BIORARE-2010

INTERNATIONAL SYMPOSIUM ON BIOLOGY OF RARE AND ENDEMIC PLANT SPECIES

26-29 May 2010

Fethiye, Turkey

METU FTSTBRD

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Preface

This international symposium on "Biology of Rare and Endemic Plant Species (for short BIORARE) is organized and planned to be repeated every other years to share and 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 and speciation, and conservation genetics of rare and endemic plants. Especially, it is essential for taxonomists and geneticist 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.

This first BIORARE-2010 symposium and its sattellite workshops (*Swetgum Conservation, Bioinformatics, Biodiversity Conservation and Tourism*) have attracted diverse group of researchers from 12 countries including Turkey. Total of 24, 11, 6, and 18 oral presentations are going to be presented in the symposium, Swetgum Conservation Workshop, Bioinformatics Workshop, Biodiversity Conservation and Tourism Workshop, respectively on May 26-29, 2010. Additionally, total of 47 diverse and interesting poster presentations will be available for the symposium participants to view.

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

May 19, 2010
Dr. Zeki Kaya
The Chair of BIORARE 2010

THE PROGRAMS OF BIORARE-2010 SYMPOSIUM AND WORKSHOPS

25 MAY 2010 – TUESDAY	
14:00-20:00	Registration
18:00-20:00	Diner and Social
26 MAY 2010 – WEDNESDAY	
07:00-09:00	Registration (Continued)
10:00-10:15	Zeki KAYA, Welcoming Speech
10:15-11:00	Opening talks
11:00-11:20	Coffee Break
11:20-12:00	**Zeki KAYA**, Biology and Genetics of Rare and Endemic Plant Species: Their Conservation Strategies
12:00-13:30	Lunch
	Session Moderators: Kani IŞIK, Fatih Temel
13:40-14:20	**David NEALE,** Development and Application of Genomic-Based Tools to Manage Forests in Response to Climate Change
14:20-14:40	**Kuddusi ERTUĞRUL**, A Molecular Study On The Determination of The Genetic Diversity In The Threatened Endemic Species *Centaurea lycaonica* Boiss.& Heldr. (Compositae)
14:40-15:00	**Ayten DİZKIRICI**, Determination of Phylogenetic Relationships Within *Oxytropis* Dc Genus By Using Internal Transcribed Spacer (*ITS*) Region Of Nuclear Ribosomal DNA
15:00-15:20	Coffee Break/ **Poster Session Begins**
15:20-16:00	**Scott ROGERS**, Preserving and Resurrecting Rare Plant Genomes
16:00-16:20	**Abdulaziz ASSEED**; Inter- And Intra Genetic Structure and Diversity of Six Wild Populations of *Capparis decidua* Tree In Saudi Arabia
16:20-17:00	**Poster Session**
17:30-18:30	**Opening cocktail for Photograph Exhibitions on :** • "Endemic flowering plants of Muğla Province by Faruk Akbaş, • " The Magic of The Mediterranean Sea: Oriental Sweetgum" by Nurşen Çopuroğlu-Hakkı Çopuroğlu • "The Alpine flowers, the closest plants to the Sky" by Faris KARAHAN • "The Çoruh Valley" by Egemen Çakır

21:00-22:00	Concert by the Marmaris Chamber Orchestra
27 MAY 2010 – THURSDAY	
ROOM B	**Moderators: Dudley RAYNAL, Sertaç ÖNDE**
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9:40-10:00	**Nisrine MACHAKA-HOURI,** A Preliminary Assessment of The Conservation Status of The Genus *Orchis* (Orchidaceae) In Lebanon With Emphasis On The Biology of *Orchis anatolica*, *O.galilea*, and *O.syriaca*
10:00-10:20	**Kemal YILDIZ**, Three Rare Endemics of *Silene* From Turkey
10:20-10:40	Coffee break
10:40-11:20	**Kani IŞIK**, Rare and Endemic Species: Why Are They Prone To Extinction?
11:20-11:40	**Evren CABİ**, Wild Relatives of Wheat and Their Impact On Sustainability in Turkey
11:40-12:00	**Evrim ZEYBEK**, Ex Situ Conservation Approach of *Crocus sativus Genetic Resources by* In Vitro Micropropagation Techniques
12:00-12:20	**Nurşen ÇÖRDÜK**, Conservation of Genetic Sources of *Digitalis trojana* Ivan. and *Sideritis trojana* Bornm. by *In Vitro* Culture
12:20-13:30	Lunch
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	Moderators: Nurşen ASLAN, Hüseyin CEBECİ
10:00-11:00	Opening Talks
11:00-11:20	**Nurşen ASLAN,** Education Studies In Schools And Villages To Conserve Sweetgum Forests
11:20-11:40	**Hakkı ÇOPUROĞLU,** Sweetgum Oil Production and Ecological Education
11:40-12:00	**Aynur HATİPOĞLU,** Protection and Monitoring Projects of Endangered and Indicator Species at Special Environmental Protection Areas (SEPAS) In Terms Of Biodiversity

12:00-13:30	Lunch
	Moderators: Belgin TAŞKIN, Burcu ÇENGEL
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14:20-14:40	**Belgin TAŞKIN**, Esterase and Acid Phosphatase Polymorphisms In Relict Endemic *Liquidambar orientalis* Mill. Var. *orientalis* And *L. orientalis* Mill. Var. *integriloba* Fiori Populations In Turkey
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15:20-15:40	**İnci Gökalan KARA,** Comparison Of The Effect Of Sweetgum Oil On Wound Healing With Conventional Wound Dressings
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09:00-09:40	**Brad STCLAIR**, Strategies For Management and Conservation of Forest Genetic Resources In The Face of Climate Change
09:40-10:00	**Abdelaziz AYARI**; Forest Stand Characteristics And Individual Tree Size Influences On Aleppo Pine Fructification And Species Conservation
10:00-10:20	**Magdy EL-BANA,** Current Situation Of The Mediterranean *Juniperus phoenicea* L. Relicts At Its Upper Limit of Distribution In Northwest Asia
10:20-10:40	Coffee break
10:40-11:00	**Alaa HEMEIDA**; Identification and Genetic Similarity Analysis of Date Palm (*Phoenix dactylifera* L.) Collected From Different Regions In

	Siwa Oasis Using Morphologically Traits and Molecular Markers
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09:40-09:55	**Başaran ULUSOY,** TURSAB
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May 26, 2010

OP1-BIOLOGY AND GENETICS OF RARE AND ENDEMIC PLANT SPECIES: THEIR CONSERVATION STRATEGIES

Zeki KAYA*

Department of Biological Sciences, Middle East Technical University, 06531 Ankara, Turkey

Due to the existence of various forms of definition for "species" and lack of data for some regions of the world, total number of plant species may not be well documented. Nevertheless, about 297000 plant species were reported. The Tropical Andees, The Sundaland, and the Mediterranean Basin are the areas with the highest endemic plant ratio, that is, 5 %, 5% and 3.9 %, respectively. Considerable portion of plant species are evaluated as rare and threatened, ranging from 9% (South Africa, New Zealand) to 17 % (Europe, Australia). This ratio is about 12 % in Turkey. Rarity could be grouped as sparse species (low local density), habitat specialist (edaphically restricted taxa), and threatened and endangered species (geographical restrictions). Although self-fertility, self-pollination and less inbreeding depression are favored in rare –endemic plants during the evolution, very little is known in reproductive biology of many rare and endemic plants. On the contrary to expectation of less genetic diversity in rare-endemic plant species, many endemic or narrow endemic plant species harbor considerably high genetic diversity owing to developed adaptation to environmental heterogeneity, alternative mode of reproduction and sharing habitats with taxonomically related species. Depending on life forms, range, magnitude of genetic diversity and current conservation status of species, *in situ* conservation programs should be developed along a closely linked *ex situ* programs with effective sampling procedures considering effective and viable population size principles.

Key words: Rare and endemic plants, Genetics, Reproductive biology, Conservation strategy

***Invited Speaker;** email: *kayaz@metu.edu.tr*

OP2-DEVELOPMENT AND APPLICATION OF GENOMIC-BASED TOOLS TO MANAGE FORESTS IN RESPONSE TO CLIMATE CHANGE

David B. NEALE*

Department of Plant Sciences, University of California, Davis, USA

Climate change and other anthropomorphic factors are certain to have widespread impacts on forest health and composition. Using climate change models, ecologists can predict which species will be lost in certain regions and which will migrate to new locations. These predictions assume a species-wide average for adaptability and ignore the significant variation in adaptive genetic potential within individual tree species. A goal of our research at UC Davis is to estimate the adaptive genetic potential of forest tree species and develop diagnostic tools that forest managers might use to monitor, conserve and restore forest tree populations in response to climate change. To begin, one must first have knowledge of the genes that control complex adaptive traits in forest trees and respond to natural or artificial selection. A combination of population and quantitative genomics approaches are used to identify such genes (genetic loci). Once genetic loci are identified, allelic variation at individual loci

is discovered and the effects of individual alleles on complex phenotypes estimated. Next, landscape genomic approaches are used to describe patterns of adaptive allelic frequency distribution across environmental gradients. Finally, diagnostic tools (molecular and computer software) can be developed for forest resource managers.

Key words: Landscape genomics, Climate change

***Invited Speaker;** email: *dbneale@ucdavis.edu*

OP3-A MOLECULAR STUDY ON THE DETERMINATION OF THE GENETIC DIVERSITY IN THE THRATENED ENDEMIC SPESIES *Centaurea lycaonica* Boiss.& Heldr. (Compositae)

Tuna UYSAL[1], Kuddisi ERTUĞRUL*[1], Eda ÖZEL[2], Meryem BOZKURT[3]

[1]Department of Biology, Science Faculty, Selcuk University, Konya, Turkey. [2]Ahmet Erdoğan Vocational School of Health Services, Karaelmas University, Zonguldak, Turkey.
[3]Department of Biology, Graduate School of Natural and Applied Sciences, Konya, Turkey.

Although the genus *Centaurea* has numerous local and threatened endemic species in Turkey, we haven't any information on gene repository and the level of genetic diversity of these species. The aim of this study is to define the genetic diversity in the population of threatened endemic species; *Centaurea lycaonica*, discovered firstly in 1845 in Konya region. In this research, it was purposed to detect the level of genetic differences among individuals and to determine the polymorphism in natural two close population of *C. lycaonica.* For this goal, a total of 162 tracks were obtained using 30 RAPD markers and 10 ISSR markers on the randomly sampling of 62 individuals of the population. 145 tracks were polymorphic (90 %) and 17 tracks were monomorphic (10 %). Although this result showed that these populations have well enough genetic resistance to survive in his area, it was necessary that these populations should be preserved by *in vivo* and *in vitro* methods in future.

Key words: Population genetics, Genetic markers, *Centaurea lycaonica*, Endemic plants, Turkey.

***Presenting author;** email: *ekuddisi@selcuk.edu.tr*

OP4-DETERMINATION OF PHYLOGENETIC RELATIONSHIPS WITHIN *OXYTROPIS* DC GENUS BY USING INTERNAL TRANSCRIBED SPACER (*ITS*) REGION OF NUCLEAR RIBOSOMAL DNA

Ayten DIZKIRICI* [1], Sertaç ÖNDE[1], Seher KARAMAN[2], Zeki AYTAÇ[3], Zeki KAYA[1]

[1]Department of Biological Sciences, Middle East Technical University, 06531, Ankara, Turkey.
[2]Department of Biology, Aksaray University, 68100, Aksaray, Turkey. [3]Department of Biology, Gazi University, 06500, Ankara, Turkey.

The phylogenetic relationships within *Oxytropis* genus were analyzed by comparing sequences of internal transcribed spacer (ITS) region of nuclear ribosomal DNA. A total of 43 Oxytropis accessions and 2 species from Astragalus genus as out-groups were analyzed. This genus has two main groups called as caulescent and acaulescent. All specimens in both groups were collected from

different areas of Turkey. Each of Oxytropis species have varied number of samples such as *O. fominii* 4, *O. lazica* 3, *O. albana* 2, *O. persica* 2, *O. engizekensis* 3, *O. savellanica* 2, *O. lupinoides* 7, *O. karjaginii* 8, *O. aucheri* 3, *O. kotschyana* 2, *O. pallasii* 3, *O. pilosa* 3 and *O. argyroleuca* 1. In addition to these targeted samples, *A. cornutus* and *A. akmanii* were used as out-groups. The molecular diversity statistics indicated that the most diverse species was *O. karjaginii* within genus. The constructed phylogenetic tree with Unweighted Pair Group Method with Arithmetic mean (UPGMA) distance method revealed caulescent and acaulescent species separately.

Key words: *Oxytropis*, ITS, Phylogeny

***Presenting author;** email: *e131715@metu.edu.tr*

OP5-PRESERVING AND RESURRECTING RARE PLANT GENOMES

Scott O. ROGERS*

BGSU, Bowling Green, Ohio, USA

The first studies of nucleic acids preserved in nature (known as ancient nucleic acids) were initiated nearly three decades ago. Since then, ancient DNA and RNA have been characterized for a large number of species, including many animals, plants, and microbes. Nucleic acids preserved for decades, centuries, millennia, and longer have been sequenced, described, and compared. Some of these have been from extinct organisms. Although DNA and RNA degrade over time, some matrices protect nucleic acids for long periods of time. My lab has studied ancient nucleic acids from a variety of natural and artificial sources to determine which conditions are best for long-term preservation of nucleic acids. Tissues from herbaria, museums, mummifications, archaeological sites, and environmental ice all were compared. A combination of cold, dry, and dark conditions is best for preservation of nucleic acids. Preservation of tissues and nucleic acids in herbaria and museums generally was poor. Heat, humidity, microbial growth, and damage by other organisms leads to short half-lives of nucleic acids in these tissues. Our results indicate that environmental ice is the best matrix for preservation. In fact, some microbes can retain viability for at least a few million years encased in ice. Although ice is composed of water, free water is limited. Free water allows movement of degredative enzymes and other damaging molecules, while immobilized frozen water holds these molecules in place, and therefore limits exposure of the nucleic acids to these molecules. Also, the cold temperatures in ice slow down the actions of degradative enzymes and other molecules. Therefore, one of the best places to find preserved nucleic acids, including those from rare, endangered, and extinct plants is in environmental ice. For rare and endangered plants, the best course of action is to freeze parts of these plants, or to extract DNA that could then be frozen. For extinct plants, nucleic acids still might be recoverable from environmental ice, especially if the pollen from the plants can be distributed by wind. However, the probability of preservation would be highest in areas close to permanently frozen ice. While about 85% of the world's ice is in Antarctica, large deposits also exist in Greenland, where plant parts and pollen have been isolated from glacial ice cores. Additionally, ice exists in temperate and tropical regions, although to so much more limited extent. Comparisons of preserved DNAs (and RNAs) will be discussed in the context of preserving rare and endangered genomes. Locations where extinct plant genomes might be found will be outlined. Plant genomes are remarkably similar, differing primarily in their arrangement of genes, and the presence or absence of very small percentages of certain groups of genes. Therefore, it might be possible to reconstruct the genome of an extinct plant in silico either by sequencing well-preserved

nucleic acids or, when the preserved nucleic acids are somewhat degraded, by partial genomic sequencing using another plant genome as a scaffold.

Key words: Nucleic acid-preservation, Ancient DNA, Genomics

***Invited Speaker;** email: *srogers@bgsu.edu*

OP6-INTER- AND INTRA GENETIC STRUCTURE AND DIVERSITY OF SIX WILD POPULATIONS OF *Capparis decidua* TREE IN SAUDI ARABIA

Abdulaziz M. ASSAEED*, Magdy I. El BANA and Ahmed L. ABDEL-MAWGOOD

Plant Production Department, College of Food & Agric. Sciences, King Saud University, P.O. Box 2460 Riyadh, Saudi Arabia 11451

The assessment of the genetic variability and the identification of isolated populations within a given species represent important information to plan conservation strategies, especially for tree species in arid regions. The present study evaluated the genetic structure and diversity of *Capparis decidua* tree within and among six isolated populations in Saudi Arabia (Madina, Farasan island, Hawayer Assos, Khor Assos, Raudhat Khuraim and Taif) using Random Amplified Polymorphic DNA (RAPDs). Based on 152 reproducible RAPD bands and analysis of molecular variance, there was genetic diversity among and within the studied populations. Farasan population had the highest level of genetic diversity (24.3%), while the lowest genetic diversity was recorded at the populations of Khor Assos (5.9%) and Taif (4.6%). The variation among populations accounted for a higher percentage of the total variance (average 77.67%, SD±8.21) than the within populations (average 22.33%, SD±8.21). No significant correlation was detected between geographical and genetic distances. However, the molecular genetic variation was positively correlated with the actual population size. The implication of the results towards devising a strategy for conservation of *Capparis decidua* is discussed.

Key words: *Capparis decidua*; Population size; RAPD markers; Genetic diversity; AMOVA

***Presenting author;** email: *assaeed@ksu.edu.sa*

MAY 27, 2010

OP7-POPULATION ECOLOGY, DYNAMICS AND CONSERVATION OF RARE PLANT SPECIES IN NEW YORK STATE

Dudley J. RAYNAL* and Donald J. LEOPOLD

Department of Environmental and Forest Biology, State University of New York College of Environmental Science and Forestry, Syracuse, NY 13210 USA

Understanding the natural history attributes of rare plants is requisite for determining the ecological role of uncommon species. Characterizing plant population dynamics represents a critically important task in assessing the long term status including the persistence and health of rare plants. This presentation addresses the causes of plant rarity and documents the demography of rare plants. Both intrinsic (natural) and extrinsic (human-related) factors are considered. Three case studies of the population dynamics of rare plants found in New York State are discussed: the fern *Asplenium scolopendrium* (harts tongue fern), the perennial herbaceous plant *Trollius laxus* (spreading globeflower), and several alpine herbs and shrubs. Additionally, restoration of rare plants is

addressed. Post-industrial waste sites known as brownfields provide opportunities to establish populations of stress-tolerant rare plants. An ongoing restoration research project on a central New York alkaline and saline brownfield illustrates how rarities can be successfully established if their basic requirements and tolerances are understood.

Key words: Rare plants; plant demography; restoration ecology

***Invited Speaker;** email: *djraynal@esf.edu*

OP8-A PRELIMINARY ASSESSMENT OF THE CONSERVATION STATUS OF THE GENUS *ORCHIS* (ORCHIDACEAE) IN LEBANON WITH EMPHASIS ON THE BIOLOGY OF *Orchis anatolica*, *O. galilea*, and *O. syriaca*

Nisrine MACHAKA-HOURI*[1,2], Mohammad S. AL-ZEIN[3], Duncan B. WESTBURY[1], Salma N. TALHOUK[2]

[1] School of Agriculture, Policy & Development, The University of Reading, Earley Gate, Reading, RG6 6AR, UK. [2] IBSAR, Nature Conservation Center for Sustainable Futures, American University of Beirut, Riad El-Solh 1107 2020, Beirut, Lebanon. [3] Division of Natural Science, School of Arts and Sciences, Lebanese American University, Chouran, Beirut, Lebanon

The Mediterranean region is widely recognized as a biodiversity hotspot, with more than fifty percent plant endemism. Since the Mediterranean region is subject to increasing threats, there is an urgent need to monitor, conserve and manage numerous plant species, particularly rare and endemic ones. The Orchidaceae, comprised of 25,000 to 30,000 species, is one of the largest families of flowering plants. Despite being speciose, and occupying a variety of habitats and geographic locations, many species are rare or threatened with extinction. Key factors affecting populations are climate change, habitat destruction, overharvesting (especially for *salep* production in the Eastern Mediterranean), and a decline in natural pollinators resulting from the use of insecticides. In Lebanon, the Orchidaceae is represented by 10 genera and approximately 40 to 90 species. The most important genus is *Orchis,* with at least 20 species out of approximately 125 being represented in Lebanon. As part of the ongoing work on Orchidaceae in Lebanon, we assess the conservation status of this genus and develop a preliminary checklist based on the literature, herbaria and recent collections. We primarily focus on the conservation status of three species endemic to the Eastern Mediterranean, namely *Orchis anatolica* Boissier, *O. galilea* (Bornmuller & Schulze) Schlechter and *O.syriaca* Boissier ex H.Baumann & Künkele. We document their distribution, phenology, insect visitors, and basic population parameters. This work will form a baseline for further studies into *Orchis* species in the Eastern Mediterranean; particularly in Lebanon.

Key words: *Orchis*, Orchids, Checklist, Conservation status, Lebanon, Eastern Mediterranean

***Presenting author;** email: *nmachaka@gmail.com*

OP9-THREE RARE ENDEMICS OF *Silene* FROM TURKEY

Kemal YILDIZ* and Ersin MİNARECİ

Department of Biology, Faculty of Arts and Sciences, Celal Bayar University, 45140, Muradiye, Manisa, Turkey.

The number of taxa belonging *Silene*, which is represented with 165 taxa among 31 sections in the Flora of Turkey. *Silene,* with the endemic ratio of 48% in Turkey, has one of the highest endemic

ratios among the genera belonging to the *Caryophyllaceae* family. Three rare endemics of *Silene* were examined in terms of micro (SEM) and macromorphological, palynological and karyological features. The spreading locations of the species have been determined and these locations with GPS data have been recorded. Conservation statuses of Silene species have been renewed according to IUCN criterions as follows; *S. amana* Boiss. CR-B2B+D, *S. doganii* A. Duran & Y. Menemen CR-D and *S. haradjianii* Chowdh. CR-D.

Keywords: *Silene*; Endemic; Flora of Turkey**.**

***Presenting author;** email: *kemalyil@gmail.com*

OP10-RARE AND ENDEMIC SPECIES: WHY ARE THEY PRONE TO EXTINCTION?

Kani IŞIK*

Biology Department, Faculty of Arts and Sciences, Akdeniz University; and Akdeniz University Biodiversity Research, Application and Development Center (AK-BİYOM), Antalya, Turkey

A species is considered to be "**rare**" if it exhibits any one of the following attributes: (1) grows naturally *in a narrow* geographical area, (2) occupies only one or a few specialized habitats, or (3) forms only small population(s) in its range. An "**endemic**" species, however, grows naturally *in a single* geographical area, the size of which could be either narrow or relatively large. Not all endemic species could be rare, just as not all rare species could be endemic. The only common criterion that makes a species *both rare and endemic* is the attribute of living in a *narrow (and single) geographical range*. When habitats of a rare and/or endemic species are damaged and/or fragmented by various human activities, the distribution ranges and population sizes of them will be reduced and the species would be vulnerable to extinction with a rate more than any other species. Many rare and/or endemic species exhibit one or more of the following attributes which make them especially prone to extinction, however, with differential rates: (1) species with a narrow (and single) geographical range, (2) species with only one or a few populations present, (3) species with small population size and little genetic variability, (4) species that are hunted and harvested by people, (5) species with declining population sizes, (6) species that do not have effective germplasm (seed, vegetative material...) dispersal ability, (7) species with specialized niche demands, (8) species that grow in stable and nearly constant environments. Species with any one or more of the above attributes must be carefully monitored and managed in genetic conservation efforts.

Key words: Rare species; Endemism; Extinction; Population size; Genetic conservation

***Invited Speaker;** email: *kani@akdeniz.edu.tr*

OP11-WILD RELATIVES OF WHEAT AND THEIR IMPACT ON SUSTAINABILITY IN TURKEY

Evren CABİ [*1], Musa DOĞAN[1], Galip AKAYDIN[2]

[1]Department of Biological Sciences, Middle East Technical University, 06531 Ankara, Turkey.
[2]Department of Biology Education, Hacettepe University, 06532 Ankara, Turkey

Conservation of biodiversity of the wild relatives of wheat is an extremely important issue for improving agricultural production and increasing food security. They are also essential components of natural steppe ecosystems as well as agricultural systems, and are, therefore, vital in maintaining ecosystem sustainability. The species of the genera *Triticum* L., *Aegilops* L. and *Amblyopyrum* (Jaub.

& Spach) Eig constitute the primary and secondary gene pools of wheat. As a part of revisional study of the tribe Triticeae Dumort. in Turkey, extensive field studies were accomplished so as to collect the wild relatives of wheat throughout the country. The results of these expeditions carried out especially in the south-eastern part of Turkey between 2006 and 2009 have showed that the range of threats such as habitat loss, degradation and mismanagement, overgrazing and the local climate change affect the future existence of wild relatives of wheat in Turkey. This paper covers the risks factors threatening the wild relatives of wheat in Turkey and updated distribution maps including the germplasm collections and recommended conservational strategies towards sustaining these genetic resources in Turkey.

Key words: Wild wheats; *Aegilops; Amblyopyrum; Triticum;* Conservational strategies; Turkey.

***Presenting author;** e-mail: *ecabi@metu.edu.tr*

OP12-EX SITU CONSERVATION APPROACH OF *Crocus sativus* GENETIC RESOURCES BY *In Vitro* MICROPROPAGATION TECHNIQUES

Evrim ZEYBEK*, Sertaç ÖNDE and Zeki KAYA

Department of Biological Sciences, Middle East Technical University, 06531 Ankara, Turkey

Saffron, Crocus sativus L., is an important crop cultivated for its red stigmatic lobes which constitute the most expensive spice in the world. The main reasons for high cost are cultivation processes, such as planting, flower harvesting and separation of the stigmas. All saffron producers, even in Turkey, suffer from increasing labour costs. Therefore, saffron crop is an endangered species and extinct in many European countries. In order to ensure the future of saffron, it is necessary to improve cultivation techniques. Thus, in vitro micropropagation of saffron by using direct and indirect organogenesis could be a viable alternative that was the objective of this study. Various combinations of different plant growth regulators were investigated for propagation of saffron. In indirect organogenesis-experiments, 33 explants were tested. Overall efficiency was 64% for adventitious root formation and was 33% for corm development. In direct organogenesis-experiments, 75 explants were used. The adventitious root formation efficiency was 57% while corm production was 36%. In conclusion, high efficiency in the plantlet regeneration complete with adventitious shoots, corms and contractile roots were obtained *in vitro*. This in vitro regeneration methods can be used for efficient clonal multiplication and for ex situ germplasm conservation of rare species.

