HEI-PLADI Project

Higher Education Innovation in PLAnt DIversity

Flexible learning paths for emerging labour market

Handbook 2016-2017

Partners and acronyms

Stefania G. Scippa, Paola Fortini, Rocco Oliveto, Simone Scalabrino, Loredana Di Rubbo, Piera Di Marzio, Paolo Di Martino, Dalila Trupiano, Ludovico Frate

UNIMOL

Gianluigi Bacchetta, Donatella Cogoni, Giuseppe Fenu, Francesca Meloni, Martino Orrù, Silvia Pinna, Lina Podda, Marco Porceddu, Andrea Santo, Mariano Ucchesu

UNICA

Ognyan Iliev, Krasimir Kosev, Anely Nedelcheva, Lyuba Pencheva

UBG

Joseph Buhagiar, Christian Borg, Marco Iannaccone

UOM

Ana Isabel Correia, Helena Maria da Conceição Cotrim, Manuela Sim-Sim, Maria Amélia Martins-Loução

ULISBOA

Ilektra Remoundou, Chariton Kalaitzidis

CIHEAM-MAICH

Adam Kapler, Maciej Niedzielski, Maciej Niemczyk, Wiesław Podyma, Anna Rucińska, Konrad Woliński

PAN OB-CZRB

HEI-PLADI Project Higher Education Innovation in PLAnt DIversity

Flexible learning paths for emerging labour market

Handbook 2016-2017

Contents

Course presentation

The “Higher Education Innovation in Plant Diversity: flexible learning paths for emerging labour market - HEI PLADI” – pilot course has been financed by ERASMUS PLUS KA2 - Cooperation for Innovation and the Exchange of Good Practices Strategic Partnerships for higher education programme.

Objective

- Attune higher education *curricula* to current and emerging labour market needs.
- Equip the young generation with “transversal skills” in the emerging labour market where plant diversity resources can offer an extraordinary opportunity to realize innovative benefits.
- Provide more opportunities for students to gain additional skills in the field of plant diversity through a program, which integrates taxonomy, systematics, molecular biology, and ICT in a blended path of virtual and physical mobility.
- Enhance the use of digital tools in learning and teaching process.
- Allow students to inter-relate and learn from scientists coming from different backgrounds in an European context.
- Encourage processes of international exchanges, integration and cooperation

Flexible learning course organization

HEI PLADI involves Universities of Molise, Cagliari, Lisboa, Malta, and Sofia, the Mediterranean Agronomic Institute of Chania, and the Polish Academy of Sciences Botanical Garden-Centre for Biological Diversity Conservation. All institutions provide strong expertise in the field of plant biodiversity characterization, management and conservation. HEI-PLADI is organized in five e-learning courses and seven practical activities. Total number of ECTS is 60.

Students may participate to the whole learning path or to courses and practical activities more related with their own needs.

The participation to the e-learning course is open whereas for short-term training activities financially supported by the project there will be a call selection that will be published on the website (www//dibt.unimol.it/HEI-PLADI/home/) and on each University partner home page.

Training activities involve short-term physical mobility in each partner country. For each short-term mobility, five students from each partner University will be selected to be financially supported by the project.

HEIPLADI

During the short-term mobility, field works, field visits, practical and laboratory activities will be focused on developing skills and deepening knowledge on topics treated in the e-learning courses.
E-learning courses and practical activities will be recognized and