Keywords: *Crocus sativus* L.; Saffron; .*In vitro* micropropagation; Conservation

***Presenting author;** email: *eyildiri@metu.edu.tr*

OP13-CONSERVATION OF GENETIC SOURCES OF *Digitalis trojana* IVAN. AND *Sideritis trojana* BORNM. BY IN VITRO CULTURE

Nurşen ÇÖRDÜK* and Cüneyt AKI

Department of Biology, Faculty of Science and Arts, Canakkale Onsekiz Mart University, 17020, Çanakkale, Turkey.

In vitro culture technologies are used increasingly for *ex situ* conservation of rare or endangered endemic plants. In addition that, these culture technologies are supporting a rapid propagation and production of an economically viable amounts of plant secondary metabolites from medicinal plants.

Digitalis trojana Ivan. (foxglove), in the family *Scrophulariaceae*, is an endemic plant of Ida Mountain, Canakkale, Turkey. This plant has been marked as a vulnerable (VU) in Red Data Book of Turkish Plants. On the other hand various species of the genus *Digitalis* are used as a source of cardiac glycosides which are important for their use in medicine and also several interesting anticancer effects have been observed in *Digitalis*. *Sideritis trojana* Bornm., in the family *Labiatae,* is also an endemic plant of Ida Mountain, Canakkale, Turkey and has been marked as an endangered (EN) in Red Data Book of Turkish Plants. In folk medicine, it is used as a nervous system stimulator, anti-inflammatory, antispasmodic, carminative, analgesic in the treatment of coughs due to colds and for curing gastrointestinal disorders. Efficient and rapid regeneration of these significant plants are major and first stage of *in vitro* culture. In this study, a highly efficient and rapid regeneration protocol was developed and optimized for *D. trojana* and *S. trojana.* These regeneration protocols were applied for micropropagation and also can be use for production secondary metabolites of these plant species.

Key words: *Digitalis trojana* Ivan., *Sideritis trojana* Bornm., Endemic, *In vitro culture*, Regeneration

***Presenting author;** email: *nursencorduk@comu.edu.tr*

May 27, 2010

WORKSHOP-I: SWEETGUM CONSERVATION

OPWI1-EDUCATION STUDIES IN SCHOOLS AND VILLAGES TO CONSERVE SWEETGUM FORESTS

Nurşen ASLAN*

Group Peace with Nature and Association for Arts and Education, Hatipirimi Mah 186.sk 6/2 Marmaris-Muğla

Environment awareness is needed to be developed in society in order to preserve nature. For this reason, primary method in conservation is education and instruction studies. Within the project of conservation of sweetgum forests, conferences were held in schools in Muğla and in villages close to forests. Posters, brochures and educational cd's were also distributed to public. Village society meetings were done in village cafe's to share experiences of senior citizens and to emphasize the importance of forest conservation for public health.

Key words: Education, forest vilaages, Turkey, Anatolian Sweetgum

***Presenting author;** email: *grupdogaylabaris@gmail.com*

OPWI2-SWEETGUM OIL PRODUCTION AND ECOLOGICAL EDUCATION

HAKKI ÇOPUROĞLU

Group Peace with Nature and Association for Arts and Education, Hatipirimi Mah 186.sk 6/2 Marmaris-Muğla

Sweetgum forests are decreasing from year to year and are under significant threat. Sweetgum oil since antiquity also for health has many positive features, and by local people is still widely used. However, conventional oil production techniques are primitive which cause damage to the trees. The way to prevent Sweetgum forest damage is to train vilagers about harmless oil production method. This production also has to be done by people having a diploma of education. In this way, people who live in the area will be more aware, Sweetgum forest will not be disturbed and Sweetgum oil will contribute to human health and economy. Acting on this concept in 2009, oil production without sweetgum tree damaging course was started and the first graduates received their diplomas in Marmaris-Çetibeli locality.

Key words: Sweetgum, oil production, villagers, education.

***Presenting author;** email: *grupdogaylabaris@gmail.com*

OPWI3-PROTECTION AND MONITORING PROJECTS OF ENDANGERED AND INDICATOR SPECIES AT SPECIAL ENVIRONMENTAL PROTECTION AREAS (SEPAS) IN TERMS OF BIODIVERSITY

Aynur HATIPOĞLU*

Environmental Protection Agency for Special Areas (EPASA), Ankara, Turkey

The tasks of our agency are: 1) Taking international protectio conventions into consideration, 2) Carrying out all types of scientific research for the purposes of protection and improvement of the living and non-living entities at Special Environmental Protection Areas (SEPAs) falls in Environmental Protection Agency for Special Areas' duties and 3) In this context, EPASA fulfils research, monitoring and protection studies on endangered species and habitats strictly and continuously.

At Special Environmental Protection Areas (SEPAs), Sea Turtles and Nile Turtles, Sweet Gum Tree, Centaurea Tchihatcheffii, Sandbark Shark, Monk Seal, The Otters, Serik Pear, Sea Daffodil, Marbled Duck, Purple Gallinule and Lycian salamander, Datça Date have been monitoring. As examples for monitoring studies carried out by Our Agency, Sweetgum Protection Action Plan will be explained further.

Key words: Special Environmental Protection Areas, Turkey, Anatolian Sweetgum

***Presenting author;** email: *hatipoglu.aynur@gmail.com*

OPWI4-GENETICS AND CONSERVATION OF ORIENTAL SWEETGUM

Aslı ÖZDİLEK[1], Melis OR[1], Burcu ÇENGEL[2], Gaye KANDEMIR[2], Yasemin TAYANÇ[2], Ercan VELIOĞLU[2] and Zeki KAYA[*1]

[1]Department of Biological Sciences, Middle East Technical University, 06531, Ankara. [2]Forest Tree Seeds and Tree Breeding Research Directorate, Ministry of Environment and Forestry, Gazi, Ankara, Turkey.

Liquidambar orientalis (Oriental sweetgum) is a relict and endemic plant species to Turkey. There are four other species of sweetgum in the world (i.e., *L. styraciflua, L .macrophylla, L. Formosana* and *L.**acalycina).*** In order to determine the magnitude and pattern of genetic diversity and to generate genetic information for development of conservation strategies for Turkish sweetgum populations; RAPD markers, chloroplast *matK* and *tRNA* regions were studied. For these purposes, 20 families from 18 populations were sampled and screened with 10 polymorphic RAPD primers. From the same materials, chloroplast genome regions were amplified with the designed primers specific to the regions. Then, amplified regions were sequenced for assessing molecular diversity for these genomic regions. Minimum parsimony tree were constructed after DNA sequence analysis of chloroplast DNA *matK* and *tRNA* regions.

Results of RAPD analysis indicated that genetic diversity in Oriental sweetgum populations was not very high. Some of the populations may have been differentiated from each other due to the genetic drift. Estimated percentage of polymorphic loci, effective allele number and heterozygosity were as 45 %, 1.30 and 0.17, respectively. Most of the genetic diversity resides between populations (54 %)

and genetic diversity within populations (46 %) was low. Gene flow coefficient between populations (Nm=0.42) were also low.

DNA sequence data of chloroplast *matK* gene region indicated that var integriloba populations (e.g., Muğla-Kiyra, Köyceğiz-Köyceğiz, Marmaris-Değirmenyanı, Marmaris-Hisarönü, Fethiye-Günlükbaşı) seem to be differentiated from the others. Again based on genetic distance results obtained from chloroplast DNA *tRNA* region sequence analysis, the most differentiated populations were Fethiye- Günlükbaşı, and Muğla-Kıyra.

Based on the results from RAPD, chloroplast *matK* and *tRNA* region-sequencing, the closest neighbors to Oriental sweet gum are *L. styraciflua* and *L .macrophylla* species. There was no clear separation of varities of Oriental sweetgum. However, most populations of *integriloba* variety were grouped together by high bootstrap values in neighbour joining tree. Therefore, variety designations based on morphological trait should be revised.

Due to differentiation among studied populations and low genetic diversity parameters, *in-situ* conservation of all populations could be suggested. However *in-situ* conservation of these populations which are located in important tourism regions of Turkey, is problematic. Therefore, *ex-situ* conservation strategy should be developed by considering Muğla-Kiyra, Köyceğiz-Köyceğiz, Marmaris-Değirmenyanı, Marmaris-Hisarönü, Fethiye-Günlükbaşı populations.

Keywords. *Liquidambar* sp., Oriental sweetgum, matK, tRNA, genetic diversity, genetic differentiation, Conservation

***Presenting author:** e-mail: *kayaz@metu.edu.tr*

OPWI5-ESTERASE AND ACID PHOSPHATASE POLYMORPHISMS IN RELICT ENDEMIC *Liquidambar orientalis* MILL. VAR. *orientalis* AND *L. orientalis* mill. VAR. *integriloba* FIORI POPULATIONS IN TURKEY

Göçmen TAŞKIN[*1], Eaylettin ÖZTÜRK[1], Ersin DOĞAÇ[1], Ömer VAROL[1], Köksal KÜÇÜKAKYÜZ[1], Tulin ARSLAN[2] and Vatan TAŞKIN[1]

[1]Department of Biology, Faculty of Art and Sciences, Mugla University, Mugla, Turkey
[2] Department of Aquaculture, Mugla University, Mugla, Turkey

Liquidambar orientalis is relict endemic to southwest of Turkey. *L. orientalis* Mill. var. *orientalis* and *L. orientalis* Mill. var. *integriloba* Fiori are the two varieties of *L. orientalis* found in the same locations together. Production of the balsam, "liquid storax", makes this species economically important. Unfortunately, its natural distribution area has decreased ~80 % since the beginning of 20th century. Studies of genetic diversity in this species are important for conservation purposes. The use of isozyme variation has a long tradition in population genetics, and a more recent application in conservation biology. Nonspecific esterases (EST) and acid phosphatases (ACP) are usual markers in genetic studies of animals, plants and microorganisms because they are easy to detect and appear to be highly polymorphic. For most esterases and acid phosphatases rather general substrate specificity is observed, indicating that they may have a broad biological function. In the present study, we report α- and β-EST (E.C. 3.1.1…) and α- and β-ACP (E.C. 3.1.3.2) polymorphisms within and among six *L. orientalis* Mill.var. *orientalis* and eight *L. orientalis* Mill.var. *integriloba* Fiori. populations. Native-Polyacrylamide Gel Electrophoresis (PAGE) technique was used for the analysis of the enzymes. Enzyme bands separated by electrophoresis on gels were characterized by their position that is due to

their relative mobility (Rm). 11 α-EST, 11 β-EST, 14 α-ACP and 12 β-ACP bands were detected in the populations. Because of the lack of consensus on the loci patterns of these enzymes in the literature, each band was evaluated as a locus. The percentage of polymorphic loci was changed between 12.50 and 60.42 in the populations. According to Nei's analysis of gene diversity for the enzymes analyzed, total genetic variation (H_T) was found as 0.146 ± 0.021. Higher proportion of this variation, 0.084 ± 0.008 (57.53%), were due to within population genetic variation (H_S). Mean of genetic differentiation coefficient (G_{ST}) was detected as 0.4267. Level of gene flow (Nm) within a generation among 14 populations studied was calculated to be, on average, 0.67.

Key words: *Liquidambar orientalis,* Acid phosphatase (ACP), Esterase (EST), Native-PAGE, Relict endemic, Polymorphism.

***Presenting author;** email: *belgingocmen@hotmail.com*

OPWI6-CONSERVATION OF ORIENTAL SWEETGUM (*Liquidambar orientalis*) GENETIC RESOURCES

Burcu ÇENGEL[1]*, Gaye KANDEMIR[1], Yasemin TAYANÇ [1], Ercan VELIOĞLU[1] AND Zeki KAYA[2]

[1]Ministry of Environment and Forestry, Forest Tree Seeds and Tree Breeding Research Directorate, Ankara, Turkey. [2]Department of Biological Sciences, Middle East Technical University, Ankara, Turkey.

Liquidambar orientalis Miller (Oriental sweet gum) is one of the relict-endemic forest tree species of Turkey. It is also economically important due to its balsam producing ability. Its distribution is highly fragmented and declined critically mainly due to habitat destruction and climate change. In this study, conservation strategies were suggested for Oriental sweetgum genetic resources. First of all, genetic diversity parameters were estimated for all sampled populations. All these parameters stated that genetic diversity of the sweet gum populations is low, populations are considerably differentiated from each other; so, there is very low gene flow among populations. Considering low genetic diversity parameters in Oriental sweetgum, all fragmented populations should be conserved as *in-situ* programs. However most of the populations are located in important tourism and agricultural regions of Turkey that makes *in-situ* conservation be complicated. As a result, Köyceğiz-Köyceğiz and Marmaris-Değirmenyanı populations were recommended for *in situ* conservation. Nine populations were identified for *ex-situ* conservation (Acıpayam-Bozdağ, Marmaris-Çetibeli, Marmaris-Günnücek, Köyceğiz- Köyceğiz, Muğla-Yılanlı, Marmaris-Değirmenyanı, Fethiye-Günlükbaşı, Muğla-Kıyra, Muğla-Yatağan) due to their high genetic diversity values and differentiation. Then, seeds were collected from 25 trees/population and raised to seedlings in a nursery. Then ,seedlings from these populations were transplanted in a 7 ha land in Gökova, Muğla. This area will serve as both *ex-situ* conservation and trial site for studying adaptive traits. As a result, it is hoped that Oriental sweetgum genetic resources could be effectively conserved in the future depite of increasing anthropogenic factors.

Keywords. *Liquidambar orientalis*, Oriental Sweetgum, genetic diversity, *Ex situ* conservation

***Presenting author:** e-mail: *kayaz@metu.edu.tr*

OPWI7-COMPARISON OF THE EFFECT OF SWEETGUM OIL ON WOUND HEALING WITH CONVENTIONAL WOUND DRESSINGS

Hakan ÖÇSEL and İnci GÖKALAN KARA*

Pamukkale University, Faculty of Medicine, Department of Plastic Reconstructive and Aesthetic Surgery, Denizli, Turkey

Wound healing is a complicated event. This study is made in order to determine the most effective and handy wound healing product by using the oil of sweetgum tree named ‘*’Liquidambar orientalis’’* which has been used since the ancient ages for obtaining rapid wound healing and %1 silver sulphadiazine and hydracolloid wound dressings which both have proven themselves to be effective in wound healing in many researches in split and full thickness skin wounds. In this research 5 male and 1 female young domestic Yorkshire pigs weighing between 10-14 kg were used. By using the matrix drawn on the animals back before surgery, 16 split thickness skin wounds were made respectively on two animals back and 16 full thicknesss skin wounds were made respectively on 4 animals back . 4 wound care groups were generated as sweetgum oil, %1 silver sulphadiazine, hydracolloid wound dresssing and control groups. Wound healing was estimated after sacrification of animals which had split thicknesss skin wounds on day 4 and 8 sacrification of animals which had full rthickness skin wounds on days 4.8.14 and 21. The thicknesss of the regenerated epidermis and the granulation tissue, the concentration of hydroxiproline levels in tissue and wound contraction rates were used as parameters for estimation of wound healing and groups were compared. In the research, in split thicknesss skin wounds at the end of day8, %”1 silver sulphadiazine was found to form the thickest rgenerated epidermis statistically when compared of sweetgum oil, hydracolloid wound dressing and control groups. In in full thickness skin wounds at the end of day 21, both %1 silver sulphadiazine and sweetgum oil were found to form significantly thicker regenerated epidermis statistically when compared to the hydrocolloid wound dressing and control groups.In full thickness skin wounds at the end of the day 21, both %1 silver sulphadiazine and sweetgum oil were found to form significantly thicker regenerated epidermis statistically when compared to the hydracolloid wound dressing and control groups. In this split thickness wounds at the end of day 8, %1 silver sulphadiazine formed statistically significant thicker granulation tissue when compared to the control group. In the full thickness wounds at days 4 and 8, sweetgum oil has formed statistically significsnt thicker granulation tissue when compared to the % 1 silver sulphadiazine, hydrocolloid wound dressing and control groups. In both split and full thickness skin wounds, there wasn’t a statistically significant difference between the groups in means of wound contraction. In full thickness skin wounds, there wasn’t a statistically significant difference between the groups in means of wound contraction. We hace shown that, in both split and full thicness skin wounds and in all parameters, sığla oil wasn’t inferior to the %1 silver sulphadiazine, hydrocolloid wound dressing both which have proven themselves to be effective in wound healing in many researches and to the control group.Also in reepitelization and granularion tissue formation parameters, sığla oil,is found to have statistically significantly beter results in some days of the experiment. In research, sığla oil is used in its ancient form; which is directly taken from the tree and pressed in containers. It showed its beneficial affect when compared tot the other groups in this “ancient” form. “*Liquidambar orientalis*” or sığla oil, is an endemic specie and has some unidentified substances in liquid cromatographic investigations but the last liquid cromatographic investigations about this oil were made years ago. After new analysis and performing another research with the possible active substances and by using additional wound healing parametres and finally controlled human experimets, an efficient wound care product which can be used both in split and full thichness wounds can be created.

Key words: *Liquidambar orientalis,* Sweetgum oil*,* Wound-dressing, Skin wounds
***Presenting author;** email: *incigk@yahoo.com*

OPWI8-THE PAST AND TODAY OF SWEETGUM FORESTS

REŞAT TUNÇ*

Fethiye Forest Management Directorate, Fethiye, Muğla

Six thousand hectares of sweetgum forests are destroyed in Muğla region over time according to the literature. The remaining area of sweetgum forests in Turkey are 800 hectares as determined by the data of management plans of General Directorate of Forestry. Today, sweetgum forest areas have been reached to 1300 hectares by reforestation studies. The main reason of extinction of sweetgum forest areas in the past is battle by jungle fever.

Key words: Sweetgum forest, General Directorate of Forestry, Turkey.

***Presenting author;** email: *rtunc48@hotmail.com*

OPWI9-CERAMBYCIDAE (COLEOPTERA) SPECIES COLLECTED ON DEAD OR STRESSED ORIENTAL SWEETGUM, *Liquidambar orientalis* TREES IN FETHIYE AND ITS EFFECT ON BIODIVERSITY

H. Hüseyin CEBECİ[*1] and Hüseyin ÖZDİKMEN[2]

*[1]Istanbul University, Faculty of Forestry, Department of Forest Entomology and Protection, 34473 Sariyer Istanbul, Turkey, [2]Gazi University, Faculty of Arts and Sciences, Department of Biology, 06500 Ankara, Turkey

Oriental sweetgum, *Liquidambar orientalis* Mill. with a limited distribution in the southwest is one of the endemic species in Turkey and used in park, street along, private gardens and forest areas of its region. This species forms stands in site. Longhorn beetles are important pathogens of sweetgum trees in Turkey. Four species, *Arhopalus rusticus* (L., 1758), *Niphona picticornis* Muls., 1839, *Rhamnusium bicolor* (Schr. 1781) and *Rhesus serricollis* (Motsch., 1838) were collected from pheromone traps and dead or stressed trees. The effects on wood and biodiversity of Cerambycid species and were carried out by this study. Very investigations were studied on morphology, anatomy, ecology, genetic diversity of this tree. But, interactions between insect and host were not evaluated. Therefore, this study presents an overview on contributions and damages of Cerambycid.

Key words: *Liquidambar orientalis*, Cerambycidae, Damage, Biodiversity, Turkey.

***Presenting author;** email: *hcebeci@istanbul.edu.tr*

OPWI10-ORIENTAL SWEET GUM AND USAGE OF IT THROUGHOUT HISTORY

Esin Kahya*

Ankara University, Faculty of Language, History and Geography, Ankara, TUrkey

Oriental sweet gum balsam, or oil in other words, has been used for the medicinal purpose since ancient times. It is sometimes called as the glue of olive tree mistakenly. Balsam of oriental sweet gum

has been utilized especially as incense. Dioscorides from Çukurova, the author of the Materia Medica, is one of the persons that had made use of the oriental sweet gum. Afterwards, a lot of doctors put to use of the plant in medicines. The most detailed information about oriental sweet gum can be found from the second book of the Kanun fi't-Tıbb, the İbn Sina's book in the eleventh century. The usage of the plant, special characteristics, structure and medicinal usage has been indicated in this book. Furthermore, the fifth book of the Kanun fi't-Tıbb has more information about the plant. Then, physicians in Islamic world and in Ottoman period, especially to İbn Baytar, had been used the oriental sweet gum as medicine.

Key words: *Liquidambar orientalis*, Historical Use, Natural Health

***Presenting author;** email: *kahya@humanity.ankara.edu.tr*

OPWI11-RETURN OF SWEETGUM: FROM PATCHES TO WHOLE THROUGH ESTABLISHING CORRIDORS

Semra YALÇIN*, Seda E. TEK, Kamil BEDIR, Deniz ÖZÜT, Uğur S. ZEYDANLI

Nature Conservation Centre, Orta Doğu Sit. 1589 Sok. No:4, Balgat, Ankara, Turkey

Oriental sweetgum is a vulnerable species growing only in Southwestern Turkey. At least 50% of all sweetgum forests occur around Köyceğiz, Muğla where it is found in small fragmented patches due to opening lands for agriculture as well as urbanization. Habitat fragmentation increases susceptibility to external factors, such as wind and drainage, while results in the isolation of certain patches and decrease in gene flow among others. This may eventually lead to increased inbreeding and loss of genetic variation, which is crucial for long term viability of sweetgum forests. In order to reverse the degradation of sweetgum forests Nature Conservation Centre (DKM) and its partners (OGM, ÖÇK, KTÇD, UNDP, YADA) has developed a two-tyred approach that is based on two strategic mapping. First one is to reduce the fragmentation and its accompanying negative effects, re-constructing the connectivity between patches through establishing forest corridors at suitable sites can be an effective conservation measure. Second one is developing a monitoring program based on the threats.

The suitable locations for developing sweetgum forest corridors were determined by a joint Species Distribution Models (SDM) and Geographic Information System (GIS) analyses strategy. The important environmental factors such as hydrology and topography are used in SDM analysis for estimating the suitable areas where sweetgum forests can potentially grow. These are then merged with the actual land-use data to obtain the map of priority areas for construction of corridors between patches. Threat maps are produced through land ownership, trend of degradation and current activities in and around the forests related with the hydrology of the area. Our results will hopefully provide strategic guide the local authorities to better concentrate their efforts against fragmentation of sweetgum forests.

Keywords: Species conservation, Turkey, forest fragmentation, modeling, connectivity, threat monitoring.

***Presenting author;** e-mail: *semra.yalcin@dkm.org.tr*

MAY 28, 2010

OP14-STRATEGIES FOR MANAGEMENT AND CONSERVATION OF FOREST GENETIC RESOURCES IN THE FACE OF CHANGING CLIMATES

Brad ST.CLAIR*

USDA Forest Service, Pacific Northwest Research Station, Corvallis, Oregon, U.S.A.

Conservation of genetic diversity is important for continued evolution of populations to changed biotic and abiotic environments, as well as continued availability of traits of interest for artificial selection in genetic improvement programs. Rapidly changing climates present new threats to the conservation of forest genetic resources. We can no longer assume that existing reserves will continue to preserve existing genetic diversity. Whole populations may be lost to increased threats from fire, drought, disease, insects, invasive species, and competition from better adapted species. Natural selection and reduced population sizes will lead to the loss of unique genetic variants within populations. These threats should bring a renewed importance to *ex situ* collections from threatened populations, particularly those from disjunct populations and those at the warmer and drier edges of the species range. Management of *in situ* reserves should become more active. In some reserves, existing genetic diversity should be preserved by creating stands that are more resistant to threats using silvicultural treatments such as thinning and prescribed burning. In other reserves, natural selection and adaptation to changed environments should be promoted by increasing within population genetic diversity and promoting gene flow. This may be done by locating reserves in areas of high environmental heterogeneity, minimizing fragmentation, and using assisted migration to increase genetic diversity by seeding or planting populations adapted to future climates within or adjacent to reserves.

Key words: Climate change, Genetic diversity, conservation, *In situ* reserves, Management

***Invited Speaker;** email: *bstclair@fs.fed.us*

OP15-FOREST STAND CHARACTERISTICS AND INDIVIDUAL TREE SIZE INFLUENCES ON ALEPPO PINE FRUCTIFICATION AND SPECIES CONSERVATION

Abdelaziz AYARI[1]*, Daniel MOYA[2], Ameur Ben MANSOURA[1], Mohamed Nejib REJEB[1], Salah GARCHI[1], Jorge De Las HERAS[2], Belagacem HENCHI[3]

[1]Institut National de Recherches en Génie Rural, Eaux et Forêts (INRGREF) B.P. 10, Avenue Hédi Karray, Ariana – 2080, Tunisia. [2]Escuela Tecnica Superior de Ingenieros Agrónomos de Albacete, UCLM. Campus Universitaro, 02071, Spain. [3]Faculté des Sciences Mathématiques, Physiques et Naturelles, Tunis Université El-Manar, Campus Universitaire, 2092 - El Manar, Tunisia.

Pinus halepensis Mill. is the most important conifer in dry area of the Mediterranean Basin, whereas, the most important species used for plantations in Tunisia both in mountain and plain areas. Nevertheless, little information was accessible about the influence of either forest structure or individual tree size on its fructification and herbage production. Seventy-nine sampled plots, covering the distribution area of Aleppo pine in Tunisia, were used to examine each aforementioned influence. Simple and multiple regression analysis were used to explain the variation observed in Tunisian forest and to determine the relationships between measured variables and the most influential parameters enhancing species cone seed production, as well as, the herbage production. Results showed that all

tree measurements were significantly linked ($p<0.05$) to cone crops and seed yields, but, crown height and total height of the average individual tree were the most determinant variables to species fructification ($p<0.001$). Furthermore, under multiple regression analysis, stand density and basal area were the most influential parameters affecting the Aleppo pine Fructification ($p<0.001$). An adverse affect was observed with stand density and basal area on the harvested cones and seeds. Decreasing stand density permits to obtain a narrow burned area and to improve the Aleppo pine fructification. However, increasing basal area advances the cone counts and the seed weights. To more preserve forest ecosystems with multiple use and exploitation, Foresters are well invited to decreasing the forest stand density.

Key words: *Pinus halepensis* Mill., Stand characteristics, Tree size, Cone crops, Seed yields.

***Presenting author;** email: *abdelazizayari@yahoo*

OP16-CURRENT SITUATION OF THE MEDITERRANEAN *Juniperus phoenicea* L. RELICTS AT ITS UPPER LIMIT OF DISTRIBUTION IN NORTHWEST ASIA

Magdy EL-BANA*1, Kamal SHALTOUT2, Ahmed KHALAFALLAH3, Hosni MOSALLAM4

[1]Department of Plant Production, College of Food and Agricultural Sciences, King Saud University, Riyadh 11451, P.O. Box 2460, Saudi Arabia, [*]Permanent address: Department of Biology, Faculty of Education in Al-Arish, Suez Canal University, Egypt. [2]Botany Department, Faculty of Science, Tanta University, Egypt. [3]Botany Department, Faculty of Science for Girls, Ain Shams University, Egypt. [4]Botany Department, Faculty of Science, Ain Shams University, Egypt

Juniperus phoenicea L. is listed as threatened tree by IUCN Red List. To provide baseline information for the development of a conservation strategy, the present study aims at comparing the isolated populations of *J. phoenicea* and their associated plant composition and diversity at the three mountains in northern Sinai: Gabal El-Halal, Gabal El-Maghara and Gabal Yelleq. Juniper is generally in poor conditions at higher elevation (600 – 960 m) with a higher proportions of old and recent dead trees, and with the predominance of male individuals at the populations of Gabal El-Maghara and Gabal Yelleq. In contrast, the juniper populations at lower elevation (350-470 m) of Gabal El-Halal proved to be in best condition with mostly living foliage and reproductive branches. The differences in rock types and elevation among the three mountains reflect serious limitation on recruitment of *J. phoenicea* due to moisture availability. The results of this study showed that *J. phoenicea* is an endangered community and its conservation in northern Sinai mountains is a priority. For the conservation of this community to be successful it would be necessary to preserve the suitable habitats at Gabal El-Halal.

Key words: *Juniperus phoenicea,* IUCN Red List, Sinai Mountains

***Presenting author;** email: *mag_bana@yahoo.co.uk*

OP17-IDENTIFICATION AND GENETIC SIMILARITY ANALYSIS OF DATE PALM (*Phoenix Dactylifera* L.) COLLECTED FROM DIFFERENT REGIONS IN SIWA OASIS USING MORPHOLOGICALLY TRAITS AND MOLECULAR MARKERS

Alaa A. HEMEIDA*[1] and Reham M. ABD EL-AZEEM[2]

[1]Department of Bioinformatics, Genetic Engineering & Biotechnology Research Institute, Minufiya University, Egypt. [2] Department of Molecular Biology, Genetic Engineering & Biotechnology Research Institute, Minufiya University Egypt

Genetic variation among 15 date palm (*Phoenix dactylifera* L.) accessions, including 9 cultivars and 7 male plants, collected from different regions in Siwa oasis, was studied using morphologically traits and molecular markers (Random Amplified Polymorphic DNA and Inter Simple Sequence Repeat markers). The pre-screening of 35 primers allowed selection of 22 primers which revealed polymorphism and gave reproducible results. All analyzed genotypes were distinguishable by their fingerprint patterns. RAPD and ISSR technology therefore appears very effective for identifying male trees of date palm. Morphologically, RAPD and ISSR based genetic distance were used to determine the relationships between the male trees. They showed a relatively high level of polymorphism. This could be related to the mode of introduction and maintenance of the Siwa date palm germplasm involving limited foundation germplasm. Exchange of male trees between plantations and periodic development of new recombinant male trees through sexual reproduction and seedling selection may also have played a role. In addition, the selection applied by farmers concerns mainly end-use quality-related genes which may represent only a small fraction of the date palm genome.

Key words: Date palm, Genetic similarity, Molecular marker, Morphologically analysis.

***Presenting author;** email: *alaahemeida@hotmail.com*

OP18-HUMAN-ASSISTED MIGRATION OF A RARE SPECIES: AN EXAMPLE OF *Sequoiadendron giganteum* PLANTED ON THE TAURUS MOUNTAINS

Nevzat GÜRLEVİK[1], Gürkan SEMIZ[*2], Kani IŞIK[3]

[1]Suleyman Demirel University, Faculty of Forestry, Dept. of Forest Eng., Isparta, Turkey [2]Pamukkale University, Faculty of Arts and Sciences, Biology Dept., Denizli, Turkey
[3] Akdeniz University, Faculty of Arts and Sciences, Biology Dept., Antalya, Turkey

Sequoiadendron giganteum (giant sequoia), the most splendid and the largest of all forest tree species, grows naturally in several small groves at a restricted geographical range on the Sierra Nevada Mountains in California, USA. It is considered as a rare species, potentially threatened by various factors such as air pollution, acid rain, unforeseen diseases, and global climatic change. Being under various threats, many such rare and endemic species require special care and assistance by resource managers. This paper covers the story of giant sequoia seeds brought from the Sierra Nevada Mountains and planted on the Taurus Mountains near Antalya and Isparta in southern Turkey. The seeds of the species were brought to Turkey for the occasion of an IUFRO conference held in early October, 2006, in Belek-Antalya. The seeds were first grown in Egirdir Nursery (Isparta) in 2007 and the seedlings were transplanted on three locations (in early 2009) on the Taurus Mountains at altitudes between about 1200- 1300 m. to commemorate the conference. This paper reports their growth and survival at the end of the first growing season.

Key words: Giant sequoia, Rare species, Exotic species, Genetic conservation
***Presenting author;** email: *gsemiz@pau.edu.tr*

OP19-THREATS TO GENETIC DIVERSITY OF ORIENTAL SPRUCE (*Picea orientalis*) IN TURKEY

Fatih TEMEL*, Mehmet ÖZALP and Oğuz KURDOĞLU

Artvin Coruh University, Faculty of Forestry, 08000 Artvin, Turkey

Oriental spruce is one of the 51 species of genus *Picea* and belongs to section Picea. It has a local distribution and can only be found on the Black Sea-facing slopes and valleys in northeastern Turkey and western Georgia. Oriental spruce is one of the major forest tree species and covers about 300 000 ha in Turkey. Although oriental spruce is listed as 'Least Concern' in the IUCN Red List of Threatened Species, there are many threats to its genetic diversity in Turkey. In addition to large scale bark beetle infestation in the last several decades, disturbances and habitat reduction caused by human activities within oriental spruce dominated ecosystems. Climate Modeling studies also indicate that there is a potential for habitat reduction and increase in forest fire, a rare event in the region. Portion of oriental spruce ecosystems are secured with various conservation programs (i.e., national parks, nature conservation areas and nature parks). In addition, 12 seed stands and two gene conservation forests have been designated, and nine seed orchards were established representing 290 clones. Limited genetic diversity studies in oriental spruce indicate that existing genetic variation should be further evaluated with respect to conservation and utilization in the future.

Key words: Genetic diversity; *Picea orientalis*; Forestry.

***Presenting author;** email: *fatihtemel93@yahoo.com*

MAY 29, 2010

OP20-CONSERVATION AND THE THREAT OF HYBRIDIZATION AND INTROGRESSION: *Populus nigra* AND *Taxus baccata* IN EUROPE

Berthold HEINZE*

Federal Research Centre for Forests, Department of Genetics, Hauptstrasse 7, A-1140 Vienna, Austria

This paper describes experience gathered in Central Europe, regarding the sometimes problematic side-by-side existence of rare native forest tree species and closely related introduced plantation or ornamental species, varieties, and clones. The main focus will be the conservation of genetic diversity of native species, that is, how to maintain gene pools that are large enough and of adequate composition, in order to ensure the future survival of the species in all the ecosystems it is currently associated with. Two examples are given: black poplar (*Populus nigra*) is a floodplain forest pioneer species which is affected by cultivation of clones in great numbers, mainly of hybrid origin. Research into the molecular genetics of species barriers greatly facilitates the assessment of the level of threat that different hybrid combinations impose on black poplar. The recent boom in biomass short-rotation plantations adds to this threat. The second example, the common yew (*Taxus baccata*) is an understory, late-succession species in beech forests throughout much of Europe. It is potentially affected by horticultural varieties. Through their contrasting life-history traits, they serve well to deduce general principles and recommendations for genetic conservation in tree species in similar situations. The main conclusion from these examples is that each case requires careful consideration based on the specific biological, ecological, geographical and management circumstances.

Key words: *Populus nigra*, *Taxus baccata* Hybridization, Introgression

***Invited Speaker;** email: *berthold.heinze@bfw.gv.at*

OP21-POTENTIAL AND PROBLEMS ASSOCIATED WITH THE ENDEMIC FLORA OF PAKISTAN

Abdul MAJID* and Habib AHMAD

Department of Botany Hazara University Mansehra, Pakistan

Pakistan is unique of having wide range of altitudinal variations from the sea level to the second highest peak K2 (8611m). It provided home to some of the world's ancient civilizations and has the junction of the world's famous mountain systems Himalaya, Hindu Kush and Karakuram. Review of the available information shows that Pakistan has 372 endemic species distributed in various parts of the country, from sea shore to the alpine meadows. A sum of 325 species belonging to 48 families is taken as content of this paper. Among which *Papilionaceae* is at top with 65 species, followed by *Boraginaceae* (26), *Brassicaceae* (21), *Poaceae* (19), *Ranunculaceae* (17) and *Labiatae* (15). Among the genera, *Astragalus* alone is represented by 39 endemic species therefore stands 1st with respect to endemism. Phytogeographic regions having higher number of endemics are identified as Irano-Turanian followed by Sino-Japanese and Sharo-Sindian regions of the country. Some of the hot spots identified regarding the distribution of endemics are Chitral, Kashmir and Gilgit-Baltistan areas. This

paper communicates the information gathered about the distribution, conservation status, threats and strategies to conserve the gene pool of these endemic taxa.

Key words: Endemic plants, Pakistan, Distribution, Phytogeographic, Hot spots, conservation

***Presenting author;** email: *abdulmajidhu@gmail.com*

OP22-CONIFEROUS ENDEMIC SPECIES (PINÓPHYTA) EXISTING IN AZERBAIJAN AND THEIR USE IN VEGETATION AND THEIR CONSERVATION

Zaur HMBETOV*

Botany and Plant Physiology of Azerbaijani State Agricultural University, 2000. Ata-Turk Av. 262, Ganja, Azerbaijan.

A unique territory in the Caucasus, Azerbaijan enjoys nine of the existing climate zones. In an area that has such a variety of climatic and soil conditions, endemic coniferous species have survived in different refidium up to now. Ten species in three families of conifers have spread naturally within different geographically separated habitats in Azerbaijan. Conifers comprise 0.2% of the flora of Azerbaijan. These species include *Pinus eldarica*., *P.hamata*., *Juniperus pugmaea*., *J.Poluycarpos*., *J.foetidisma*., *J.rufescens*., *J.Sabina., J.depressa., Taxus baccata., Taxus taluschensis*. Since they live in different long-term ecological conditions, their several subspecies, natural forms, and hybrids have been creafel thriving occurred by having undergone intra-species and inter-species changes. Palaeo-botanic investigations carried out suggest that the separate and disjunctive habitats of conifers are also evidence for that. Generally, conifers have dispersed as a result of the impact of ecologic factors by micro-file evolution. Because of that they demonstrate high tolerance in ecologically hard conditions. The above-mentioned species have high degree of flexi ability. In parks they are broadly used to provide in vegetation in dirty and highly-stressed areas.

Key words: Caucasus; Existing climatic; Ecologic conditions; Disjunctive habitats; Highly-stressed.

***Presenting author;** email: *zaurgumbatov@yandex.ru*

OP23-CONSERVATION STATUS OF RARE ENDEMIC SPECIES OF *Salvia* L. (LAMIACEAE) IN TURKEY

Ferhat CELEP, Ahmet KAHRAMAN, Safi BAGHERPOUR, Ersin KARABACAK, Musa DOĞAN* and Galip AKAYDIN

Department of Biological Sciences, Middle East Technical University, 06531, Ankara, Turkey

The precise evaluation of the conservation status of endemic and rare species is a necessary condition in order to prevent their extinction. According to our current taxonomic revision, 97 species are known from Turkey. The rate of endemism is 53 %. Literatures, herbarium and field studies revealed that there were 15 species (*S. adenocaulon, S. anatolica, S. ballsiana, S. ekimiana, S. eriophora, S. freyniana, S. haussknechtii, S. hedgeana, S. marashica, S. nydegerii, S. pseudeuphratica, S. quezelii, S. reeseana, S. sericeo-tomentosa, S. siirtica, S. tigrina*) known only from type locality and 7 species (*S.*

albimaculata, S. adenophylla, S. halophila, S. smyrnaea, S. tobeyi) known from two or three locations. The destruction of habitat through human encroachment such as urbanization, land clearing, overgrazing, pollution, road and dam constructions is the principal threats in Turkey. Based on our field and population observations and the obtained data, we re-evaluated their current conservation status using recent IUCN Red List categories. Principle threats are explained for each species and some comments are given for sustainability of them. As well as, some notes are also provided on their ecology, phenology, chorology and distribution pattern.

Key words: *Salvia*, endemic species, Turkey, Red list

***Presenting author;** email: *doğanm@metu.edu.tr*

OP24-SPECIES DIVERSITY AND CONSERVATION STATUS OF THE DIVERSITY OF VASCULAR PLANTS OF NANDIAR KHAWR DISTRICT BATAGRAM PAKISTAN

Habib AHMAD*[1], Mukhtar ALAM[2] and Faizul HAQ[1]

[1]Department of Genetics, Hazara University, Pakistan, [2]Directorate of Research and Planning, Hazara University, Pakistan

This paper communicates the vascular plant diversity and problems associated with the flora of Nadiar Khawr, District Batagrram-Pakistan. Floristically the area is placed in Western Himalayan Province. It is located on the western edge of Himalayas, dominated by Sino-Japanese type of vegetation. Sum 380 plant species including 142 medicinal plants, belonging to different taxa are included in this paper. Conservation status was worked out for 367 local species; the exotic species which were only 13 were not evaluated. Among the local species; 14, 23, 61, 96 and 174 species were categorized as Critically Endangered, Endangered, Vulnerable, Near Threatened and Least Concerned, respectively. The Critically Endangered species included *Acer caecium, Betula utilis, Cedrus deodara, Cornus macrophylla, Opuntia dilleni, Paeonia emodi, Pistacia integerrima, Populus alba, Potentilla cericophylla, Quercus glauca, Skimmia laureola, Taxus wallichiana, Ulmus wallichiana* and *Vescum album*. The list of endangered species included *Aesculus indica, Bauhinia varigata, Cephalenthra longifolia, Cissampelos praiva, Ehertia serrata, Podophyllum emodi, Prunus cornuta and Viola canescens*. The critically endangered species need recovery, endangered ones need protection and other classes need restoration of the habitat for ensuring sustainable development of the region.

Key words: Pakistan, Nandiar Khwar, Batagram, Species diversity, Conservation

***Presenting author;** email: *drhahmad@gmail.com*

May 29, 2010

WORKSHOP-II: BIOINFORMATICS

OPWII1-BIOINFORMATIC SOLUTIONS FOR DATA INTEGRATION IN FOREST GENOMICS

Jill L. WEGRZYN*[1], John D. LIECHTY[1], Andrew J. ECKERT[2], Ben FIGUEROA[1], David B. NEALE[1]

[1]Department of Plant Sciences, University of California, Davis, USA. [2]Department of Evolution and Ecology, University of California, Davis, USA

The Dendrome project provides custom informatics tools and databases to manage and exploit the flood of information resulting from high-throughput genomics projects in forest trees from sample collection to downstream analysis. This resource is further enhanced with systems that are well connected with federated databases, automated data flows, machine learning analysis, standardized annotations and quality control. A sample tracking system now sits at the forefront of most large-scale projects. Barcode identifiers assigned to the trees during sample collection are maintained in the database to identify an individual through DNA extraction, resequencing, genotyping and phenotyping. Emerging technologies have been applied to integrate a solution for high-throughput SNP discovery in non-model organisms. The Pine Sequence Alignment and SNP Identification Pipeline (PineSAP) identifies SNPs from both Sanger and 454 sequencing that reflect true genetic variation. The supporting TreeGenes database contains ten curated modules that support the storage of data and provide the foundation for web-based searches and visualization tools. DiversiTree, an extensive user-friendly desktop-style interface, queries the TreeGenes database and is designed for bulk data retrieval. It provides the community with access to a multitude of data types including ESTs, primers, tracefiles, SNPs, individual tree data, genotypes and phenotypes. In particular, the variety of outputs available allows users to perform high-resolution dissection of traits and relate molecular diversity to functional variation. For downstream analysis, DNA Sequence Analysis and Manipulation (DnaSAM), was developed to address the challenges of data manipulation, summary statistic estimation and statistical hypothesis testing. This program is capable of performing a large number of standard and newly designed tests of neutrality for multiple sequence alignments of resequenced loci. The combined resources of the Dendrome project serve as a powerful knowledge environment for genotype-phenotype information resulting from a multitude of large-scale genomics projects.

Key words: Forest Genomics, TreeGenes, PineSAP, SNP

***Invited Speaker;** email: *jlwegrzyn@ucdavis.edu*

OPWII2-MOLECULAR PHYLOGENETICS AND BIOINFORMATIC TOOLS

Zeki KAYA*

Department of Biological Sciences, Middle East Technical University, 06531 Ankara, Turkey

Evolution at the molecular level is a process of mutation with selection. Molecular evolution deals with changes in genes and proteins throughout different branches of the tree of life. Furtehrmore, it uses data from present-day organisms to reconstruct the evolutionary history of species. Phylogeny is

the inference of evolutionary relationships. Traditionally, phylogeny was assessed by comparing morphological features between organisms from a variety of species. However, molecular sequence data, which are abundant now, can also be used for phylogenetic analysis. The evolutionary relationships that are inferred, which are usually depicted in the form of a tree, can provide hypotheses of past biological events.With use of multiple sequence alignments of protein (or DNA or RNA), phylogenetic trees can be generated. Molecular phylogenetic analyses can be divided into five stages: (1) selection of sequences for analysis, (2) multiple sequence alignment of homologous protein or nucleic acid sequences, (3) specification of a statistical model of nucleotide or amino acid evolution, (4) tree building, and (5) tree evaluation. Phylogenetic trees could be constructed using distance-based methods (the unweighted pair group method with arithmetic mean (UPGMA) and neighbor joining (NJ)), phylogenetic Inference (Maximum Parsimony), model-based phylogenetic inference (Maximum Likelihood) and Tree Inference (Bayesian Methods). There are various bioinformatic softwares that could be suitable for either distance based, or model-based tree construction. For example; PAUP (Phylogenetic Analysis Using Parsimony), MEGA (Molecular Genetic Evolutionary Analysis), PHYLIP (the PHYLogeny Inference Package), TREE-PUZZLE (implementing maximum likelihood method), and MrBayes (implementing Bayesian estimation of phylogeny) are few of popular softwares used in molecular tree construction. Molecular phylogenetic will be explained further in the workshop with the above available bioinformatics tools.

Key words: Molecular evolution, Phylogenetic tree, distance based methods, model based methods, Phylogeny- softwares.

***Invited Speaker;** email: *kayaz@metu.edu.tr*

OPWII3-THE PHYLOGENETIC ANALYSIS OF *Pinus nigra* ARNOLD SUBSPECIES *pallasiana* VARIETIES WITH RESPECT TO NON-CODING trn REGIONS OF CHLOROPLAST GENOME

Aysun Demet GÜLSOY*[1], Ali Murat GÜLSOY1, Burcu ÇENGEL[2], Sadi ŞIKLAR[2] and Zeki KAYA[1]

[1]Middle East Technical University, Department of Biological Sciences, 06531, Ankara, Turkey[2], Forest Tree Seeds and Tree Breeding Research Directorate, Ministry of Environment and Forestry, Gazi-Ankara, Turkey

The Anatolian Black Pine is one of the subspecies of European Black Pine, growing naturally as a widespread mid elevation species of Taurus, western Anatolian and northern Anatolian Mountains of Turkey. Although it is disputed, there are four varieties of Anatolian black pine but two of these are well recognized. These are *Pinus nigra* Arnold subsp. *pallasiana* var. *pyramidata* (pyrimidal black pine) and *Pinus nigra* Arnold subsp. *pallasiana* var. s*eneriana.* To determine the genetic relationship between Anatolian black pine (*Pinus nigra* Arnold subsp. *pallasiana* and *P. nigra* Arnold subsp. *pallasiana* var. s*eneriana)* were extensively sampled in a natural stand located Bolu– Gerede where they co-exist in large. Three sectors of non-coding *trn* regions of chloroplast DNA (cpDNA) were comparatively analyzed using MEGA 4.0 and Arlequin 2.0 softwares.Considering genetic diversity of two Anatolian black pine taxa from Bolu-Gerede with respect to *trn* regions and parsimonic sites, the results showed that *P. nigra* Arnold subsp *pallasiana* var *seneriana* were more polymorphic than *P.nigra* Arnold subsp *pallasiana*. Also, the constructed phylogenetic tree with both UPGMA and maximum parsimony methods with bootstrap test of phylogeny analysis showed that *P. nigra* Arnold subsp *pallasiana* var *seneriana* were formed a distinct group from the *P. nigra* Arnold subsp

pallasiana var *pallasiana*. According to this result, the differences between these taxa may be a result of mutations occured in the genes coding the growth form of Anatolian pine (e.g., single stemming vs. multiple stemming) and non-coding *trn* region.

Key words: *Pinus nigra*, *trn*, cpDNA, Genetic variance, Phylogeny, Molecular diversity

***Presenting author;** email: *aysundemetgulsoy@yahoo.com*

OPWII4-IDENTIFICATION OF *Aegilops* L. and *Triticum* L. SPECIES BASED ON CHLOROPLAST DNA

Ayten Dizkırıcı[1], Çiğdem Çetiner[1], Melahat Birsin[2], Zeki Kaya[1], Sertaç Önde*[1] , Murat Özgen[2]

[1]Middle East Technical University, Department of Biological Sciences, 06531, Ankara, Turkey;
[2]Ankara University, Faculty of Agriculture, Department of Field Crops, 06110, Ankara, Turkey

The phylogenetic relationships within and between *Aegilops* and *Triticum* genera were analyzed by comparing sequences of *trnT(UGU)-F(GAA)* of chloroplast DNA. A total of 8 *Aegilops* and 4 *Triticum* taxa and 1 sample from *Elymus* genus as an out-group were analyzed. When the constructed phylogenetic tree was examined, the clusters were observed to be displaying striking correlations between chloroplast data and genomic constituents of the concerned taxa. While the A genome-bearing two transition forms, *T. monococcum* and *T. boeticum* remained in a separate cluster, the C genome-bearing 4 Aegilops species and the DC genome-bearing one Aegilops species remained in a neighbouring cluster. The remaining clustering patterns of 3 *Ae. speltoides and 2 Triticum* species clearly validated the current difficulties existing in the taxonomy of these two genera. While the two subspecies of *Ae. speltoides* coexisted on the same cluster, the remaining *Aegilos speltoides* and *T. aestivum* subspecies spelta formed a separate cluster together with *T. dicoccum*. Since *T. aestivum* subspecies spelta is displaying phenotypic characteristics of both Aegilops and Triticum genera, the results we obtained clearly reflected this observation. Also the clustering of *T. dicoccum* within this group shows the genetic relationship of this species being closer to *T. aestivum* rather than *T. boeticum* or *T. monococcum*.

Key words: Phylogeny, *Aegilops, Triticum*, *trn,* cpDNA

***Presenting Authors**: e-mail: *sertac@metu.edu.tr*

OPWII5-THE SEQUENCE DATA ON NON-CODING TRN REGION OF CHLOROPLAST GENOMES OF TURKISH FIRS INDICATING THE SPECIATION FROM A SINGLE ANCESTRAL FIR

Mevlüde Alev ATEŞ*[1], Funda ÖZDEMIR DEĞIRMENCI[1], Yasemin TAYANÇ[2], Burcu ÇENGEL[2], Gaye KANDEMIR[2], Ercan VELIOĞLU[2], and Zeki KAYA[2]

[1]Department of Biological Sciences, Middle East Technical University, 06531, Ankara. [2]Forest Tree Seeds and Tree Breeding Research Directorate, Ministry of Environment and Forestry, Gazi, Ankara, Turkey.

Abies (Firs) is a genus of aproximately 55 species of evergreen conifers in the family *Pinaceae* which covers the large parts of vegetation of northern hemisphere, and includes many species and numerous interspecific hybrids. Firs are generally considered a group of species exhibiting great variability. This

variation is probably due to its extended geographical range, ecological habitats and genetic factors. Nowadays, *Abies* is regarded as a taxonomically complex group in contrast to other genera of the same family. Natural cross-pollination between the species (interspecific pollination) of the genus is one of the most important factors contributing to the instability of morphological characters of the trees. To determine the genetic relationship in *Abies* spp. 18 populations of different subspecies were collected from different regions of Turkey and non-coding *trn* regions of chloroplast DNA (cpDNA) are sequenced to assess the genetic structure of the studied species. Two sectors of *trn* region (*trn* F and *trn* leu) are examined. To compare trnF-trnleu sequences of studied Abies specimens with other taxa that are found in the world, the nucleotide sequences were taken from NCBI genbank. Analysis assessed with using MEGA (version 4.0 software) indicated that 5 *Abies* taxa in Turkey with respect to two sectors of *trn* regions did not vary at all. Although there is no phylogenetical differences between *Abies* spp. in Turkey, other *Abies* spp. from different continentals revealed substantial differences in these chloroplast sectors. The constructed phylogenetic tree showed that individuals of *Abies* spp. taken from Turkey were gruped in the same cluster and closer to Asian species with respect to *trn* F region and with respect to *trn* leu regions, grouped in the same cluster with European species in the phylogenetic tree. The results suggest that all Turkish firs may have evolved from single ancestral fir species, most likley from *Abies nordmanniana.*

Key words: Phylogeny, *Abies* spp., *trn,* cpDNA, Turkey

***Presenting authors**: e-mail: *ates.alev@gmail.com*

OPWII6-DETERMINATION OF PHYLOGENETIC RELATIONSHIPS WITHIN *Salvia euphratica* COMPLEX & ITS CLOSELY RELATED SPECIES BY USING INTERNAL TRANSCRIBED SPACER (ITS) REGION OF NUCLEAR RIBOSOMAL DNA

Çiğdem ÇETINER*, Zeki KAYA, Ayten DIZKIRICI, Ahmet KAHRAMAN, Ferhat CELEP, Musa DOĞAN

Department of Biological Sciences, Middle East Technical University, 06531, Ankara, TURKEY

The phylogenetic relationships within *Salvia euphratica* and its closely related species were analyzed by comparing sequences of internal transcribed spacer (*ITS*) region of nuclear ribosomal DNA. In this region ITS-1, 5.8S and ITS-2 were used. Specimens of *S. euphratica* sensu lato and the closely related species were gathered from their natural habitats in the East and South Anatolia. A total of seven taxa were analyzed. A phylogenetic tree was constructed by using UPGMA method. The most variation was observed in *ITS-1* region and as expected *5.8S* region had only two variable sites. Two varieties of *S.sericeo-tomentosa* were grouped in same subcluster that was phylogenetically separated from others. *ITS* region of nuclear ribosomal DNA can be used to delimit phylogenetic structure of *Salvia* genus.

Keywords: *Salvia*, *ITS* region, phylogeny, nuclear DNA

***Presenting author;** e-mail: *e137058@metu.edu.tr*

May 29, 2010

WORKSHOP-III: BIODIVERSITY CONSERVATION AND TOURISM

OPWIII1-NATURE CONSERVATION ACTIVITIES AND ECOTOURISM IN TURKEY

Mustafa Kemal YALINKILIÇ*

Ministry of Environment and Forestry, Ankara, Turkey

Nature Protection and National Parks General Directorate, which is responsible to protect our country's natural assests and to transfer these assets to future generations, deals with “nature conservation” studies in a systematic integrity.Our institution, that is currently authorized to manage about 4.5 million hectare land. To do so, since 2003, in accordance with the National Parks Law (2783) of the Turkish Constitution and Terrestrial Hunting Law (4915) and Environmental Law (2872), a new statute regarding Protection of the Wetlands has been established which was 100 % concertant with the EU legislations and this new Law "Protection of the Nature and Biodiversity" is ready to be submitted to the parliement.

The lagality of this draft and the regulations that will be issued subsequently are present in the criteria of Environment section closure. The important particular points and the novelties in the implementation of the law and regulations together with the help of civil society organizations will show the effects countrywide. Establishment of “National Biodiversity Committee”, formation of “Biodiversity Science Committee”, configuration of “Turkey Nature preservation fields network” and planning and management of fields by the ecological chain logic and integrated approach can be counted as the novelties.

The rationality of this study is applying the decision of land usage both providing ecotourism, ecoagriculture, ecological life style and conservation-handling balance of protected areas; and functioning of sustainability of the resources supported by natural wealth. Education of the locals about land guide within protected areas and obtaining the visitors of this areas from ecological products, are included in management planing of ecotourism in the world. Across the country there are 41 national parks, 42 natural parks, 31 natural conserved areas, 105 natural monument, 135 marshy area having international significance, 79 wildlife protection and development areas, 14 special environment protection area and else. We believe that Turkey generates trademark in ecotourism between other countries and gets ready to ecotourism with planned background.

Key words: Nature conservation, National Parks, Turkey
***Invited Speaker**; email:

OPWIII2-CONSERVATION OF BIODIVERSITY AND TOURISM

HAKKI ÇOPUROĞLU

Group Peace with Nature and Association for Arts and Education, Hatipirimi Mah 186.sk 6/2 Marmaris-Muğla

Turkey is known to have very rich biodiversity. However, many species are under threat because of both global and local factors. One of the threatening elements is the threat by mass tourism. It is necessary to conserve biodiversity. Nevertheless this can be done by organizations that could increase the welfare level of people living in the region instead of

applying rigid rules. This can be achieved by going towards Ecotourism to decline stress created due to mass tourism. A planned and conscious development in Ecotourism will decrease the pressure exerted on natural areas and also lead to economic growth in the region.

Key Words: Biodiversity, ecotourism, conservation.

***Presenting author:**e-mail: *grupdogaylabaris@gmail.com*

OPWIII3-BIODIVERSITY CONSERVATION OF BABA MOUNTAIN'S AND SCIENCE TOURISM

Reşat TUNÇ[1], Gül Bahar EDİK*[2], Ulaş KİPER[2]

[1]Fethiye Forest Management Directorate, General Directoraet of Foresry,Fethiye, Muğla, Turkey, [2] Muğla University, Fethiye Ali Sıtkı Mefharet Koçman Vocational College, Taşyaka Mahallesi, 48300, Fethiye Muğla

Baba Mountain, situated in the east of Fethiye Bay is a mountain range with three peaks (Baba Dağ Mountain - 1969 m, Mendos Mountain -1758 m and Eren Mountain -1478 m) 1969 metres from sea level. The lower altitude of the mountain consists of maquis and red pine (*Pinus brutia)*, the zone up to the tree level is dominated by cedar (*Cedrus libani*), and the subalpine belt is rugged and rocky with a flora resistent to extreme high alttitude conditions. Eşen River valley separates Baba Mountain from Ak Mountain in the west edge of Taurus Mountain range. Being isolated in terms of geographical orientation and close proximity to the sea, it has a wide diversity of flora including lots of rare and endemic plants. Although there are several national conservation areas within immediate surrondings, Baba Mountain doesn't have any conservation status. It is one of the areas determined to be a Hotspot in European Forests and to be conserved urgently. Due to its location and the natural resources, it is exposed to several dangers like mass tourism activities, construction and uprooting of plants.In this study, Baba Mountain's biodiversity is undertaken in terms of its flora. At the end of the study, it is proposed that the area should be given on site conservation status with all resources and science tourism is proposed as a tourism model that supports this conservation status.

Key Words: Baba Mountain, Biodiversity, Endemic, Biodiversity Hotspots, In situ (on site) Conservation, Science Tourism, Fethiye

***Presenting author:**e-mail: *gulbaharedik@gmail.com*

OPWIII4-THE CURRENT SITUATION OF NATURE CONSERVATION IN TÜRKIYE IN THE LIGHT OF INTERNATIONAL ORGANISATIONS, OECD ENVIRONMENTAL INDICATORS, EU APPROXIMATION AND FURTHER IMPLEMENTATION ALTERNATIVES PROPOSED

Eyüp YÜKSEL*

Environmental Protection Agency for Special Areas (EPASA), Alparslan Türkeş Caddesi 31. Sokak No: 10 Beştepe, 06510, Ankara, Turkey

In the last years the term biodiversity has been so frequently discussed in national legislation, national programmes, various researches and research projects. However, the links between the position of related professions, in particular, the place and role of natural science graduates, mainly biologists, so far could not be established. In addition, this process has been carried out by EU Approximation

period, and project level approach of universities so become in a way grouping process. Biodiversity concept has been mentioned so frequently In the national bureaucracy, legislation, national programmes, researches carried out by universities and research institutions and research and conservation projects carried out by governmental agencies and NGOs. Nonetheless, the right place of natural sciences professionals, mainly biologists, and their links to employment policies have hitherto could not be established appropriately. EU Approximation process has made the situation complicated. The university's single project approach towards conservation has been disintegrated from ecosystem approach and use of instruments of conservation biology, and landscape ecology, and national conservation programmes. Moreover, some vital topics such as ecosystem services of biodiversity, cost-benefit analysis of environmental degradation (environmental accounting) could have not been introduced to our academic and bureaucratic lives properly. In addition, use of molecular biology and genetics techniques have been marginalized or at least, so far ignored due to lack of knowledge in conservation practice. Conservation biology, landscape ecology, and biomonitoring by means of indicators are amongst the ignored parts, because they are considered as being the unknowns of conservation in our country. Along with our traditional nature conservation practice, apart from biology those disciplines more closer to application has dominated over pure biology profession due to traditional habits including their relatively strong and powerful professional chambers, and their prestige in the minds of the citizens. Another problem which could be mentioned financial, technical, and expertise supports coming from EU countries during EU Approximation period. For one thing they have suppressed the potential use of national sources, including knowledge and experience of university academics, and secondly remain insufficient due to its own incapacity. Our universities, and organisations have not been used to using comparable data along with local, national, regional (Europe) and global level. So our common Works with OECD, EU, UNEP has remained incomplete.

Key words: EU Approximation, Turkey, Environmental Protection, Special Areas

***Presenting author;** email: *yukseleyup@gmail.com*

OPWIII5-TOURISM POTANTIAL OF ENDEMIC PLANT RICHNESS OF TURKEY

Hasan TORLAK*

Kültür ve Turizm Bakanlığı, Teftiş Kurulu Başkanlığı, Ankara, Turkey

Our Country possesses a magnificient potential in terms of biological vareity. Endemic flora and fauna sourches of our country are considered to be high value factors of Turkey's tourism product. However, this potential neccessitates employment of a very sensitive balance in preservation versus usage of this assortment in terms of what is called Ecotourism. The idea behind the Ecotourism must assume promotion of these resources to our own people and visitors and a well determined preservation program. It will be very advantageous to preserve the biological wealth by attracting interest to the Ecotourism and combining biological assets with the other continuing cultural values of Anatolia in promoting Turkey's tourism product.

Key words: Endemic plants, Ecotourism, Cultural contuniuation of Anatolia

***Presenting author;** email: *htorlak@hotmail.com*

OPWIII6-CONSERVATION STUDIES OF *Centaurea tchihatcheffi* IN GÖLBAŞI

Yaşar DOSTBİL*

Agricultural Developmental Foundation, Karanfil Sokak, Beton Apartmanı No: 34/13, Kızılay Ankara

Centaurea tchihatcheffi, which is endemic to Hacı Hasan village in Gölbaşı-Ankara, is under threat of extinction. Asteraceae family member Centaurea tchihatcheffi is collected and sold by florists which accelerates its extinction. Therefore, it is under protection. Instead of collecting from nature for trading, *in vitro* propogation will contribute to regional economy and tourism.

Key words: Endemic plants, *Centaurea*, Gölbaşı.

***Presenting author;** email: *ydostbil@yahoo.com*

OPWIII7-RECREATIONAL RESOURCE VALUES OF THE CHORUH VALLEY

Faris KARAHAN[1] and Egemen ÇAKIR[2*]

[1]Atatürk University, Faculty of Agriculture, Erzurum, Turkey; [2]Tourism Develeopment in Eastern Anatolia Development, Erzurum, Turkey

Choruh Valley has become one of the major tourism destinations in the Northeastern Anatolia Region with its natural, cultural, historic and recreational values. The valley, very deep-rooted cultural heritage and unique natural wealth, has alternative tourism region both domestic and foreign tourists. In this paper, some recreational values of İspir, Yusufeli, Uzundere, Tortum and Narman districts will be tried to share with the public. Some tourism potential of the Choruh valley has been classified main categories as (1) Rafting on the Choruh River and Tortum stream (2) Bird Observation (3) Flora Tourism, (4), Wildlife Observation, (5) Butterfly Observation (6) İspir, Tortum and Uzundere Sevenlakes, (7) Haho, Öşvank and Ishan Churches (8) Trekking (9) Tortum Lake and Water-Based Activities (10) Narman and Uzundere fairy chimneys and (11) Festivals.

Key words: Tourism, Recreation, Ecotourism, Coruh Valley

***Presenting Author:** e-mail: *fariskarahan@gmail.com*

OPWIII8-BIOLOGICAL DIVERSITY IN UPCOMING TOURISM

Pelin BOZOĞLU* and Candan BAL

Republic of Turkey Ministry of Culture And Tourism

Tourism and international tourism market with its stable growth is seen as one of the most important sector in the world. Our country with its 12000 floral plant species is the third region in the world that has the most biological diversity. Furthermore, it is one of the richest countries in terms of biological diversity with its 163 mammiferous, 456 birds, 24 amphibian, 105 reptile, and about 180 freshwater fish species. It has important tourism potential with its approximately 8000 km coastal line, invaluable cultural heritage remained from various civilizations, natural beauties that exist on very few countries and its climate diversification. Turkey has enormous tourism range with its mountains, plateaus, caves, rivers, lakes and thermal resources. All of the components that create these resources are result of the

wealthiness that our country's biological diversification constitutes. Depending on this, tourism can be seen as the easiest way to preserve and improve this biological diversity and access to international environmental standards. Tourism creates incentive to local people for not only tourism activities but the other supportive activities. The main objective of our Ministry's tourism policy is planned approach with preserve-use balance.

Keywords: Tourism, biological diversification

***Presenting author;** e-mail: *pelinbozoglu@gmail.com*

OPWIII9-TURKEY'S FORESTS AND BIODIVERSITY

Mustafa KILIÇ and Özlem Şenel ARSLAN*

Turkish Ministry of Environment and Forestry, General Directorate of Forests, Gazi Tesisleri 06560, Ankara, Turkey

Biorichness or biodiversity is described as the integrity of genes, ecological processes and ecosystems in a region. Biodiversty consists of four main parts; namely genetic diversity, species diversity, ecosystem diversity and finally the diversity of ecological processes.
The surface of Turkey is the 0,5% of the World surface. Besides, 2.4% of the plants, 2.9% of the fish species, 0.8% of the amphibians, 1.7% of the reptiles and 2.9% of mammalians of the world live in Turkey. Moreover, two of the eight important gene centers of the world are located in Anatolia. In addition, Turkey possesses 75% of the plant species of Europe, and one third of them are endemic. Turkey has a unique flora and fauna by its relations with different fauna and flora regions and through its evolutionary process by means of geological processes which led the occurrence of seas and lands. In addition to this, its unique position among the continents provide a species flow from different biogeographic and ecogeographic regions during the stability of the lands and seas. Thus, Anatolia has whole biodiversity characteristics as if a separate great continent. The mountain ranges which lay parallel to the sea in the North and South, place the obstacles among living communities, which is accepted as a common belief causing the variation of species. Anatolian diagonal occurred as a result of the convergence of the mountains in the East Anatolia and it is considered as the major obstacle isolating the populations. As a result; variation of geology, altitude and climate caused the variety of habitats for living organisms and thus ecosystem diversity. The subject of this paper is forest ecosystems which are the most stable, the most balanced, the most constant, the most diverse and the healthiest among existing ecosystems. A healthy forest ecosystem is the main source of biodiversity and an insurance for sustainable biodiversity.
Turkish Parliament has ratified the Convention on Biodiversity in 1996 that is one of the outputs of World Summit on Environment and sustainable Development. Hence, Turkey recognizes that biodiversity is a common issue of humanity and countries committed to conserve their biodiversity and use it sustainably. Within this context, General Directorate of Forests starts process of functional planning in the scope of Forest Management since 2005.

Key words: Biodiversity, forest, Turkey

***Presenting author;** email: *seneloz@yahoo.com*

OPWIII10-EXPLORATION OF THE USAGE PRIORITY OF THE BULBOUS PLANTS IN BOTANIC TOURISM: THE EXAMPLE OF *Fritillaria imperialis* L.

Şevket ALP*[1], Hacer ARSLAN[1], Feran ASUR[1], Mehmet KOYUNCU[2]

[1]Yüzüncü Yıl University, Vocational School of Gevas, 65080 Van, Turkey. [2]Ankara University, Faculty of Pharmacy, Department of Pharmaceutical Botany Ankara, Turkey.

Bulbous plants have historically attracted human attention and admiration due to their blooming most of which occur in early spring and some of which in autumn. As in other plants, Anatolia is rich in terms of bulbous plants. There are approximately 700 types of bulbous plants growing across different parts of Anatolia. One of these plants is *Fritillaria imperialis* L. which is gaining importance as an ornamental plant every passing day. *F. imperialis* is one of the bulbous plants which exhibits all beauty of spring with its vivid colors and ostentatious stance. Bulbous plants are amongst plants which are under threat due to illegal collection and the destruction of its natural habitats. *F. imperialis*'s bulbs are collected illegally for export which puts them under threat. The preservation of its habitats would be more beneficial if these habitats are used for nature tourism. Therefore, one of the actions to preserve the bulbous plants in their habitat can be promoting nature tourism. Van Lake Basin is amongst one of the most important touristic places in Turkey in terms of its cultural texture as well as its natural resources and biological richnesses. The region is also amongst the propagation-areas of *F. imperialis* particularly, some of the areas and graveyards in the region harbor significant populations of *F. imperialis* Well-planned and conscious publicizing of these areas would lead to liveliness in domestic and foreign botanic tourism. This would encourage the local public to grow *F. imperialis* and preserve its natural habitats. We are of the opinion that with a well-planned preservation which is supported by promotion of botanic tourism, the protection and sustainability of *F. imperialis* in its natural habitats would be significantly ensured. In the presentation, the significance and characteristics of this beautiful and ostentatious plant will be discussed and its natural shots will be presented.

Key words: Biological Protection, Botanic tourism, Geophytes, Van/Turkey

***Presenting author;** email: *alpsevket@hotmail.com*

OPWIII11-THE CLOSEST PLANTS TO THE SKY: THE ALPINE FLOWERS PROJECT

Faris KARAHAN

Atatürk University, Faculty of Agriculture, Erzurum, Turkey

"The Closest Plants to the Sky: Alpine Flowers Project" is one of the projects supported by the European Commission and Turkish Goverment in the Local Development Initiatives Grant Programme of Samsun, Kastamonu, Erzurum (SKE) Nuts 2 Regions on behalf of Ataturk University Agricultural Faculty in 2006. The objective of the project is to contribute to disseminating the scientific knowledge produced in universities in popular language, to promote the potential of alpine flowers in the surrounding mountains of Erzurum in national and international areas and to development and to contribute ecotourism activities directly and indirectly. 2400 units "The Closest Plants to the Sky: Alpine Flowers Project" book and 12 000 units postcards with 20 different alpine

flowers were printed and distributed. A 20-day "Flora Tourism Training Program" was organized to create consciousness for flora tourism purposes in the region. Lastly, an exhibition of 101 photographs created and presented in more than 15 centers in the country and outside, and conferences related to the project development and sustainability process were given.

Key words: Alpine Plants, Flora Tourism, Language of Nature, Erzurum

***Presenting author**: email: *fariskarahan@gmail.com*

OPWIII12-MUGLA'S FRUIT HERITAGE PROJECT, TURKEY

Esin Alice IŞIN TAYLOR[1] and Neş'e BİLGİN[2]*

[1]Fruit Heritage Working Group, Muğla, [2] Dept. of Molecular Biology and Genetics, Boğaziçi University, Bebek, Istanbul

It is estimated that three quarters of the world's agricultural biodiversty has been lost in the last century. Traditional fruit varieties still grown in rural areas form an important part of Turkey's rich agricultural biodiversity, which today is rapidly being eroded as a result of agricultural policies, globalisation and marketing problems. This decline not only puts the food resources of future generations at risk, but also undermines cultural diversity. Heritage varieties are adapted to local soil and climate conditions, have greater resistance to pests and disease, and require little or no irrigation. With their diverse flavours and traditional uses they are a significant part of Turkey's cultural heritage. Mugla's Fruit Heritage: Cultural Heritage, Database and Conservation Project aims to conserve local heritage fruit varieties and agricultural biodiversity in Turkey, encourage their contribution to the local economy, and maintain the ecologically friendly agricultural practices associated with them. Field surveys carried out in local markets and villages have so far identified more than 550 heritage variety names belonging to 28 fruit species, primarily grapes, pears, almonds, figs, pomegranates, plums and apples. Living trees have been located for more than 300 of these varieties. Since June 2009 a weekly stall named 'Traditional Tastes of the Muğla Region' has been organized at Bodrum market in cooperation with local farmers. The stall displays and sells a wide range of traditional products to raise awareness of their existence and inform the public and the tourists about traditional varieties and their uses. Sources of alternative income such as eco-tourism, ecological agriculture, food tourism and traditional foods encourage local people to protect their own cultural and natural heritage. With its many surviving varieties and traditions like making pear molasses and sour plum syrup, Muğla has considerable potential for exploiting such sources of alternative income.

Keywords: Mugla Province, Fruit heritage, Conservation

Presenting author; e-mail: *bilginne@boun.edu.tr*

OPWIII13-CONSERVATION STRATEGIES OF Morchella TAXA GROWING IN TURKEY

Mustafa IŞILOĞLU*, Hakan ALLI

Muğla University, Faculty of Science and Arts, Biology Department, 48170, Muğla, Turkey

Morels are ascomycetous edible species grow in conifer and deciduous forests from the middle of february to end of may depending on the altitute in Turkey. These are one of most important macrofungi of the country and have a high importance biodiversity and economic value. Although it is

very difficult to find in the field because of their comouflage in their habitats, it is easily recognized with their curious honey comb shaped fruitbodies. Morels have about 40 taxa in Turkey and most of them in the red list. In this study, all morel taxa of Turkey are presented and their conservation strategies are discussed.

Key words: Biodiversity, *Morchella*, Conservation, Turkey

Presenting author; e-mail: *isiloglu48@gmail.com*

OPWIII14-TODEG: AN EXAMPLE FOR ECOTOURISM IN FOREST ECOSYSTEMS

Kubilay ÖZYALÇIN*

Turkish Forester's Association, Ankara, Turkey.

The Foresters' Association of Turkey (The TOD), which is an "Association for the Public Welfare" was founded in 1924. Some aims of the TOD are "extending love for forests throughout the country, increasing public awareness for forest resources, conserving forests". The Ecotourism Group (TODEG) was founded in 2000 as a voluntary / non-profit working group within the body of the TOD. TODEG organizes 10-13 excursions each year, and tries to introduce forests to tourists in the context of forest ecosystem. Apart from protected areas, TODEG places emphasis to rare and unique forest ecosystems without a legal status. TODEG also organizes events for school kids.
Canyons, lakes, wetlands, wildlife generating stations, bird nesting areas, fossil forests, geological formations, archaeological and historical values in forest ecosystems are in the group's excursion range as well as forests.

Key words: TOD, TODEG, ecotourism, forest ecosystem, TIES

Presenting author; e-mail: *qqblay@yahoo.com*

OPWIII15-PLANNING ECO-TOURISM IN YANIKLAR VILLAGE

Emre KARABACAK

Yonca Lodge, Fethiye, Muğla, Turkey

This presentation aims to come up with a discussion about planning eco – tourism in Yanıklar Village. And hope to be a starting point for the following detailed researches.
In the first part the definitions of eco – tourism in the world will be briefly told in terms of social and cultural sustainability.

Key Words: Eco - tourism, Planning Eco - Tourism, Social and Cultural Sustainability

Presenting author; e-mail: *iletisim@yoncalodge.com*

OPWIII16-ECO TURISM AND CARAVAN TOURISM

Erdal ÖTÜGEN*

Chief of Board of Directors Asya Camping ve Caravaning Association, General Secretary of National Camping and Caravaning Federation

The sector of caravan tourism which supports the ecotourism in its facilities to protect the endemic plants and the natural life, is not well-known and it doesn't attract enough support yet. The importance of this branch of tourism which is shown as an altenatif to the hotel tourism in Europe and which has important impacts on the protection of the natural life and the ecosystem, hasn't been understood exactly yet. The number of the caravans in Europe is 5.480.000, whereas in Turkey this number is only 3000. Because the caravan tourism needs a very little substructure and that it is an important alternatif to concretion, this sector should be supported and be improved. The investements for the hotel tourism can be regarded profitable in short-term, but this income is blocked before entering in our country and doesn't leave much things for the region, wherease by the caravan tourism the needs of the caravaners are provided by the region and this contribues directly to the economic developpement of the local inhabitants. The other advantage of the caravan tourism is that they protect the natural structure and the ecologic balance of the region by organizing trips in little groups. The best way for these regions which are situated around little residentel areas to benefit from tourism without giving harm to the natural areas under proction with the roads, houses or hotels, is to developpe these regions by caravan travels. To revive the biggest supporter of ecotourism, the Caravan Tourism, will attract the European caravaners whose giro is around 17 milliard and even a little part from this sector will make important contributions to the developpment of Turkey.

Key words: Caravan tourism, Ecotourism

***Presenting author;** email: *erdal.otugen@ttmail.com*

OPWIII17-BIODIVERSITY AND ECOTOURISM

Okyay TİRLİ*

TEMA Foundation (The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural Habitats), Fethiye Agency, Muğla

States, so far, have not kept their promise for the protection of the environment. However, since biodiversity in our world has gone under risk and have been threatening human life, states should give priority to the protection of the species.

Key words: Biodiversity, Ecotourism

***Presenting author;** email: *te_ma@mynet.com*

OPWIII18-THE USE OF SOIL, TREE & PLANTS IN TRADITIONAL FLAT ROOF ARCHITECTURAL AS A CONSTRUCTION (BUILDING)MATERIAL

Ertuğrul ALADAĞ*

The Chamber of Turkish Architects and Engineers, Muğla Branch, Hacı Şerifağa Sok No.9, Muğla

In East Aegean,traditional flat roof architectural constructions were built in totally natural materials and in a simple technics. The materials,like the lime,which is achieved by making a fire or the tile, which is put in the oven,were not used.The beams,which were used in the constructions,were bearings.

The stalks,leaves,the barks,the pikes,the moss and the clayish,rockery,farinaceous soil were all for isolation.These materials could have been kept upwithin the structure for hundred years.In other words,these materials were assuming a duty to take the climate and plant culture to the future.
However,as soon as the structure is abandoned,in a few years, these materials could have been mixed with the nature on the stand.

Key words: Architecture, Construction, Building material

***Presenting author;** email: *e_aladag@mynet.com*

POSTER PRESENTATIONS

PP1-IN VITRO BULBLET REGENERATION OF ENDEMIC TUNCELI GARLIC (*Allium tuncelianum*)

Muhammad AASIM*, Derya GÜRLEK, Khalid Mehmood KHAWAR and Sebahattin ÖZCAN

Department of Field Crops, Faculty of Agriculture, University of Ankara, 06110, Dışkapı, Ankara, Turkey

Tunceli or Ovacik garlic (*Allium tuncelianum* Kollman, Özhatay,. Matthew, Şiraneci) synonym *Allium macrochaetum* Boiss and Haussk subsp. *tuncelianum* Kollmann is a single cloved white bulb with non-bulbiferous inflorescences and fertile flowers. It is threatened plant species endemic to Munzur Mountains in Ovacik district of Eastern Turkish province of Tunceli; where it grow naturally in region located between Sivas and Erzurum provinces. There is urgent need to protect and conserve the plant through traditional and non traditional means. In line with this objective, the present study presents successful bulblet regeneration using lower portion of the clove bearing basal plate and upper part of clove as an explant. Explants were cultured on MS medium containing 0.25 and 0.50 mg/l BAP with 0.25, 0.50 and 1.00 mg/l poatssium salt of Naphtalene acetic acid (K-NAA) along with 500 mg/l Augmentin as anti biotic. No bulblet regeneration was recorded on upper part of clove; whereas, lower portion of the clove showed variable frequency (%) of bulblet regeneration. Maximum number of bulblets per explant were recorded on MS medium containing 0.50 mg/l BAP-0.25 mg/l K-NAA. Explants were subcultured on the same medium with 60 g/l Sucrose for ingincreas bulblet size and rooting.

Key words: *In vitro*, Bulblet, Endemic, Garlic, Regeneration

***Presenting author;** email: *mshazim@gmail.com*

PP2-A MORPHOMETRIC ANALYSIS FOR TAXONOMIC DIFFERENTIATION OF TURKISH ENDEMIC SUB-SPECIES *Quercus macranthera* FISCH. & C.A.MEY. EX HOHEN. SUBSP. *syspirensis* (C.KOCH) MENITSKY (*FAGACEAE*) FROM OTHER SYMPATRIC OAK SPECIES IN AN ISOLATED STAND

Caner AKTAŞ*, Zeki KAYA, Sertac ÖNDE

Department of Biological Sciences, Middle East Technical University, Ankara, Turkey

Quercus macranthera. subsp. *syspirensis* is one of the endemic oak taxon in Turkey. The genus *Quercus* is still one of the most problematical groups in Turkish flora, particularly in identification practices. Multivariate morphometrics on 52 leaf characters has been used in this study to differentiate *Quercus macranthera* subsp. *syspirensis* from other sympatric oak species of *Q. pubescens* Willd. and *Q. infectoria* Olivier subsp. *boissieri* (Reuter) O. Schwarz in an isolated stand (Beynam Forest, Ankara). Additional oak specimens were included in the analysis for comparison. Random forest classification method was used to select discriminating variables and to calculate posterior probabilities of class memberships of specimens. Principle component analyses (PCA), hierarchical cluster analysis and scatter-plots for discriminating variables were used to represent the results. The results showed that Q. *macranthera* subsp. *syspirensis* specimens were distinguished from *Q. pubescens* based on overall leaf size and the number of intercalary veins while *Q. infectoria* subsp.

boissieri individuals were distinct with the leaf size and leaf lobe shape. A *priori* identified putative hybrids were observed to be displaying different morphometric patterns rather than being only the intermediates between putative parents.

Key words: Quercus, Sympatric species, putative hybrids, Morphometric analysis

***Presenting author;** email: *e158686@metu.edu.tr*

PP3-COMPARATIVE SYSTEMATICAL, MORPHOLOGICAL, TRICHOMES AND PHYTOCHEMICAL CHARACTERIZATION OF *Teucrium montbretıı* and *T. odontites*

Sevim ALAN*[1], Yavuz Bülent KÖSE[1], Betül DEMIRCI[2], Kemal Hüsnü Can BAŞER[2]

[1]Department of Pharmaceutical Botany, Faculty of Pharmacy, Anadolu University, 26470, Eskisehir, Turkey. [2]Department of Pharmacognosy, Faculty of Pharmacy, Anadolu University, 26470 Eskisehir, Turkey

The genus *Teucrium* L., (Lamiaceae) is represented in Turkey by 27 species. In Flora of Turkey, *Teucrium montbretii* Bentham subsp. *pamphylicum* P. H. Davis was recorded closely related with *Teucrium odontites* Boiss. & Bal. Both species are endemic to Turkey. The paper compares morphological, trichomes and chemical features of the two species with a view to confirm their taxonomical status. In morphological studies, detailed descriptions of the species and characteristic features are given. General appearance of plants, leaf, bract, flower, calyx, corolla and fruit shapes have also presented. The aerial organs of *T. montbretii* subsp. *pamphylicum* and *T. odontites* bears numerous eglandular and glandular trichomes. Eglandular trichomes are simple, long-multicellular with cuticular micropapillae, and glandular hairs are of peltate and capitate types. Hydrodistilled essential oils of *T. montbretii* subsp. *pamphylicum* and *T. odontites* were analysed by GC/MS. Caryophyllene oxide (37.4%), β-caryophyllene (29.1%) and caryophyllenol-II (7.9%) was the main constituent in the oil of *T. montbretii* subsp. *pamphylicum*, cadalene (10.3%), caryophyllene oxide (7.2%) and alloaromadendrene (6.0%) was the main component in the oil of *T. odontites*.

Key words: *Teucrium* (Lamiaceae), Morphology, Trichomes, Essential oil.

***Presenting author;** email: *salan@anadolu.edu.tr*

PP4-A COMPARISON OF MANAGEMENT PLANNING PRINCIPLES OF WETLAND ECOSYSTEM (THE DELTA OF BENDIMAHI) AND MOUNTAIN ECOSYSTEM (MOUNTAIN OF ISPIRIZ) IN THE VAN LAKE BASIN

Şevket ALP*[1], Özdemir ADIZEL[2], Murat ÜNAL[2], Osman KARABACAK[3], Atilla DURMUŞ[2], Emin Yaşar DEMIRCI[4], Murat ERMAN[5], Şerife BERBER[6]

[1]Yüzüncü Yıl University, Vocational School of Gevas, 65080 Van-Turkey, [2]Yüzüncü Yıl University, Faculty of Education, Department of Biology, 65080 Van-Turkey, [3]Siirt University, Faculty of Arts and Sciences, Department of Biology, 56100-Siirt-Turkey, [4]Yüzüncü Yıl University, Faculty of Arts and Sciences, Department of Sociology, 65080-Van-Turkey, [5]Yüzüncü Yıl University, Faculty of Agriculture, Department of Biology, 65080 Van-Turkey, [6]Sinop University, Vocational School of Gerze, Gerze/Sinop –Turkey.

Van Lake Basin which is an important and different part of East Anatolia Region possesses important biological richness due to its geological, climatic, geographical and topographical varieties. In the region, Van Lake which is located between high mountains has led to the formation of a different climate which has resulted in different vegetation and formation of important wetlands. In the basin lies Ispiriz Mountain which is one of the important natural fields and Delta of Bendimahi which is an important part of the basin. Although the flora of Ispiriz Mountain has not been thoroughly studied, 35 of the plants which have been recorded from the area are classified as endemic, whilst 50 of them have been classified as rare plants. 15 of endemic plants have been collected from Ispriz Mountain and introduced to the world. 9 of these plants are endemic plants which have been recorded from a narrow area of Ispiriz Mountain. In the Delta of Bendimahi, there are 188 bird species. 68 of these birds are local, 80 of them migrant, 20 of them winter visitor, 15 of them transit migrant and 2 of them are determined to be coincidental. In this study, together with the socio-economic structure of Delta of Bendimahi which is wetland ecosystem and Mountain of Ispiriz which is mountain ecosystem, the existing relations and problems between natural resources have been determined. According to the gathered information, basic principles of management planning of both regions have been determined. In the presentation, the characteristics of both regions and similarities and differences between the two regions would be touched upon in terms of management of natural resources. It has been determined that the security and economical problems of the region have caused different difficulties in terms of studies which have aimed to determine natural resources in both ecosystems.

Key words: Biological protection, Management planning, Flora, Wetland, Van/Turkey

***Presenting author;** email: *alpsevket@hotmail.com*

PP5-CONTRIBUTIONS TOWARDS BIOLOGICAL PROTECTION OF *Gypsophila graminifolia* Bar

Murat ÜNAL[2], Osman KARABACAK[3], Şevket ALP*[1]

[1]Yüzüncü Yıl University, Vocational School of Gevas, 65080 Van-Turkey, [2]Yüzüncü Yıl University, Faculty of Education, Department of Biology, 65080 Van-Turkey, [3]Siirt University, Faculty of Arts and Sciences, Department of Biology, 56100-Siirt-Turkey

Ispiriz Mountain which is one of the important natural fields of our country is situated in the midst of Baskale Mountains on which Cuh (Guzeldere) Pass (2730m) which connects Van and Hakkari Provinces of East Anatolia Region exists. One of the most important biological richness that the mountain possesses is *Gypsophila graminifolia* BARK species. This species has been collected and introduced to the world from this mountain as well as existing only on this mountain. *G. graminifolia* is under threat due to its excessive collection from the nature for commercial purposes. This study was carried out between the years of 2008-2009 in order to determine the biological characteristics of this species as well as its habitat and fields of expansion. Locations on which taxon exists were examined in detail and they were determined on the map with GPS records. In the area where this species exist, a few individuals were identified in an area of 1 m^2 and 1 km^2 and the maturity level of these individuals and the size (how many cm^2) of taxon's part on the outer of soil in the critical season were recorded. The number of seeds in a mature individual, the number of leaves and trunk length of individuals which constitute population and the largeness of inflorescence were set forth based on field observations At the end of the study, new locations where this species has expanded were determined. The questionnaire which was carried out among the local people showed that this species is well

known with "dag coveni" name in the region and it is excessively collected from the nature for commercial purposes for its use in the making of soap and halvah. However, immigration from rural areas to the cities due to the security issues in the region has diminished this pressure on this species.

Key words: Biological protection, Gypsophila graminifolia, Flora, Mountain of Ispiriz

***Presenting author;** email: *alpsevket@hotmail.com*

PP6-COMPARATIVE BIOLOGY, ECOLOGY AND GENETICS OF THE RARE WESTERN ASIAN QUILLWORT, *Isoetes olympica* A. BRAUN (ISOETACEAE: LYCOPHYTA), IN LEBANON AND SYRIA

Ali H. AMRO[1] and Mohammad S. AL - ZEIN[*2]

[1] Biology Department, American University of Beirut, P.O. Box 11-0236, Riad El Solh 1107 2020, Beirut, Lebanon. [2]Department of Natural Sciences, Lebanese American University, Beirut Campus, P.O. Box 13-5053, Chouran 1102 2801, Beirut, Lebanon

Of all the vascular plants of Western Asia, quillworts (*Isoetes* spp.) remain one of the least researched and most overlooked. While Post (1932) reports no *Isoetes* species from Lebanon and Syria, Mouterde (1966) reports two species, *I. olympica* A. Braun from Southeast Syria and *I. hystrix* forma *subenermis* Durieu from Akkar Province, North Lebanon. Originally described from Western Anatolia, *I. olympica* has since only been reported from Southeast Syria, where it is threatened with extripation (Musselman 2002). Bolin *et al.* (2008) suggested that *I. olympica* may be extinct in its type locality possibly because of habitat destruction resulting from extensive construction of ski resorts. Recently, Musselman and Al-Zein (in press) reported *I. olympica* from intermittent pools in Akkar Province, North Lebanon and in the area across the Lebanese-Syrian border. In this study, we assess the conservation status of *I. olympica* in the light of the newly located populations. We describe its basic biology, life history, and ecology, and compare the Syrian and Lebanese populations morphologically and genetically. This study will serve as the baseline for conserving *I. olympica* in its native habitat in Western Asia in general, and Lebanon and Syria in particular.

Key words: Lebanon, Syria, *Isoetes* sp., Comparative biology

***Presenting author;** email: *malzein@yahoo.com*

PP7-ECOLOGICAL STUDY ON *Dobera glabra* FORSSK. AT JAZAN REGION IN SAUDI ARABIA

I. M. AREF*, H. A. El ATTA and A. A. Al GHTANI

Department of Plant Production, King Saud University, P. O. Box 2460, Riyadh 11451, Saudi Arabia

Research on *Dobera glabra* Forssk is very little. A study was carried out in Jazan (south western Saudi Arabia) on the ecology of *D. glabra*. The species was distributed over a large area, but with decreasing density towards the Red Sea coast. Generally, the density of the species is very little. This is combined with 0% survival of seedlings and samplings after 8 months made the species existence endangered and urgent intervention is required to conserve it. Although the frequency of flowering was normal, nevertheless fruiting is extremely little (0.29%). The species regenerates well with seeds without any

pretreatment, however, the seedlings require immediate protection from grazing and other human activities. Seedling growth is extremely slow. All attempts of vegetative propagation of *D. glabra* from cuttings, failed despite the use of suitable rooting media and growth ormones. Due to the importance of the species as a fodder during the dry season where most other resources are unavailable and as famine food for humans, further research is needed on how to conserve *D. glabra*.

Key words: *Dobera glabra,* Germination, Vegetative propagation, Grazing, Famine, Foods, Fodder.

***Presenting author;** email: *iaref@ksu.edu.sa*

PP8-ENDEMIC PLANTS OF ANKARA THAT ARE LOCATED IN CR AND EN CATEGORIES

Zeki AYTAÇ*, Hayri DUMAN

Gazi University, Faculty of Arts and Science, Department of Biology, Teknikokullar / Ankara, Turkey

Ankara which is located in the middle of the step formation is floristically an interesting city with a well known flora. According to the previous surveys, 1367 flowering plants are identified to be growing in Ankara where 275 of them (20%) are endemic. Approximately 20 species that are located in the CR and EN categories are endemic to Ankara, and so far, 5 taxons are named after Ankara. In this study, 11 taxons in CR category and 3 taxons in EN category is investigated with respect to their localities, ecological characteristics and endangered categories.

Key words: IUCN categories, endemic plants, Ankara

***Presenting author;** email: *zaytac@gazi.edu.tr*

PP9-TEN ENDEMIC *Astragalus* L. SPECIES LOCATED IN CR AND EN CATEGORIES THAT ARE GROWING IN TURKEY

Zeki AYTAÇ[*1], Murat EKİCİ[1], Hasan AKAN[2]

[1]Gazi University, Faculty of Arts and Science, Department of Biology, Teknikokullar, Ankara, Turkey. [2]Harran University, Department of Biology, Urfa, Turkey.

According to the latest data, approximately 450 taxon of *Astragalus* grow in Turkey. 151 of these taxon are grouped as with spines, and 299 are grouped as without spines. The endemizm ratio of the species is 45 %. Seven of the taxons presented in this study are categorized as CR and three of them are categorized as EN. The reasons why these species are categorized as such is critically discussed with respect to the localities where they are collected and their habitat information.

Key words: Endemic plants, Astragalus, IUCN categories

***Presenting author;** email: *zaytac@gazi.edu.tr*

PP10-*EX-SITU* CONSERVATION OF ENDANGERED SPECIES OF COLCHIC FLORA *Arbutus andrachne* L. AND *Osmanthus decorus* (BOISS&BAL.) KASAPLIGIL

N. MELIA, L. GABEDAVA, T. BARBLISHVILI*, L. ZHGENTI

Tbilisi Botanical Garden and Institute of Botany, 0105, Botanikuri Street 1, Tbilisi, Georgia

Structural peculiarities of generative sphere at different phases of development, processes of pollination, fertilization and seed formation have been studied in two species of wild flora of Arcto-Tertiary Period included in "Red Data Book" of Georgia (2006) - *Arbutus andrachne* L. (**Ericaceae**) - Strawberry tree and *Osmanthus decorus* (Boiss&Bal.) Kasapligil **(Oleaceae)** – Caucasian osmanthus. As germinable seed is the main factor determining species distribution and complete transfer of genetic information, the aim of our research was to establish self-regeneration capacity of species under study and chose optimum conditions for seed germination, further development of seedlings and their *ex-situ* conservation.

It has been stated that abnormalities taking place at different stages of sexual reproduction of studied species are responsible for their low capacity for seed formation. In particular, these factors are as follows: limited capacities of allogamy; low percentage of pollen tube development – 20-30% - for *Arbutus andrachne* and 15-20% - for *Osmanthus decorus* despite the high fertility of pollen grain of both species (~70-80%); frequent occurrence of embryo degeneration.

The results of study have allowed elaboration of best protocols for propagation of these relic species for their further *ex-situ* conservation on the collection plot of the Department of Plant Conservation.

Key words: Conservation, fertility, pollen grain, embryo.

Presenting author: e-mail: *tinabar7@yahoo.com*

PP11-EX-SITU CONSERVATION OF SOME SPECIES OF *Quercus* L.

S. SIKHARULIDZE[1], N. MELIA [1], L. GABEDAVA [1], L. ZHGENTI [1], S. AVSARKISOV [2], T. BARBLISHVILI *[1]

[1]Tbilisi Botanical Garden and Institute of Botany, 0105, Botanikuri street 1, Tbilisi, Georgia
[2]Iv. Javakhishvili Tbilisi State University, 0105, Chavchavadze avenue 1, Tbilisi, Georgia

Some aspects of seed germination and seedlings establishment of two species of oak *Quercus pontica* C. Koch and *Quercus iberica* Stev. have been investigated. Urgency of complex study of *Quercus pontica* is stipulated by the fact that this species is a relic of Arcto-Tertiary Period. In particular, of great importance is investigation of reproduction biology, seed germination and sprouting and seed storage of these species. Results of investigation have shown that formation and further development of both female and male generative spheres of *Quercus pontica* and the processes of seed formation proceed normally and finally seeds of high germination capacity are formed. In order to establish germination capacity of seeds several variants of sowing were chosen. In conditions of room temperature seeds start to germinate on Petri dishes on the 17th day and germination rate reaches 75% after a month. Seed germination is promoted by low temperature ~10^{o}C. Temperature rather than humidity is important for storage of seeds. Seeds of *Quercus pontica* and *Quercus iberica* are well stored at +3^{o}C.

Effect of 8 different regimes of low intensity irradiation (light diode, α-radiation, pulse photon burning, UV radiation, 3 different kinds of laser emission) on germination capacity and development of seedlings of *Quercus iberica* has been studied. Germination of unirradiated seeds at room temperature served as a control. Optimum regime of irradiation and corresponding percent of established seedlings was stated.

Ex-situ conservation works are carried out for species under study. Optimum conditions for storage of oak seeds are established. Seed of both species are deposited in conditions of cold room at the Millennium Seed Bank of Kew Royal Botanical Gardens, UK.

Keywords: *Quercus pontica*, *Q. iberica*, Seed germination, Seedling establishement

***Presenting author:** e-mail:*bakurianigarden@yahoo.com*

PP12-*IN VITRO* PROPAGATION OF *Linaria genistifolia* (L.) Miller ssp. *praealta* (Boiss.) Davis

Gülat ÇAGLAR, Esra BULUNUZ*, Selay ELDOĞAN

[1]Kahramanmaraş Sütçü İmam University, Faculty of Agriculture, Department of Horticulture, Kahramanmaras, 46100-Turkey

The genus *Linaria* covers perennial herbaceous plants belong to *Scrophulariaceae* family. This genus has 150 species worldwide, and Turkey has 9 endemic plants out of its 20 species and 12 sub-species grown throughout the country. *Linaria genistifolia* (L.) Miller ssp. *praealta* (Boiss.) Davis is one of the endemic species found in the East Mediterranean Region of Turkey. The chemical composition of the genus includes many diverse ingredients such as monoterpenes, diterpenes, iridoids, flavonoids and alcoholids. The *Linaria* plant has been widely used in the folk medicine of Anatolia, Japan and India for centruies and recently is also valued as an ornemantal plant. Improved technologic tools have fortunetely led us conduct studies to develop such wild plants to adopt on different conditions with diverse usage. The aim of this study was to make rapid propagation of endemic plants of *Linaria genistifolia* (L.) Miller ssp. *praealta* (Boiss.) Davis, native to Anatolia. The axiller shoot tips were collected from native plants and cultured as explants onto ½ MS medium. Four concentrations of TDZ (0.0, 0.1, 0.5, 1.0 mg/l) and of BA (0.0, 0.5, 1.0, 2.0 mg/l) were investigated alone or with combination of GA_3 (0.1 mg/l). In rooting stage, different concentrations of IAA, IBA and NAA ((0.0, 0.1, 0.5, 1.0 mg/l) were tested. The effect of growth regulators on shoot induction, rate of shoot and callus formation, shoot number per explant, shoot and root length, subculture frequency, and the number of subcultures were determined. On the media supplemented TDZ, the shoot number was between 6.8 and 30.5, while on the media supplemented TDZ+GA_3 it was ranged from 20.4 to 30.8. However, on the media supplemented BA the shoot number was only between 6.5 and 9.8; and similarly on the media supplemented BA+GA_3 it was ranged from 7.3 to 14.5. The shoot length was between 8.8 and 9.1 mm on the media supplemented TDZ and was ranged from 7.0 to 11.5 mm on the media supplemented TDZ+GA_3 media. BA added media improved shoot lengths up to 16.1-20.6 mm, but it was further increased to 18.6 -34.17 mm by BA+GA_3 added media. Considering both the shoot length and the number of shoots of *in vitro propagtion* of *Linaria genistifolia* (L.) Miller ssp. *praealta* (Boiss.) Davis plants, it was concluded that the best results for obtaining plantlets could be achieved by adding 2.0 mg/l BA+0.1 mg/l GA_3 into the ½ MS medium.

Key words: *Linaria genistifolia, In vitro* propagation, Endemic plants.

***Presenting author;** email: *bulunuzesra@hotmail.com*

PP13-DISTRIBUTION AND CONSERVATION STATUS OF ENDEMIC TAXA OF TURKISH *Scutellaria* L. (LAMIACEAE)

Mehmet ÇİÇEK[*1] and Osman KETENOĞLU[2]

[1]Department of Biology, Pamukkale University, Faculty of Arts and Science, 20070 Denizli, Turkey,
[2]Department of Biology, Ankara University, Faculty of Science, 06100 Ankara, Turkey.

As part of a recent taxonomic revision of the genus *Scutellaria* L. (Lamiaceae) in Turkey, distribution and conservation status of endemic taxa of Turkish *Scutellaria* is presented here. *Scutellaria* L., with nearly 350 species mainly found in temperate regions and on tropical mountains of the world, is a subcosmopolitan genus of Lamiaceae. In the *Flora of Turkey*, the genus was previously represented by 16 species, and totally 37 taxa at specific and infraspecific ranks. However, according to the first author's recent treatment, Turkish *Scutellaria* is considered to consist of 32 taxa, 13 of which are endemic to Turkey. Data on the biogeography of taxa are obtained from the field studies and the herbarium materials kept at herbaria AEF, ANK, BM, EGE, GAZI, G-Boiss., HUB, ISTE, ISTF, JE, K, LD, LINN, P-Tourn., OXF, W and WU. In order to assess their conservational status, the population dynamics of taxa are noted during the field studies. Based on distributions and observations on the populations of the taxa, their conservational status is assessed. The geographical distribution of the taxa is mapped. According to the criteria of IUCN 2001, threatened categories of endemic taxa of Turkish *Scutellaria* are as follows: *S. brevibracteata* subsp. *pannosula* (CR), *S. tortumensis* (CR), *S.* x *ketenoglui* (CR), *S. anatolica* (CR), *S. pectinata* subsp. *elongata* (CR), *S. haussknechtii* (EN), *S. glaphyrostachys* (VU), *S. diffusa* (VU), *S. brevibracteata* subsp. *brevibracteata* (LC), *S. bicolor* (LC), *S. macrostegia* (LC), *S. salviifolia* (LC), and *S. sintenisii* (LC).

Key words: *Scutellaria*, Endemic, Conservation status, Endangered plants, Lamiaceae, Turkey

***Presenting author;** email: *mcicek@pau.edu.tr*

PP14-DETERMINATION OF PHYLOGENETIC AND EVOLUTIONARY STRUCTURE WITHIN *Quercus* GENUS THAT ARE NATIVE TO TURKEY

Ayten DIZKIRICI*, Zeki KAYA, Caner AKTAŞ and Çiğdem ÇETINER

[1]Middle East Technical University, Department of Biological Sciences, 06531, Ankara, Turkey

Quercus genus is the most widespread angiosperm-tree in Turkey. There is no enough information about hybridization, genetic and phylogenetical structures between and within populations of this genus. To delimit the taxonomic status of *Quercus* genus *trnL5'-F* region of cpDNA was used. Primers *c-d*, and *e-f* were prefered for double stranded DNA amplification of the *trnL intron (trnL5'-trnL3'),* and *the trnL3'-F* spacer, respectively. Specimen were collected from Ankara [Beynam (BEY), Elmadağ (ELM), Alacaatlı (ALA)] , Bolu (BOL)and Erzurum [Aşkale (ASK)] locations during field trips. A total of about 10 taxa (41 samples), nine of them belong to section *Quercus* sensu stricto (s.s) and the left one (ELMEX7) belongs to section *Cerris,* were analyzed during study. Variation is more in *trnL3'-F* region than that of *trnL intron* region. The constructed phylogenetic tree with Neighbor-Joining (NJ) distance method revealed that studied regions pyhlogenetically separated populations from each other rather than taxa. This situation may be caused because of hybridizations between species that are found in same population.

Key words: *Quercus,* Phylogeny, Evolution, Hybridization, *trnL-F* region

***Presenting author;** email: *e131715@metu.edu.tr*

PP15-PHYLOGENETIC RELATIONSHIPS BETWEEN SOME TAXA OF *Salvia* GENUS BY USING cpDNA REGION FROM trnT (UGU) TO trnF (GAA)

Ayten DİZKIRICI, Zeki KAYA, Çiğdem ÇETİNER*, Ferhat CELEP, Ahmet KAHRAMAN and Musa DOĞAN

Middle East Technical University, Department of Biological Sciences, 06531, Ankara, Turkey

The phylogenetic relationships between taxa of *Salvia* genus were analyzed by comparing sequences of *trnT-F* region that is found in cpDNA. All studies samples belong to Section *Hymenosphace.* Specimens of *S. euphratica* sensu lato and closely related taxa were gathered from their natural habitats in the East and South Anatolia. A total of 7 taxa were analyzed during study. Two intergenic spacers, *trnT-trnL* and *trnL-trnF,* and the *trnL* intron of cpDNA were sequenced to determine phylogenetic relationships of 7 *Salvia* taxa. There is no variable sequences in *trnL3'-trnF* region. Each of *trnT-trnL* and *trnL5'-trnL3'* regions has only one variable DNA sequence. While DNA sequences taken from *trnT-trnL* region was used, *S.sericeo-tomentosa-sericeo-tomentosa* taxa was seperated from other taxa. However *trnL5'-trnL3'* region was used*, S.euphratica-leiocalycina* subspecies was separated from others by phylogenetically. Therefore to understand phylogenetic structure of Salvia taxa, only this region may not be enough with these restricted number of samples.

Key words: *Salvia*, Phylogeny, *trnT-F* region

***Presenting author;** email: *e131715@metu.edu.tr*

PP16-IN VITRO PROPAGATION OF CRITICALLY ENDANGERED ENDEMIC *Rhaponticoides mykalea* (Hub.-Mor.) BY AXILLARY SHOOT PROLIFERATION

Yelda EMEK* and Bengi ERDAĞ

Department of Biology, Faculty of Science & Arts, Adnan Menderes University, 09010 Kepez Aydın, Turkey

R. mykalea is an endemic critically endangered species which spreads very narrow in Kuşadası (Aydın), Muğla and Isparta and faced with danger of extinction. Species which has very limited number of individuals is under strong anthropogenic pressure; such as the gradually increase in ongoing urbanization due to rapid developments of tourism sector, the destruction of natural habitats for providing land, the over-grazing and collecting capitula by local people for food. The species's already been under the threat of extinction and the situation above will risk the danger of the extinction of this species more. In this study, plants have been produced by *in vitro* tissue culture methods which are one of the alternative propagation methods for plant propagation. The shoots which were obtained from *in vitro* germinated mature embryos were used for axillary shoot proliferation. For that reason, the most appropriate cytokinin type and concentration were determined. The highest axillary shoot number per explant was obtained with MS medium supplemented with 0.5 mg/L $^{1}N^{6}$- Benzyladenine (BA) (5.8 shoot/explant). MS medium supplemented with 0.1 mg/L Kinetin (KIN) was determined as the the most suitable medium for the maximum shoot length (7.35 cm). Solitary shoots, removed from

stock cultures, were transferred onto half- strength MS (½ MS) or MS media supplemented with various concentrations of indole-3-butyric acid (IBA), indole-3-acetic acid (IAA) or naphthalene acetic acid (NAA) for rooting. The maximum rooting rate was obtained with half-strength MS medium supplemented with 0.5 mg/L IBA. Rooted plantlets were transferred to external environment step by step.

Key words: Conservation, *In vitro*, *R. mykalea*, Axillary shoot proliferation

***Presenting author;** email: *yelda@adu.edu.tr*

PP17-VARIABILITY OF FOLIAGE STRUCTURAL PARAMETERS OF TUNISIAN CORK OAK POPULATIONS

Amel ENNAJAH*[1], Salah GARCHI[1], Florent MOUILLOT [2], Richard JOFFRE[2] and Nejib REJEB[1]

[1] Research Institute in Agricultural Engineering, Water and Forestry, Street HédiElkarray, Elmenzah IV, BP10, Ariana 2080, Tunisia, [2] Centre of Evolutionary and Functionnel Ecology CNRS – 1919, route de Mende. 34293 Montpellier cedex. France

A forest can be considered as a dynamic tree community on long time periods, and reflecting at each time step the changes in environmental conditions (Shugart and Noble, 1981). More generally, forest dynamic is associated with canopy structural variation and in time and space. In this context, the objectives of this paper is to quantify the spatial variation in canopy structural parameters (LMA, LAI) in 30 cork Oak populations distributed along a temperature and precipitation gradient in Northern Tunisia, as an indicator of ecosystem functioning. We observed a significant difference in LMA according to altitude and climate. Highest values were obtained in the less favorable sites. Measurements of LAI (m2 of leaves per m2 of ground), closely linked with ecosystem's net primary production (NPP) allowed us to conclude on the role of understorey vegetation on cork oaks functioning: the denser is the understorey, the lower is the cork oak canopy LAI.

Key words: Kroumirie Mountains, Cork Oak, Canopy structural parameters, Environmental gradient

***Presenting author;** email: *aennajah@yahoo.fr*

PP18-ANATOMICAL AND PALYNOLOGICAL INVESTIGATIONS ON RARE ENDEMIC *Hypericum sechmenii* OCAK & KOYUNCU (HYPERICACEAE) GROWING NATURALLY IN ARAYİT MOUNTAIN, (SİVRİHİSAR) ESKİŞEHİR

İsmühan Potoğlu ERKARA*, Atila OCAK, Onur KOYUNCU, Kadir OSOYDAN, Murat ARDIÇ, Ömer Koray YAYLACI, Derviş ÖZTÜRK

Eskişehir Osmangazi University, Faculty of Science and Art, Department of Biology, 26480, Meselik, Eskisehir, Turkey

The purpose of the present study is to determine anatomical and palynological characteristics of the rare endemic Turkish taxon *Hypericum sechmenii* Ocak & Koyuncu (Hypericaceae) that show natural distribution in Arayit Mountain, (Sivrihisar) Eskişehir. Upon the examination of the root cross-rections, the pith was determined to be completely covered by xylem cells. As to stem cross-sections, it was observed that large parenchymatic cells were present in the pith of the young stems, while old stems were observed to have formed cavity in its pith. Leaves are equifacial and amphistomatious and

they have amaryllis type stomata. They are mesomorphic and there are schizo-lisigenous type secretion pockets in the leaves. Compared to adjacent cells, stomata are anisocytic. The results of the light and scanning electron microscope investigation revealed pollen grains of *H. sechmenii* are tricolporatae, amb shape triangular, pollen shape spheroidal-prolate.

Key words: *H. sechmenii* Ocak & Koyuncu, Hypericaceae, Anatomy, Pollen morphology, Light microscope, SEM (scanning electron microscope), Arayit Mountain, Sivrihisar, Eskişehir, Turkey.

***Presenting author;** email: *ismuhan@ogu.edu.tr*

PP19-POLLEN MORPHOLOGY ON THE THREE ENDEMIC *APIACEAE* TAXA

Derviş ÖZTÜRK, İsmühan Potoğlu ERKARA*, Atila OCAK, Onur KOYUNCU, Kadir OSOYDAN, Ömer Koray YAYLACI, Filiz SAVAROĞLU, Süleyman TOKUR

Eskişehir Osmangazi University, Faculty of Science and Art, Department of Biology, 26480, Meselik, Eskisehir, Turkey

In this study, the detailed morphological structure of the pollen of the three endemic Turkish taxa *Pimpinella anthriscoides* Boiss. var. *cruciata* (Bornm. & Wolff) Matthews, *Bupleurum turcicum* Snogerup, *Astrantia maxima* Pallas var. *haradjianii* (Grintz) Rech. fil. (Apiaceae) were observed by light and scanning electron microscope for the first time.
The results of the light and scanning electron microscope investigation revealed prolate, the amb triangular and tricolporatae in the pollen of three endemic Apiaceae taxa. Exine ornamentation was also determined infratectatae- rugulate.

Key words: *Pimpinella anthriscoides* var. *cruciata*, *Bupleurum turcicum*, *Astrantia maxima* var. *haradjianii*, Apiaceae, Pollen morphology, Light microscope, SEM, Turkey

***Presenting author;** email: *ismuhan@ogu.edu.tr*

PP20-STUDYING AND EX-SITU CONSERVATION GEORGIAN ENDEMIC SPECIES *Pyrus sachokiana* Kutath., *Pyrus ketzkhovelii* Kutath., *Pyrus demetrii* Kutath.

I. TVAURI [1], Nana GOGINASHVILI [*1], Tamar JINJIKHADZE[2]

[1]V. Gulisashvili Forest Institute, 0186 Mindeli 9, Tbilisi, Georgia. [2] Tbilisi Botanic Garden and Institute of Botany, Kodjori road #1 0105, Tbilisi, Georgia

Georgia is rich in unique representatives of species of Flora, the part of which is at the edge of extinction. We studied three species of Pyrus genus: *Pyrus demetrii Kutath., Pyrus sachokiana Kutath, Pyrus ketzkhovelii* which are endems of Georgia, all the three species belong to the endangered taxons (EN). It was carried out definition of precise geographical coordinates, there was done detailed description. We have studied karyotype of these species. At the basis of the recieved material there is done composition of the georeference maps, which will be put together with EUFORGEN information system. We have created seed bank, Seed were gathered from different location, it was elaborated with standards of FAO and is kept as short term (1-3 years), also for the long term (10 and more). As a result of the research it was stated that two species: *Pyrus ketzkovelii* Kuthath. and *Pyrus sachokiana* Kutath are very limited, and they are at the edge of the real extinction. *Pyrus demetrii* Kutath is in better condition which is also fragmentary and is singled out with the limited space.

Key words: Endemic, *Pyrus*, Conservation, Seed Bank, Georeference maps.

***Presenting author**; email: *nanagoginashvili@mail.ru*

PP21-KARYOTYPE AND POLLEN MORPHOLOGY OF TURKISH RARE ENDEMIC *Centaurea Lycopifola* Boiss. &Amp; Kotschy

Ayşe Nihal GÖMÜRGEN*[1], İsmühan POTOĞLU[2], Haşim ALTINÖZLÜ[1]

[1]Department of Biology, Science Faculty, Hacettepe University, Beytepe, Ankara, Turkey
[2]Department of Biology, Science and Art Faculty,Eskişehir Osmangazi University, Eskişehir, Turkey

In this study, karyotype and detailed morphological structure of the pollen of the rare endemic Turkish taxon *Centaurea lycopifola* Boiss. & Kotschy, are studied for the first time. Chromosome number of *Centaurea lycopifolia* is found to be tetraploid (2n = 4x = 36). The basic chromosome number of *C.lycopifolia* is found to be x = 9 and the haploid karyotype formula is 9 m, 9 sm. The pollen grains of *C. lycopifolia* are observed by light and scanning electron microscope for the first time. The results of the light and scanning electron microscope investigation revealed spheroidal-subprolate, the amb triangular and tricolporatae in the polen of *Centaurea lycopifolia* taxon. Exine ornamentation is also determined tectatae, microechinate-scabrate.

Key words: Turkish rare endemic, *Centaurea lycopifolia*, Karyotype, Pollen morphology, Light microscope, SEM (scanning electron microscope)

***Presenting author;** email: *gomurgen@hacettepe.edu.tr*

PP22-THE PHYLOGENETIC ANALYSIS OF *Picea orientalis* POPULATIONS FROM NORTHEASTERN TURKEY WITH RESPECT TO NON-CODING trn REGIONS OF CHLOROPLAST GENOME

Ali Murat GÜLSOY*[1], Fatih TEMEL[2], Aysun Demet GÜLSOY[1], and Zeki KAYA[1]

[1]Middle East Technical University, Department of Biological Sciences, 06531, Ankara, Turkey
[2]Artvin Coruh University, Faculty of Forestry, 08000, Artvin, Turkey

The oriental spruce (*Picea orientalis*) is one of the species of Pineceae family, growing naturally as a widespread in northeastern Turkey and lower Caucasus. To determine the phylogentic status of the species, non-coding *trn* regions of chloroplast DNA (cpDNA) was studied and molecular diversity was assessed comparatively among 15 oriental spruce populations each of which possesses 1-4 families, sampled from northeast Turkey. Of three regions of *trn*, it was found that although there were no significant differences between regions, with respect to the variable site and the parsimony informative site *trn*L3'-*trn*F' could be more suitable for comparative molecular analaysis in spruces. The constructed phylogenetic tree showed that populations from Artvin Sacinka, Trabzon Pazar and Ordu Gölköy were grouped together with a bootstrap value larger than 50; however, other populations showed a dispersed allocation in the tree. Moreover, with respect to two *trn* regions, which are *trn*L5'-trnL3' and *trn*L3'-*trn*F', the studied populations were compared with other *Picea* species on database. The result showed that although there are groupings among *Picea* species, they were not phylogenetically informative due to the low bootstrap values. It can be concluded that there is no a clear speciation or genetic divergence of *Picea* species with respect to *trn* regions.

Key words: *Picea orientalis*, *trn*, Molecular diversity, Phylogeny

***Presenting author;** email: *alimuratgulsoy@yahoo.com*

PP23-Relationships based on nrDNA ITS region in some endemic *Scorzonera* L. (Asteraceae) taxa from Turkey

Mutlu GÜLTEPE[1*], Azer OZAD[2], Serdar MAKBUL[2] and Kamil COŞKUNÇELEBI[1]

[1]Karadeniz Technical University, Faculty of Arts & Sciences, Department of Biology, 61080 Trabzon, TURKEY, [2]Rize University, Faculty of Arts & Sciences, Department of Biology, 53100, Rize,TURKEY

In this study, six endemic *Scorzonera* (Asteraceae) taxa (*S. aucheriana* DC, *S. eriophora* DC, *S. hieraciifolia* Hayek, *S. pygmaea* Sibth. & Sm., *S. suberosa* C. Koch subsp. *suberosa*, *S. tomentosa* L.) were analysed using nucleotide sequences of nrDNA ITS region. The plant materials were collected from Anatolia during the vegetation period. Total genomic DNAs were isolated from the healthy leaves. Amplification of entire ITS region were obtained by using universal primers with the aid of polymerase chain reaction (PCR) and PCR products were sequenced. The sequences of the region were analyzed with MEGA software. The alignment of ITS region were occured 742 characters. Of the 742 characters, 493 were constant, 157 variable characters, and 126 characters were parsimony-informative. The Neighbour Joining (NJ) Maximum Parsimony (MP) trees were constructed based on sequences in order to emerge the relationships among the taxa. According the NJ & MP trees, all the investigated taxa clustered within the two clades which shows that the genus *Scorzonera* should be a paraphyletic genus.

Keywords : Asteraceae, *Scorzonera*, nrDNA, ITS, Turkey

***Presenting author:** email:*mutlugultepe@yahoo.com*

PP24-EFFICIENT MICROPROPAGATION OF ENDEMIC *Origanum acutidens* (Hand.-Mazz.) Ietswaart

Derya GÜRLEK*, Sebahattin ÖZCAN, Khalid Mahmood KHAWAR, Muhammad AASIM, Oğuzhan FAKILI

Department of Field Crops, Faculty of Agriculture, Ankara University, 06110, Dışkapı, Ankara, Turkey

About 38 species of *Origanum,* family Lamiaceaea are found in the world; Out of 22 Origanum species found in Turkey, 13 are endemic. Origanum species is known to have antioxidant, antifungal, and antibacterial properties. It is widely used as spice among people. Some *Origanum* species are also used as remedy for problems in digestion, respiration and appetite. *Origanum acutidens* (Hand.-Mazz.) Ietswaart is endemic to Eastern Anatolia, Turkey and is found as perenniel bush in the natural flora. The population of the plant is reducing gradually due to fast urbanişsation. There is need to conserve and protect flora of Turkey both through conventional and non conventional methods of propagation; however, there has been no report about its multiplication either through conventional or non

conventionals methods. This study reports *in vitro* micropropagation of *O. acutidens* from first hypogeal node obtained from *in vitro* regenerated one week old seedlings on MS medium containing different concentrations of auxins and cytokinins. The shoot regeneration ranged 9.97 to 15.03 shoots per explant on MS medium containing 2 mg/l BAP - 0,02 mg/l NAA and 0,5 mg/l BAP - 0,02 mg/l NAA respectively. The *in vitro* regenerated shoots were rooted and acclimatized to external conditions.

Key words: *Origanum acutidens*, *In vitro*, Micropropagation, Conservation, Endemic

***Presenting author;** email: *deryagurlek@hotmail.com*

PP25-A TURKISH CAUCASIAN ENDEMIC; *Tulipa gumusanica* TERZİOĞLU, AND ITS RELATION WITH CLOSELY RELATED TAXA BASED ON nrDNA ITS AND NONCODING cpDNA REGIONS

Murat Erdem GÜZEL*[1], Mutlu GÜLTEPE[1], Kamil COŞKUNÇELEBI[1] and Salih TERZIOĞLU[2]

[1]Karadeniz Technical University, Faculty of Arts & Sciences, Department of Biology, 61080 Trabzon – Turkey, [2]Karadeniz Technical University, Faculty of Forestry, Department of Forest Botany, 61080, Trabzon – Turkey

In this study, two *Tulipa* L. (Liliaceae) were compared using nucleotide sequences of nrDNA ITS and three noncoding cpDNA regions (*trn*T-L, *trn*L, *trn*L-F). The plant materials were collected from near Gümüşhane included by Caucasus Biodiversity Hotspot. Total genomic DNAs were isolated from the healthy leaves. Amplification of entire nrDNA and cpDNA regions were obtained by using universal primers with the aid of polymerase chain reaction (PCR). The lengths of ITS, *trn*T-L, *trn*L, *trn*L-F were found 701, 802, 660, 260 bp for *T. gumusanica*, and 697, 803, 670, 257 bp for *T. armena* var. *armena*, respectively. The *trn*T-L region shown only a base difference between two taxa, but the ITS was the most variable one among the examined region.

Key words: *Tulipa*, Endemic, nrDNA ITS, *trn*T-L, *trn*L, *trn*L-F, Liliaceae

***Presenting author;** email: *muraterdemguzel@hotmail.com*

PP26-RARE NON-ENDEMIC SPECIES OF THE GENUS *Salvia* L. (LAMIACEAE) IN TURKEY

Ahmet KAHRAMAN[1*], Musa DOĞAN[1], Ferhat CELEP[1], Safi BAGHERPOUR[1], Galip AKAYDIN[2]

[1]Middle East Technical University, Department of Biological Sciences, 06531, Ankara, Turkey, [2]Hacettepe University, Department of Biology Education, 06532, Ankara, Turkey

As a part of a current revision study of *Salvia* L. (Lamiaceae) in Turkey, extensive field, herbarium and literature studies have been carried out on rare non-endemic species of the genus. The results show that three species (*S. kurdica* Boiss. & Hohen. Ex Benth., *S. macrosiphon* Boiss. and *S. viscosa* Jacq.) are found only in one locality and four species (*S. aramiensis* Rech.f., *S. cassia* Sam. ex Rech.f., *S. indica* L. and *S. pomifera* L.) are distributed in a few localities. Their conservation status at national level using recent IUCN red list categories, the factors affecting their survival, distribution areas, distribution maps and ecology are also given.

Keywords: Lamiaceae, Rare non-endemic species, *Salvia*, Turkey

***Presenting author**: email: *ahmetk@metu.edu.tr*

PP27-THE ENDEMIC *Crocus* TAXA OF WESTERN ANATOLIA

Mesut KIRMACI*, Ali ÖZMEN, Emre AĞCAGİL

Adnan Menderes University, Faculty of Arts & Sciences, Department of Biology, 09010 Aydın, Turkey

The geographic location and position of Turkey yield to a very rich biodiversity for floral sources. Wild flowers, including many endemic species have distributed in many different habitats and altitudes. Turkey has approximately 11.500 species, subspecies and varieties which comprise a very rich flora. Among these plants, more than 3.200 taxa, approximately 34% of them are endemic for our country. With 150 endemic plant taxa, Aegean Region comes after Mediterranean, East Anatolia, Middle Anatolia and Black Sea Region. *Crocus* is a very rich genus with 56 taxa deployed in Turkey and according to TUBİVES (Turkish Plant Data Service) 34 taxa is endemic for Turkey. Among these, 10 taxa which are *C. fleischerii, C. olivieri ssp balansae, C. antalyensis, C. biflorus ssp nubigena, C. baytopiorum, C. gargaricus, C. flavus ssp dissectus, C. biflorus ssp isauricus, C. cancellatus* and *C. nerimaniae* were recorded from West Anatolia. While *C. cancellatus* and *C. nerimaniae* are flowering in autumn season, the others are flowering in spring season. In this study, endemic *Crocus* taxa of West Anatolia were given with collecting date, locality information and pictures.

Key words: West Anatolia, Flora, Endemic, *Crocus*

***Presenting author;** email: *mkirmaci@adu.edu.tr*

PP28-ANATOMICAL AND PALYNOLOGICAL CHARACTERISTICS OF TWO ENDEMIC PLANTS SPECIES (*Anthemis oxylepis* and *Sideritis galatica*) FROM ESKIŞEHIR

Atila OCAK, Onur KOYUNCU*, Kadir OSOYDAN, Ömer Koray YAYLACI, Derviş ÖZTÜRK, İsmühan Potoglu ERKARA, Murat ARDIÇ

Eskişehir Osmangazi University, Faculty of Science and Art, Department of Biology, 26480, Meselik, Eskisehir, Turkey

The purpose of the present study is to determine anatomical and palynological characteristics of the rare endemic Turkish taxa *Anthemis oxylepis* (Boiss.) Boiss. (Asteraceae) and *Sideritis galatica* Bornm. *A. oxylepis* show natural distribution in Idris Plateau, Eskişehir. Upon the examination of the root cross-rections, the pith was determined to be completely covered by xylem cells. As to stem cross-sections, it was observed that large parenchymatic cells were present in the pith of the stems. Leaves are equifacial and amphistomatious and they have amaryllis type stomata. They are mesomorphic. Stomata are anisocytic. The results of the light and scanning electron microscope investigation revealed pollen grains of *Anthemis oxylepis* are tricolporatae, amb shape triangular, pollen shape spheroidal. Exine tectatae-echinate. *S. galatica* Bornm. has a compact root anatomy with a parenchymatous component in pith. The plant has four cornered stem with 5-6 layers of collenchyma cells inside the epidermis. The pith is parenchymatous. In the leaf mesophyll, the palisade and spongy parenchyma cells were of similar shape. The leaf was amphistomatious. The plant was amaryllis

mesomorphic and anisocytic type of stomata. According to Light microscope and SEM (scanning electron microscope), the pollen grains were prolate-spheroidal and tetrazonocolpate. Exine was seen to be tectate-psilate.

Keywords: *Anthemis oxylepis* (Boiss.) Boiss., Asteraceae, *Sideritis galatica* Bornm., Lamiaceae, Anatomy, Pollen morphology, Light microscope, SEM, Eskişehir, Turkey

***Presenting author;** email: *okoyuncu@ogu.edu.tr*

PP29-LIGHT EFFECTS ON SEED GERMINATION OF ENDEMIC *Centaurea* L. SPECIES IN SECTION Phalolepis (Cass.) DC.

Yavuz Bülent KÖSE[*1] and Ersin YÜCEL[2]

[1]Anadolu University, Faculty of Pharmacy, Pharmaceutical Botany, 26470, Eskişehir, Turkey. [2] Anadolu University, Faculty of Science, Biology Department, 26470, Eskişehir, Turkey

While almost 600 species of *Centaurea* L. are common around the world, there are 221 species in Europe [Brummitt, 2004; Tutin, 1976]. In Turkey, after the genus *Astragalus* and *Verbascum*, which includes the most species, *Centaurea* is the third in terms of the number of species it has [Davis, 1975]. The ratio of endemism is quite high (about 63%). In this study, light effects on seed germination of 8 endemic species belonging to *Centaurea* L. Section *Phalolepis* (Cass.) DC. (*C. cadmea*, *C. aphrodisea, C. amaena, C. lycia, C. luschaniana, C. wagenitzii, C. tossiensis, C. hieropolitana)*. The effect of light on germination was determined for three photoperiod (16 h light : 8 h dark, 16 h dark : 8 h light, 24 h dark) and 25 ^{0}C ± 1 temperature regime. In every experiment serie, 100 mature seeds were germinated. Experiments were made in petri disches (9 cm wide) and on filter paper. Significant results (p<0,01) were found according to variance analysis in point of germination percentage and germination speed . *C. amaena* has highest germination percantage and germination speed.

Key words:*Centaurea* sp., endemics, germination

***Presenting author;** email: *ybkose@anadolu.edu.tr*

PP30-DIFFERENCES BETWEEN CHEMICAL COMPOSITIONS OF WOOD EXTRACTS (TARS) PRODUCED BY TRADITIONAL METHODS AND MODERN LABORATORY METHODS IN TAURUS CEDAR (*Cedrus libani* A. Rich.)

Yusuf KURT* and Kani IŞIK

Akdeniz University, Faculty of Arts and Sciences, Biology Department, Antalya-Turkey

Ethnobotanical uses of plant species varies depending on the knowledge and geography of the civilizations, and also prevailing diseases in a given time and region. Katran or wood extractives from *Cedrus libani* A. Rich., a native and relatively rare species in the eastern Mediterranean region, have been used for various purposes by Mediterranean civilizations since ancient times. This study is based on information obtained both from the literature and a research project carried out by the authors. In terms of their qualitative and quantitative chemical properties, we observed significant differences between the wood extractives produced by traditional methods and modern laboratory methods. We

also determined considerable differences in extraction procedures. Quality of wood used for extraction, extraction temperature and duration appear to be among the several factors that influence the chemical quality and quantity of the extracts. The contribution of each of these factors, either alone or by combination, is not clearly known. In addition, although the products extracted by either method are used for similar purposes, the level of biological effectiveness of each of them and specific chemicals responsible for such effectiveness need to be determined.

Key words: *Cedrus libani*, Sesquiterpenoids, Wood extractives, Volatile oils, Wood tar

***Presenting author;** email: *yusufkurt@akdeniz.edu.tr*

PP31-IN VITRO REPRODUCTION OF *Jurinea cyanoides* (L.) RCHB.

Jana MALÁ, Pavlína MÁCHOVÁ*, Helena CVRČKOVÁ

Forestry and Game Management Research Institute, Strnady 136, 252 02 Jíloviště, Czech Republic

Jurinea cyanoides is the perennial a species of the genus *Jurinea.* This plant belongs to the critically threatened taxa in the Czech Republic growing in open vegetation on sandy dune and in rare pine tree forest on the locality near Tišice. The present number of these species individuals is so low that their natural reproduction is not guaranteed. Micropropagation was used for preservation of the critically endangered *Jurinea cyanoides.* The vegetative organs from the endangered donor plants were sampled and the sterilized shoots for induction of organogenesis were planted on the modified MS medium (Murashige and Skoog 1962) with 0.2 $mg.l^{-1}$ of BAP and 0.1 $mg.l^{-1}$ of IBA, 200 $mg.l^{-1}$ of glutamine, 200 $mg.l^{-1}$ of casein hydrolysate, 30 $g.l^{-1}$ of sucrose, 6 $g.l^{-1}$ of agar, pH adjusted to 5.8. The shoots were cultivated in the acclimatized conditions at 24 ºC and for 16h photoperiod by the white fluorescent light (30 $nmol.m^{-2}.s^{-1}$). Multiplicated shoots were used for rooting attempt. They were transferred on MS modified medium without cytokinins and with the enhanced concetration of auxin 3 $mg.l^{-1}$of IBA. Rooting was done under the same cultivation conditions like organogenesis induction and multiplication. The rooted cultures were transplanted into perlit and watered by the basal MS medium without phytohormones and saccharose diluted by distilled water 1 : 10. The cultures were cultivated in the constant cultivation conditions at 20 °C under 24h white fluorescent light (30 $nmol.m^{-2}.s^{-1}$). The preservation programme is running in the cooperation with the Agency of Nature Protection.

Key words: *Jurinea cyanoides,* Critically threatened taxon, Micropropagation, Preservation

***Presenting author;** email: *machova@vulhm.cz*

PP32-*EX-SITU* CONSERVATION OF WORONOW'S SNOWDROP (*Galanthus woronnowii* A. LOSINSK) AND GEORGIAN CYCLAMEN (*Cylamen vernum* SWEET)

T. MIKATADZE-PANTSULAIA*, Tinatin BARBLISHVILI, M. KHUTSISHVILI

Tbilisi Botanical Garden and Institute of Botany, 0105, Botanikuri street 1, Tbilisi, Georgia

Representatives of genera **Galanthus** and **Cyclamen** are distributed locally on almost the whole territory of Georgia. Due to high ornamental and medicinal properties these species are of high commercial value and are under severe anthropogenic stress. Though protected under CITES convention, these species are often harvested immediately from the wild nature. This impedes

reproduction of their natural populations resulting in decrease of number of individuals. Production of great number of seeds and then successful settlement of obtained generation in corresponding ecological niches is necessary for a species to survive in certain environment (ecosystem).
Study of peculiarities of seed forming processes and establishment of reproduction strategy is of crucial importance for survival of plant species reproduced mainly by seeds. This will serve as a basis for the development of concrete protection measures.
Reproduction strategy, ratio between potential and actual seed production capacities, capacities for self-reproduction, seed germination rate, capacity of seedlings sprouting and development of seedlings have been studied for *Galanthus woronowii* A. Losinsk and *Cyclamen vernum* Sweet .
It has been established that the studied species have good self-reproduction capacity. Potential for reproduction by seeds is high and the process is well adapted to the environment. Seed germination and sprouting capacities are quite high. Sprouting capacity of seeds sown in pots was 77-78% for *Galanthus woronowii* and 88% for *Cyclamen vernum*. Plants developed from seeds of *G. woronowii* start flowering on 4th year. Plants of *C. vernum* obtained by seeds start flowering on the 3rd year. Also high is capacity of seedlings development.
Our investigations have shown that generative reproduction of *Galanthus woronowii* and *Cyclamen vernum* is less affected by environmental factors. Generative reproduction of these species is threatened by human impact (flowers are extensively collected reducing likelihood of seed falling into soil. Also corms and bulbs are collected in medicinal purposes, causing reduction in number of these species, as this hampers realization of potential capacity for reproduction. In our opinion harvesting from the wild of *Galanthus woronowii* and *Cyclamen vernum* is inadmissible and only plant stock propagated artificially in farms should be used for commercial purposes.
Ex-situ conservation activities have been undertaken: stock of seeds of *G. woronowii* are *Cyclamen vernum* is created at the Caucasus Regional Seed Bank, managed by the Tbilisi Botanical Garden and Institute of Botany and 500 seeds with accompanying herbarium vouchers are sent to the Millennium Seed Bank of the Royal Botanical Gardens Kew, UK. Living collections of the species under study are established at the collection plot of the Department of Plant Conservation. This stock will be available for individuals interested in commercial use of these species and also for reintroduction of plants in case of need.

Key words: Conservation, seed reproduction, germination, seed bank.

Presenting author: email*: tsirapantsu@yahoo.com*

PP33-A RARE ENDEMIC SPECIES FROM TURKEY: *Asperula serotina*

Ersin MİNARECİ* and Kemal YILDIZ

Celal Bayar University, Faculty of Arts and Sciences, Department of Biology, 45140, Muradiye, Manisa, Turkey

Asperula L., with a total of 183 species, is one of the most important genera in the family. There are 51 taxa in six sections in the Turkish flora, 26 of which are endemic. The rare endemic *Asperula serotina* (Boiss. & Heldr.) Ehrend. was examined in terms of general characteristics, seedstructure and micromorphology, pollen characteristics. In our study, the descriptions of the species found in "Flora of Turkey" have been widened. The pollens and seeds belonging to the species specimens have been taken photographs via scanning electron microscope (SEM). The spreading locations have been determined and these locations with GPS data have been recorded. Conservation status of *A. serotina* has been renewed according to IUCN criterions as follows; EN B2ab (i,ii). By this study, explanations and interpretations related to being narrowly spreading endemic have been made on the investigated

species. In addition, an insect genus effecting the living and spreading of the investigated species has been detected and identified.

Key words: *Asperula*; endemic; Flora of Turkey.

***Presenting author;** email: *ersinminareci@gmail.com*

PP34-ENDEMIC *Satureja* L. SPECIES (LABIATAE) IN TURKEY

Mehtap ÖZTEKİN[1]* and Sadık ERİK[2]

[1]Central Anatolia Forestry Research Institute, Ministry of Environment and Forestry, P.B. 24, 06501 Bahcelievler-Ankara, Turkey. [2]Hacettepe University, Faculty of Science, Department of Biology, Botany Section, 06800, Beytepe, Ankara, Turkey.

In Turkey, there are 15 species of *Satureja* L. genus. Five of these *Satureja* species are endemic and grown in *S. cilicica* (İçel), *S. amani* (Antakya), *S. wiedemanniana* (Tokat), *S. parnassica* ssp. *sipylea* (Manisa) and *S. aintabensis* (Gaziantep). In this study, morphological properties, distribution area features, population conditions and risk categories of 5 endemic species of *Satureja* genus have been given. Generally, since *Satureja* species, under the name of savory, are used as tea, spices and folk medicine, populations are at risk. Plant samples which were collected during the field studies of "TUBITAK-TBAG No. 1682" project has been named according to the Flora of Turkey. To determine the risk classes, Red Data Book of Turkey and IUCN Red List Categories (version 3.1) has been taken in to the consideration.

Keywords: *Satureja,* Labiatae, Revision

***Presenting author:** email:*oztekinmehtap@yahoo.com*

PP35-GENETIC VARIATION IN HANÖNÜ (KASTAMONU)-GÜNLÜBURUN ANATOLIAN BLACK PINE (*Pinus nigra* ARNOLD. Subsp. *pallasiana* (LAMB.) HOLMBOE) CLONAL SEED ORCHARD ACCORDING TO SOME NEEDLES CHARACTERS

Hakan ŞEVIK [*1], Sezgin AYAN[2], Nurcan YIGIT[3]

[1]Kastamonu Univ., Forestry Faculty, Landscape Architecture Dep., 37100 Kastamonu, Turkey, [2]Kastamonu Univ., Forestry Faculty, Silviculture Dep., 37100 Kastamonu, Turkey, [3]Kastamonu Univ., Forestry Faculty, Botanic Dep., 37100 Kastamonu Turkey

Anatolian Black Pine (*Pinus nigra* Arnold. subsp. *pallasiana* (Lamb.) Holmboe) is one of the most common and important forest tree species in Turkey. Meanwhile, the stands of this species occupy roughly 4,2 million ha, of which about 1,8 million ha are considered to be non productive forest. Also, this pine species is most important species which can be spread to the steppe regions in Anatolia. The semi-arid steppe regions evaluate as potential afforestation areas. Actually, the seed demand for this species is mainly supplied from current 53 of seed orchards and 79 of seed stands. Most of these seed orchards are still rather young and mainly established after 1990's. The main objective of Anatolian black pine seed orchards is the production of genetically improved seed for reforestation purpose. The objective of this study was to investigate the genetic variation in Hanönü-Günlüburun Anatolian Black Pine (*Pinus nigra* Arnold. subsp. *pallasiana* (Lamb.) Holmboe) clonal seed orchard using eight morphological and anatomical needles characters. For this purpose; 5 sample trees from 30 clones and

10 needles from each samples tree were selected. Totally 1500 sample needle were used for this study. Nine morphological and anatomical traits (needle length, needle width, needle thickness, sheath thickness, number of rows of stomata in the dorsal and ventral faces, number of stomata per cm of needle length in the dorsal and ventral faces) were determinate in 1500 needle. The results showed that; there were significant differences between clones according to eight morphological and anatomical needles characters.

Key words: Anatolian Black Pine, Seed orchard, Genetic variation, Needles characters

***Presenting author;** email: *hsevik@kastamonu.edu.tr*

PP36-DETERMINATION OF GENETIC VARIATION BETWEEN AND WITHIN POPULATIONS OF *Abies nordmanniana* SUBSP. *bornmülleriana* MATTF ACCORDING TO SOME SEED AND SEEDLING CHARACTERISTICS

Hakan ŞEVIK[*1], Zeki YAHYAOĞLU[2] and İbrahim TURNA[2]

[1]Kastamonu Univ., Forestry Faculty, Landscape Architecture Dep., 37100 Kastamonu, Turkey,
[2]Karadeniz Technical University, Forestry Faculty, Silviculture Dep., 61080 Trabzon Turkey

The object of this study was to determine the genetic variation between and within of Uludağ fir (*Abies nordmanniana* subsp. *bornmulleriana* Mattf) which is an endemic species of Turkey. Uludağ fir is distributed from Kızılırmak River to Mount Uludağ in Western Blacksea region, particularly in Ayancık, Ilgaz Mountains, Bolu Seben Mountains, Boyabat-Göktepe forests, Abant and Mount Uludağ. Uludağ fir is a very decorative species. For this reason, *Abies nordmanniana* is widely used for recreational works and preferred as Christmas Tree. In this study, genetic variation of Uludağ fir was investigated according to some seed and seedling characteristics. A total of 303 trees were selected from 17 plots in the study area. Then, an amount of seeds were collected from the sample trees. Thirteen morphological features were determined, including width, thickness, length and weight of seeds, width, length and weight of carpels, width and length of wings, height of seedlings, root collar diameter, number of cotyledons, and length of cotyledons. Data were subjected to multi-way analysis of variance and Hierarchical Cluster Analysis. The results showed that there were significant differences between the populations in terms of thirteen morphological features examined. The results of this research would be used for breeding studies in Uludağ fir and in-situ/ex-situ conservation strategies.

Key words: *Abies nordmanniana* subsp. *bornmulleriana*, Bornmullerian Fir, Genetic Variation

***Presenting author;** email: *hsevik@kastamonu.edu.tr*

PP37-DOCUMENTATION OF SOME SAUDI WILD PLANT SPECIES ON CYTOGENETICS AND MOLECULAR BASIS

M.S.A. SOLIMAN[1]*, K.A. SOLIMAN[1], S.M EL-NAGGAR[2] and N.E. IBRAHIM[2]

Biotech.y & Genet. Eng. Res. Unit, Taif University, Taif, KSA. [1] Botany Dept., Fac. of Sci., Assuit Uni., Egypt and [2]Genetics Dept., Fac. of Agri.,Ain Sham's Univ., Egypt

Saudi Arabia is the largest country of the Arabian Peninsula which has a diverse higher plant flora in its varied landscapes with more than 2243 plant species. The variety of wild plant species has a valuable

economic importance due to its usage as pharmaceuticals, nutritional, fire wood suppliers for urban and rural populations as well as its use in popular remedy.
In present study, identification for some wild plant species have been carried out, preservation of herbarium specimens including some seeds or fruits of the studied taxa which help in preserving genetics origins for the concerned taxa, in addition to individual in-situ plant photographs which help in establishment bio-informatics system. Seed coat sculpture has also been identified using Scanning Electron Microscopy, in addition to cytogenetics characteristic mitotic cell division of germinated seeds for it's chromosomal number determination, storage seed protein and DNA finger-printings have been identified according to (SDS-PAGE and RAPD-DNA) electrophoresis techniques. Accordingly, the present results can help in Conservation strategies and other applied programs such as Biodiversity, plant taxonomy and molecular studies of local wild plants, in addition to the establishment of gene-bank for plants in studied area.

Key words: Seed coat sculpture, Scanning Electron Microscopy, Cytogentics, SDS-PAGE, RAPD-DNA, Saudi Arabia flora

***Presenting author;** email: *prof.msoliman@yahoo.com*

PP38-BREEDING SYSTEMS AND REPRODUCTIVE SUCCESS ON *Salvia smyrnaea* Boiss. (LAMIACEAE) IN WESTERN TURKEY

Ümit SUBAŞI*, Aykut GÜVENSEN

EgeUniversity, Faculty of Science, Depart. of Biology, 35100, İzmir, Turkey

In this study, the reproductive ecology of *S. smyrnaea* in Nif Mountain, their breeding system and reproductive success was examined. *S. smyrnaea*, which is located in Nif Mountian (Izmir, Kemalpaşa) in 1500 metres, is the study material of this research. To detech the stigma receptivity, Perex test was applied to 25 young and mature flowers. To detech pollen viability, MTT (Diphenyly Tetrazolium Bromid) methode was used. To detech the fertilization type of the taxon, 5 different fertilization methods were tested on the flowers of the plant. Reproductive success, fruit set was examined in the base level. In the 25 young flowers which were applied Perex tests, enzyme activity was calculated as approximately 14.2 % with 71 ppm; for the mature flowers (stigma bifurcate, female phase) enzyme activity was calculated as approximately 60-300 ppm. In the mature flowers, the highest pollen viability is 10.29 %, whereas this rate is 70,27 % for the young flowers. In our study, rate of self-incompatibility of *S. smyrnaea* was calculated, as (ISI)= 22/24= 0.91 (>0.2 ile 1<) and it was deteched as partially self-incompatible. This result was found positive regarding to the fact that the taxon is protandrous.

Key words: *Salvia smyrnaea*, Breeding systems, Reproductive success, Partially self-incompatible

***Presenting author;** email: *subasi_umit@hotmail.com*

PP39-POPULATION STUDIES OF *Anthemis xylopoda* (L.) SCHWARZ

Serdar Gökhan ŞENOL*, Aykut GÜVENSEN, Özcan SEÇMEN, Avni GÜVEN

Ege University Science Faculty, Biology Department, 35100 Izmir, Turkey

In this study, it was aimed to investigate the characteristics of the habitat of *Anthemis xylopoda* populations, its population characteristics, factors leading to its extinction and strategies to protect it from extinction. *Anthemis xylopoda* is an endemic plant growing on the schist rocks located at a very

narrow area with an altitude of 1300m and over on the slopes of Mahmut Mountain and Çıplak Mountain exposed to north winds and facing to northeast. In marked individuals of both populations, buds, mature capitulum, flowers and seeds in the capitulum, and the numbers of dying plants were determined between June and August for two years (2008-2009). Data on the features of the soils the plants grow, and on such reproduction features as pollination and germination were collected. It was determined that *A. xylopoda* population was in CR B2b+v endangerment category according to IUCN (2001) categorization. The topic of the study is based on how to assure their survivability in their own ecosystem. Therefore, studies on the protection and rehabilitation of the plant in the in-situ and ex-situ conditions.

Key words: *Anthemis xylopoda*, Life history, Pollination.

***Presenting author;** email: *sgsenol@yahoo.com*

PP40-GENETIC DIVERSITY OF NATURAL *Cyclamen alpinum* POPULATIONS FROM DIFFERENT ALTITUDES BASED ON RAPD ANALYSIS

Belgin GÖÇMEN TAŞKIN[*1], Nilden VARDARELI[1], Ersin DOĞAÇ[1], Ramazan MAMMADOV[2], Vatan TAŞKIN[1]

[1]Faculty of Art and Sciences, Department of Biology, Mugla University, Mugla, Turkey
[2]Faculty of Art and Sciences, Department of Biology, Pamukkale University, Denizli, Turkey

More than 500 geophyte species grow naturally in Turkey and the bulbs of the majority of them are exported. In general, they are propagated by vegetative means. However, the horticulturally important genus *Cyclamen* L. is the tuberous geophyte and seeds are used in their propagation. *Cyclamen* has been the focus of unusual taxonomic activity over the last 70 years. Nine infrageneric classifications were proposed over that period for *Cyclamen*, a small genus with fewer than 30 species. Therefore, *Cyclamen alpinum* has a confusing taxonomic history. It has been identified in the last part of the 19th century and described as *Cyclamen alpinum* Sprenger. It remained known as *C. alpinum* until 1975, when it was described as *C. trochopteranthum* by Otto Schwarz. Today it is described as *C. alpinum*, again. It is a species that grows naturally in the south-western part of Turkey, especially in Antalya, Muğla, Denizli, Burdur and Isparta. It was reported that this species is found at 350-1500 m altitudes in Turkey under *Pinus brutia* Ten. and *Liquidambar orientalis* Mill. forests, or under *Laurus nobilis* L. and *Ceratonia siliqua* L. shrubs. However, we found populations at lower altitudes (between 20-50 m) in Dalyan-Muğla. In this study, RAPD analysis was employed to assess the genetic diversity within and among six natural *C. alpinum* populations in relation with changing altitudes. Four populations at 20, 30, 40 and 50 m altitudes from Dalyan-Muğla, one population at 560 m from Çukurköy-Denizli and one population at 1100 m from Elmalı-Antalya were used in the study. A total of 70 individuals were screened with 20 polymorphic random ten-mer oligonucleotide primers. The data obtained will be analyzed by POPGENE VERSION 1.31 software package for parameters of population genetics.

Key words: *Cyclamen alpinum, Cyclamen trochopteranthum,* Genetic diversity, RAPD

***Presenting author;** email: *belgingocmen@hotmail.com*

PP41-NOTES ON CONTROVERSIAL ANATOLIAN ENDEMIC GROUP; *Aristolochia auricularia* COMPLEX

Aycan TOSUNOGLU[*1], Hafez MAHFOUD[2], Hulusi MALYER[1], Christoph NEINHUIS[2], Stefan WANKE[2]

[1] Uludag University, Science & Arts Faculty, Dept. of Biology, Bursa, Turkey.[2] Technische Universität Dresden, Institut für Botanik, Dresden, Germany

Aristolochia is a species rich genus which has a great diversity especially in the tropics. The only diversity hotspot in northern hemisphere is known as surroundings of Mediterranean basin, especially Anatolia; has 15 endemics of 26 species. Endemic species of Near East mostly inhabit in Anatolia, have local distributions in geographically restricted areas especially on south-west and south coasts. *Aristolochia auricularia* Group as firstly described by Nardi, is one of the major components of the area, covering 4 endemic species (*A. auricularia* Boiss., *A. rechingeriana* Kit Tan & Sorger, *A. isaurica* Nardi, *A. geniculata* Nardi) and are already found to be controversial by several authors. Field studies while revising *Aristolochia* genus over Turkey, supplied us better knowledge about species borders of this group and interspecific or intraspecific relations in population level. Our own field observations showed that, it is easy to recognize the separation between geographically isolated western and eastern populations of *A. auricularia* Group members. On the other hand, about the sympatric species of these, it needs to discuss the variation, flowering phenology, mixed morphology, present descriptions and distributions with emphasizing the considerable authors' own remarks.

Key words: Morphology, Taxonomy, Biogeography, Flowering phenology, Mediterranean *Aristolochia*.

***Presenting author;** email: *aycanbilisik@uludag.edu.tr*

PP42-GENETIC HETEROGENEITY of *Urtica dioica* in TURKEY as REVEALED by RAPD ANALYSIS

Gamze AKDENIZ and Irem UZONUR*

Fatih University, Faculty of Arts and Sciences, Biology Department, Istanbul, Turkey

Stinging nettle or common nettle, *Urtica dioica*, is a herbaceous perennial flowering plant, native to Europe, Asia, northern Africa, and North America, and is the best-known member of the nettle genus *Urtica*. It is a medicinally important plant which has unique ethnobotanical uses in Turkey in different provinces. When we consider a plant in phytotherapy as a herbal remedy reliable identification is a priority, which should not depend solely on personel expertise and experiences as it does in the case of traditional, morphology-based methods. Controversial effects on several diseases can be due to genetic subtypes living in different geographies and phenotypic correlations like the antioxidant activity changes of the species that is not yet proven to our knowledge fort his species. While some researchers claim affirmatively that its effect on some diseases (including some types of cancers) has been proved by clinical trials, others totally refuse it. This may partly be caused by the differences in the ethnobotanical recipes. However, in this study, we propose a different point of view to determine whether the contradicting researchs on its effect might be caused by different subspecies of *Urtica dioica*. In this work we designed a set of species specific primers targeting *Urtica dioica* agglutinin isolectin VII precursor (chia5.7.2) gene, exon 3 for identification of the samples collected from six different provinces of Turkey. After molecular confirmation of the samples, they have been analysed for their diversity patterns and genetic heterogeity levels using RAPD-PCR analysis. The profile

differences can be due to innate variation and/or acquired pollution/environmental effects that can be another point of view in assessing ethnobotanically important species in traditional remedies.

Key words: *Utrica dioica*, genetic diversity, RAPD, Medical use.

***Presenting author;** email: *iuzonur@fatih.edu.tr*

PP43- MORPHOLOGICAL DIVERSITY OF TURKISH PALE FLAX (*Linum bienne* Mill)

Hüseyin UYSAL* and Orhan KURT*

University of Ondokuz Mayıs, Faculty of Agriculture, Department of Agronomy, 55139 Kurupelit Kampusu, Samsun, Turkey

During recent years there has been an increased interest by industry, agriculture and plant breeders in flax, due to its use as natural raw material for industrial purposes. It has been cultivated for oil and fiber for several thousand years. Traditionally the oil extracted from the seeds (35–45 %) is used for a variety of industrial purposes such as linoleum, paint varnish, soap and printer link. Recently, flax varieties with low linolenic acid have been developed for human consumption as edible oil. The wild progenitor of cultivated flax forms *Linum bienne* is an important as cultivated flax (*Linum usitatissimum* L) can be crossed with *L. bienne* due to the equal number of chromosomes with cultivated flax (2n=30). It is also important as to understand of flax domestication. There are different ways to evaluate plant genetic variation, such as morphological characteristics, isozymes and molecular markers. We conducted a research with morphological characteristics in *L. bienne*. This research project is a collaborate project between Plant Breeding & Biotechnology Research Group of Agricultural Faculty of Ondokuz Mayıs University with Agriculture and Agri-Food Canada, Saskatoon Research Centre during 2008–2009. The plant materials were collected from 34 different locations such as Samsun, Trabzon, Sinop, Kastamonu, Zonguldak, Bilecik, Bolu, Bursa, Çanakkale, İstanbul, Denizli, İzmir, Muğla and Antalya according to reference of Flora of Turkey. In this paper, we will discuss a evolutionally changes of morphological characters such as flowering period, plant height, number of tillers per plant, close capsules' lengths, close capsules' widths, The length/width of closed capsules, The length of petals, The width of petals, The length/width of petals, The color of petals, the color of anthers, the color of filaments, the color of stigmas, the color of styles within and between the different locations.

Key words: *Linum usitatissimum*, *L. bienne*, wild progenitor, Morphological diversity

***Presenting author;** email: *orhank@omu.edu.tr, huysal@omu.edu.tr*

PP44-CURRENT STATUS OF SERIK PEAR (*Pyrus serikensis*) AT BELEK SPECIAL ENVIRONMENT PROTECTION AREA NEAR ANTALYA

O. ÜNAL*, R. S. GÖKTÜRK, M. GÖKÇEOĞLU, H. SÜMBÜL, K. IŞIK

Akdeniz University, Faculty of Arts and Sciences, Biology Department and Akdeniz University Biodiversity Research, Application and Development Center (AK-BİYOM), Antalya, Turkey

Serik pear (*Pyrus serikensis*) is an endemic and a rare species along a narrow coastal area in Antalya region, ranging from Kemer to Manavgat in southwestern Turkey. This study, which was carried out in 2008, covers the distribution and inventory of the species at Belek Special Environment Protection Area (BSEPA) near Serik (Antalya). Certain fundamental population characteristics (such as

population size, number of individuals, frequency distributions of the plants in terms of theirs heights and diameters, frequency distribution in terms of habitat types, relationships between height and diameters, growth localities based on latitudes and longitudes...) of the species were presented in the study. We also determined various biotic and abiotic "limiting factors" that threaten the species and listed habitat types where the species thrives and in the study area. Certain plant characteristics related to developmental phenology, co-existence, competition and reproductive biology of the species were also noted. Based on the above information, we suggested various measures in relation to *in-situ* and *ex-situ* conservation, restoration and propagation strategies of the species in Antalya region.

Key words: *Pyrus serikensis*, rare species, genetic conservation, *in situ* conservation.

***Presenting author;** email: *ounal@akdeniz.edu.tr*

PP45-ENDEMIC PLANTS OF MUĞLA PROVINCE (TURKEY)

E. Burcu YEŞİLYURT*[1] and Galip AKAYDIN[2]

[1] Department of Biology, Hacettepe University, 06800 Ankara TURKEY. [2]Department of Biology Education, Hacettepe University, 06800 Ankara, TURKEY.

In this poster presentation, the endemic plants distributed in Muğla province (Western Mediterranean region of Turkey), which is in the C1 and C2 squares according to Davis, were reviewed.
The results of the botanical investigations have been performed so far showed that 385 endemic taxa within 154 genera of 46 families were distributed in Muğla province. 38% (145) of these were reported for the first time as new taxon. While 283 (73.5%) of the endemic taxa, distributed in Muğla province, are the members of Mediterranean phytogeographic region, 21 (5.5%) and 3 (0.7%) of them are belong to Irano-Turanian and Euro-Siberian phytogeographic regions, respectively. The remaining 78 taxa (20.3%) are widely distributed or not to be specified to any phytogeographic region. While the families rich in endemic taxa are Lamiaceae (48), Caryophyllaceae (42), Asteraceae (41), Liliaceae (29) and Scrophulariaceae (28), the genus rich in endemic taxa are *Verbascum* (19), *Astragalus* (11), *Silene* (10), *Centaurea* (10) ve *Fritillaria* (9). According to the threat categories assigned by IUCN in Turkish Red List, the 48.6% (187), 15.8% (61), 13.2% (51), 10.6 %(41) and 10.4% (40) of the endemic taxa distributed in Muğla province are categorized as LC, EN, VU, CR and NT, respectively.

Key words: Endemism; Conservation; Threat categories; Muğla; Turkey.

***Presenting author:** email: *brctrl@yahoo.com*

PP46-GENETIC VARIATION IN TAŞKÖPRÜ-TEKÇAM SCOTS PINE (*Pinus sylvestris* L.) CLONAL SEED ORCHARD ACCORDING TO SOME NEEDLES CHARACTERS

Nurcan YİĞİT*[1], Sezgin AYAN[2], Hakan SEVIK[3]

[1]Kastamonu Univ., Forestry Faculty, Botanic Dep., 37100 Kastamonu Turkey, [2]Kastamonu Univ., Forestry Faculty, Silviculture Dep., 37100 Kastamonu Turkey, [3]Kastamonu Univ., Forestry Faculty, Landscape Architecture Dep., 37100 Kastamonu,Turkey

Scots pine (*Pinus sylvestris* L.) is one of the most common and important forest tree species in Turkey due to usefulness of its wood to many commercial uses. This species is classified as one of the economically important tree species for Turkish Forestry in the "National Tree Breeding and Seed Production Program". Demand for scots pine seeds and seedlings in Turkey is obtained mainly by

domestic production, but currently only 9.2% of the Turkish seed demand in scots pine is supplied from current 111 ha of seed orchards. High and genetically improved seed yield from the seed orchard is an integral part for the success of a tree breeding program. Genetic variation between the clones must be identified in the seed orchards to maintain high seed production. The objective of this study was to investigate the genetic variation in Kastamonu Taşköprü-Tekçam Scots pine (Pinus sylvestris L.) clonal seed orchard using eight morphological and anatomical needles characters. For this purpose; 5 sample trees from 30 clones and 10 needles from each samples tree were selected. Totally 1500 sample needle were used for this study. Nine morphological and anatomical traits (needle length, needle width, needle thickness, sheath thickness, number of rows of stomata in the dorsal and ventral faces, number of stomata per cm of needle length in the dorsal and ventral faces) were determinate in 1500 needle. The results showed that; there were significant differences between clones according to eight morphological and anatomical needles characters.

Key words: *Pinus sylvestris* L., Scotch Pine, Seed orchard, Genetic variation, Needles characters

***Presenting author;** email: *nyigit@kastamonu.edu.tr*

PP47-VARIATION OF CONE AND SEED CHARACTERISTICS OF SOME NATURAL CRIMEAN JUNIPER POPULATIONS IN TURKEY

Cengiz YÜCEDAĞ*, Abdullah GEZER and Nurdan GÜZEL

Department of Environmental Engineering, Engineering Faculty, Bartın University, 74100 Bartın, Turkey

In this study, the variation of some metric characteristics (cone diameter, the cone number per kg, the sound seed number per cone and one thousand seed weight) regarding cones and seeds of seven natural Crimean juniper (*Juniperus excelsa* Bieb.) populations in Turkey's Lakes District was studied. For this reason, from each population ten individuals were sampled. In addition, the relation between the sound seed number and altitude was investigated. The data from study for being determined the variation and the relation were analyzed by SPSS Program. Average cone diameter, the cone number per kg, the sound seed number per cone and one thousand seed weight were 9.49 mm, 2165, 0.83 and 41.49 g, respectively. Besides, it was found that these characteristics showed important differences between and within populations. According to the result of regression analysis, there was a negative relation (r = - 0.77) between the sound seed number and altitude. This result could appear likely due to poor pollination resulting from the unfavorable effects of the rainfall. The results from the present study would be an infrastructure for the breeding studies of the species.

Key words: Population genetics, Crimean juniper, Variation

***Presenting author;** email: *cyucedag@bartin.edu.tr*

***Presenting author**

LIST OF PARTICIPANTS

Surname	Name	Address	Country	E-mail
AASIM	**Muhammad**	University of Ankara, Faculty of Agriculture, Department of Field Crops, 06110 Dışkapı, Ankara	Turkey	mshazim@gmail.com
AHMAD	**Habib**	Hazara University, Department of Genetics, Mansehra	Pakistan	drhahmad@gmail.com
AKAYDIN	**Galip**	Hacettepe University, Faculty of Education, Department of Secondary Science and Mathematics Education, 06800, Ankara	Turkey	agalip@hacettepe.edu.tr
AKTAŞ	**Caner**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	e158686@metu.edu.tr
ALADAĞ	**Ertugrul**	TMMOB Mimarlar Odası Muğla Şubesi, Hacı Şerifağa Sok No.9, Muğla	Turkey	e_aladag@mynet.com
ALAN	**Sevim**	Department of Pharmaceutical Botany, Faculty of Pharmacy, Anadolu University, 26470, Eskisehir	Turkey	salan@anadolu.edu.tr
ALP	**Şevket**	Yüzüncü Yıl University, Vocational School of Gevas, 65080 Van	Turkey	alpsevket@hotmail.com
AL-QARAWI	**Abdulaziz A.**	King Saud University, College of Food and Agricultural Sciences, Department of Plant Production, 2460, Riyadh 11451	Saudi Arabia	alqarawi@ksu.edu.sa
AL-ROWAILY	**Saud**	King Saud University, College of Food and Agricultural Sciences, Department of Plant Production, 2460, Riyadh 11451	Saudi Arabia	srowaily@gmail.com
AL-SHAHRANI	**Thobayet**	King Saud University, College of Food and Agricultural Sciences, Department of Plant Production, 2460, Riyadh 11451	Saudi Arabia	thobayet@yahoo.com
AREF	**Ibrahim M.**	Department of Plant Production, King Saud University, P. O. Box 2460, Riyadh 11451	Saudi Arabia	iaref@KSU.EDU.SA
ARSLAN	**Özlem ŞENEL**	General Directorate of Forests, OGM Gazi Tesisleri, Gazi 06560 Ankara	Turkey	seneloz@yahoo.com
ASSAED	**Abdulaziz**	King Saud University, College of Food and Agricultural Sciences, Department of Plant Production, 2460, Riyadh 11451	Saudi Arabia	assaeed@ksu.edu.sa
ATEŞ	**Alev M.**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	ates.alev@gmail.com
AYARI	**Abdelaziz**	Institut National de Recherches en Génie Rural Eaux et Forêts, P.B. 10, Rue Hedi Karray, Ariana, 2082	Tunisie	abdelazizayari2006@yahoo.fr
AYTAÇ	**Zeki**	Gazi University, Faculty of Arts and Sciences, Department of Biology, Teknikokullar, Ankara	Turkey	zaytac@gazi.edu.tr
BARBLISHVILI	**Tinatin**	Tbilisi Botanical Garden and Institute of Botany, 0105, Botanikuri street 1, Tbilisi	Georgia	tinabar7@yahoo.com
BİLGİN	**Neş'e**	Boğaziçi University, Department of Molecular Biology and Genetics, İstanbul	Turkey	bilginne@boun.edu.tr
BULUNUZ	**Esra**	Kahramanmaraş Sütçü İmam University, Faculty of Agriculture,	Turkey	bulunuzesra@hotmail.com

		Department of Horticulture, Kahramanmaras, 46100		
CABİ	**Evren**	Department of Biological Sciences, Middle East Technical University, 06531 Ankara	Turkey	ecabi@metu.edu.tr
CEBECİ	**Hüseyin**	Istanbul University, Faculty of Forestry, Department of Forest Entomology and Protection, 34473 Sariyer Istanbul	Turkey	hcebeci@istanbul.edu.tr
CELEP	**Ferhat**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	fcelep@metu.edu.tr
CVRCKOVA	**Helena**	Forestry and Game Management Research Institute, Strnady 136, 252 02 Jíloviště	Czech Republic	cvrckova@vulhm.cz
ÇAKIR	**Egemen**	Tourism Development in Eastern Anatolia Project, Uzundere, Erzurum	Turkey	egemen.cakir@yahoo.com
ÇENGEL	**Burcu**	Ministry of Environment and Forestry, Forest Tree Seeds and Tree Breeding Research Directorate, OGM Gazi Tesisleri, 06560 Gazi Ankara	Turkey	nazlier@yahoo.com
ÇETİNER	**Çiğdem**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	e137058@metu.edu.tr
ÇİÇEK	**Mehmet**	Pamukkale University, Faculty of Arts and Science, Department of Biology, 20070 Denizli	Turkey	mcicek@pau.edu.tr
ÇÖRDÜK	**Nurşen**	Canakkale Onsekiz Mart University, Faculty of Science and Arts, Department of Biology	Turkey	nursencorduk@comu.edu.tr
DEĞİRMENCİ	**Funda**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	funda07@gmail.com
DEMİRCİOĞLU YİĞİT	**Nurcan**	Kastamonu University, Forestry Faculty, Kuzeykent, 37100, Kastamonu	Turkey	nyigit@kastamonu.edu.tr
DİZKIRICI	**Ayten**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	e131715@metu.edu.tr
DOĞAN	**Musa**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	doğanm@metu.edu.tr
DOĞAÇ	**Ersin**	Muğla University, Science & Art Faculty, Biology Department, 48000 Kötekli Muğla	Turkey	ersindogac@hotmail.com
DOSTBİL	**Yaşar**	Tarımsal Kalkınma Vakfı, Karanfil Sokak Beton Apartmanı No: 34/13, Kızılay Ankara	Turkey	ydostbil@yahoo.com
EDİK	**Gülbahar**	Muğla University, Fethiye Ali Sıtkı Mefharet Koçman Vocational College, Taşyaka Mahallesi, 48300, Fethiye Muğla	Turkey	gulbaharedik@gmail.com
EL_BANA	**Magdy**	King Saud University, Department of Plant Production, College of Agricultural & Food Sciences, Riyadh 11451, P.O. Box 2460	Saudi Arabia	mag_bana@yahoo.co.uk
EMEK	**Yelda**	Adnan Menderes University, Faculty of Science & Arts, Department of Biology, 09010-Kepez-Aydın	Turkey	yelda@adu.edu.tr
ERTUĞRUL	**Kuddisi**	Selçuk Üniversitesi, Fen Fakültesi Biyoloji Bölümü Kampus, Selçuklu, Konya	Turkey	ekuddisi@selcuk.edu.tr
FAKILI	**Oğuzhan**	Department of Field Crops, Faculty of Agriculture, Ankara University, 06110, Dışkapı, Ankara	Turkey	oguzhanfakili@yahoo.com

GABEDAVA	**Laura**	Tbilisi Botanical Garden and Institute of Botany, 0105, Botanikuri street 1, Tbilisi	Georgia	tinabar7@yahoo.com
GOGINASHVILI	**Nana**	V. Gulisashvili Forest Institute, 0186 Mindeli 9, Tbilisi	Georgia	nanagoginashvili@mail.ru
GÖMÜRGEN	**Ayşe Nihal**	Hacettepe University, Science Faculty,Biology Department, 06800, Ankara	Turkey	gomurgen@hacettepe.edu.tr
GÖÇMEN TAŞKIN	**Belgin**	Muğla University, Science & Art Faculty, Biology Department, 48000 Kötekli, Muğla	Turkey	belgingocmen@hotmail.com
GÜLSOY	**Aysun Demet**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	aysundemetgulsoy@yahoo.com
GÜLSOY	**Murat**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	alimuratgulsoy@yahoo.com
GÜLTEPE	**Mutlu**	Karadeniz Technical University, Faculty of Arts & Sciences, Department of Biology, 61080 Trabzon	Turkey	mutlugultepe@yahoo.com
GÜRLEK	**Derya**	Department of Field Crops, Faculty of Agriculture, Ankara University, 06110, Dışkapı, Ankara	Turkey	deryagurlek@hotmail.com
GÜVENSEN	**Aykut**	Ege University, Botanical Garden & Herbarium Research and Application Center, 35100 Bornova-IZMIR	Turkey	guvensen@fenfak.ege.edu.tr
GÜZEL	**Murat Erdem**	Karadeniz Technical University, Faculty of Arts & Sciences, Department of Biology, 61080 Trabzon	Turkey	muraterdemguzel@hotmail.com
GÜZEL	**Nurdan**	Bartın University, Engineering Faculty, Department of Environmental Engineering	Turkey	cyucedag@bartin.edu.tr
HATİPOĞLU	**Aynur**	Environmental Protection Agency for Special Areas (EPASA), Ankara	Turkey	hatipoglu.aynur@gmail.com
HEINZE	**Berthold**	Federal Research Centre for Forestry, Department of Genetics, Hauptstrasse 7, A-1140 Vienna	Austria	berthold.heinze@bfw.gv.at
HEMEIDA	**Alaa**	Genetic Engineering and Biotechnology Research Institute Minufiya University 79/32897, Sadat City	Egypt	alaahemeida@hotmail.com
IŞILOĞLU	**Mustafa**	Muğla University, Science & Art Faculty, Biology Department, 48000 Kötekli Muğla	Turkey	isiloglu48@gmail.com
IŞIK	**Kani**	Akdeniz University, faculty of Arts and Sciences, Department of Biology, Antalya	Turkey	kani@akdeniz.edu.tr
JGENTI	**Lali**	Tbilisi Botanical Garden and Institute of Botany 0105 Botanikuri Street #1, Tbilisi	Georgia	botanins@yahoo.com
JINJIKHADZE	**Tamar**	Tbilisi Botanical Garden and Institute of Botany 0105 Kodjori road #1, Tbilisi	Georgia	tamrikoj@yahoo.com
KAHRAMAN	**Ahmet**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	ahmetk@metu.edu.tr
KARAMAN	**Seher**	Aksaray Univeristy Art and Science Faculty Department of Biology 68100 Aksaray	Turkey	seherkaraman@yahoo.com
KAHYA	**Esin**	Ankara University, Faculty of Language, History and Geography, 06100 Sıhhiye, Ankara	Turkey	kahya@humanity.ankara.edu.tr
KARABACAK	**Emre**	Yonca Lodge, Yanıklar Köyü, Fethiye	Turkey	iletisim@yoncalodge.com

KARAHAN	**Faris**	Atatürk University, Faculty of Architecture and Design, Department of Landscape Architecture, 25240 Erzurum	Turkey	fariskarahan@gmail.com
KAYA	**Zeki**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	kayaz@metu.edu.tr
KHUTSISHVILI	**Manana**	Tbilisi Botanical Garden and Institute of Botany, 0105, Botanikuri street 1, Tbilisi	Georgia	botanins@yahoo.com
KIRMACI	**Mesut**	Adnan Menderes Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, Merkez Kampüs, 09010 Aydın	Turkey	mkirmaci@adu.edu.tr
KOYUNCU	**Onur**	Eskişehir Osmangazi University, Faculty of Science and Art, Department of Biology, 26480, Meselik, Eskisehir	Turkey	okoyuncu@ogu.edu.tr
KÖSE	**Yavuz Bülent**	Anadolu University, Faculty of Pharmacy, 26470, Eskişehir	Turkey	ybkose@anadolu.edu.tr
KURT	**Yusuf**	Akdeniz University, Faculty of Arts and Sciences, Biology Department , 07058 Campus/Antalya	Turkey	yusufkurt@akdeniz.edu.tr
KURT	**Orhan**	Unversity of Ondokuz May, Faculty of Agriculture, Department of Crop Science, 55139 Kurupelit Kampusu/SAMSUN	Turkey	orhank@omu.edu.tr
MACHAKA-HOURI	**Nisrine**	IBSAR - American University of Beirut, P.O. Box 11-0236, Riad El-Solh 1107 2020, Beirut	Lebanon	nmachaka@gmail.com
MACHOVA	**Pavlína**	Forestry and Game Management Research Institute, Strnady 136, 252 02 Jíloviště	Czech Republic	machova@vulhm.cz
MAJID	**Abdul**	Hazara University, Department of Botany, Mansehra	Pakistan	abdulmajidhu@gmail.com
MIKATADZE-PANTSULAIA	**Tsira**	Tbilisi Botanical Garden and Institute of Botany, 0105, Botanikuri street 1, Tbilisi	Georgia	tsirapantsu@yahoo.com
MİNARECİ	**Ersin**	Celal Bayar University, Faculty of Arts and Sciences, Department of Biology, 45140, Muradiye, Manisa	Turkey	ersinminareci@gmail.com
NEALE	**David**	University of California, Department of Plant Sciences, Davis	USA	dbneale@ucdavis.edu
ÖNDE	**Sertaç**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	sertac@metu.edu.tr
ÖTÜGEN	**Erdal**	Asya Camping ve Caravaning Association, National Camping and Caravaning Federation, İntaş Çamlık Sitesi K Blok No: 21 D:29 34734 Sahrayıcedit Kadıköy, İstanbul	Turkey	erdal.otugen@ttmail.com
ÖZDİLEK	**Aslı**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	aozdilek@metu.edu.tr
ÖZTEKIN	**Mehtap**	İç Anadolu Ormancılık Araştırma Enstitüsü	Turkey	oztekinmehtap@yahoo.com
ÖZTÜRK	**Eaylettin**	Muğla University, Science & Art Faculty, Biology Department, 48000 Kötekli, Muğla	Turkey	eaylettin@hotmail.com
ÖZYALÇIN	**Kubilay**	General Directorate of Forests, OGM Gazi Tesisleri Gazi 06560 Ankara	Turkey	qqblay@yahoo.com
RAYNAL	**Dudley J.**	Department of Environmental and Forest Biology, SUNY, Syracuse, New York	USA	djraynal@esf.edu

ROGERS	**Scott**	Bowling Green State University, Bowling Green, Ohio	USA	srogers@bgsu.edu
SEÇMEN	**Özcan**	Ege University, Botanical Garden & Herbarium Research and Application Center, 35100 Bornova İzmir	Turkey	secmen@fenfak.ege.edu.tr
SEMİZ	**Gürkan**	Pamukkale University, Faculty of Arts & Sciences, Biology Dept. Kınıklı Kampus, Denizli	Turkey	gsemiz@pau.edu.tr
ŞEVİK	**Hakan**	Kastamonu University, Forestry Faculty, Kuzeykent, 37100	Turkey	hakansevik@gmail.com
SOLIMAN	**Mohamed**	Biotech. & gen. Eng. Research Unit, Sintific Research Center, Taif Uni., Taif, P.O. Box 888, Al-Hawayia	Saudi Arabia	prof.msoliman@yahoo.com
STCLAIR	**Brad**	USDA Forest Service, Pacific Nortwest Research Station, 3200 SW Jefferson Way, Corvallis Oregon	USA	bstclair@fs.fed.us
SUBAŞI	**Ümit**	EgeUniversity, Faculty of Science, Depart. of Biology, 35100, Bornova, İzmir,	Turkey	subasi_umit@hotmail.com
ŞENOL	**Serdar Gökhan**	Ege University, Botanical Garden & Herbarium Research and Application Center, 35100 Bornova İzmir	Turkey	sgsenol@yahoo.com
ŞENTURK	**Ozan**	Ege University, Botanical Garden & Herbarium Research and Application Center, 35100 Bornova İzmir	Turkey	
TEMEL	**Fatih**	Artvin Coruh University, Faculty of Forestry, Seyitler Campus, 08000 Artvin	Turkey	fatihtemel93@yahoo.com
TİRLİ	**Okyay**	TEMA Foundation (The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural Habitats), Fethiye Agency, Muğla	Turkey	te_ma@mynet.com
TORLAK	**Hasan**	Kültür ve Turizm Bakanlığı, Teftiş Kurulu Başkanlığı	Turkey	htorlak@hotmail.com
TUNÇ	**Reşat**	1Fethiye Forest Management Directorate, General Directoraet of Foresry,Fethiye, Muğla	Turkey	rtunc48@hotmail.com
TOSUNOĞLU	**Aycan**	Uludag University, Science & Ars Faculty, Department of Biology, 16059, Nilufer, Bursa	Turkey	aycanbilisik@uludag.edu.tr
TÜMBİLEN ÖZER	**Yeliz**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	e159613@metu.edu.tr
TVAURI	**Irina**	V. Gulisashvili Forest Institute, 0186 Mindeli 9, Tbilisi	Georgia	itvauri@yahoo.com
UYSAL	**Hüseyin**	University of Ondokuz Mayıs, Faculty of Agriculture, Department of Agronomy, 55139 Kurupelit Kampusu, Samsun	Turkey	huysal@omu.edu.tr
UZONUR	**İrem**	Fatih University, Biology Dept, Büyükçekmece, 34500, İstanbul	Turkey	iuzonur@fatih.edu.tr
ÜNAL	**Orhan**	Akdeniz University, Faculty of Arts and Sciences, Biology Dept. 07058, Antalya	Turkey	ounal@akdeniz.edu.tr
VARDARELİ	**Nilden**	Muğla University, Science & Art Faculty, Biology Department, 48000 Kötekli Muğla	Turkey	
WEGRZYN	**Jill**	University of California, Davis, CA	USA	jlwegrzyn@ucdavis.edu
YALÇIN	**Semra**	Nature Conservation Centre, Orta Doğu Sit. 1589 Sok. No:4, Balgat, Ankara	Turkey	semra.yalcin@dkm.org.tr

YAYLACI	**Ömer Koray**	Eskişehir Osmangazi University, Faculty of Science and Art, Department of Biology, 26480, Meselik, Eskisehir	Turkey	
YEŞİLYURT	**Burcu**	Department of Biology, Hacettepe University, 06800 Ankara	Turkey	brctrl@yahoo.com
YILDIRIM	**Kubilay**	Middle East Technical University, Department of Biological Sciences, 06531, Ankara	Turkey	ykubilay@metu.edu.tr
YILDIZ	**Kemal**	Celal Bayar University, Faculty of Arts and Sciences, Department of Biology, 45140, Muradiye, Manisa	Turkey	kemalyil@gmail.com
YÜKSEL	**Eyüp**	Environmental Protection Agency for Special Areas (EPASA), Alparslan Türkeş Caddesi 31. Sokak No: 10 Beştepe, 06510, Ankara	Turkey	yukseleyup@gmail.com
ZEYBEK	**Evrim**	Department of Biological Sciences, Middle East Technical University, 06531 Ankara	Turkey	eyildiri@metu.edu.tr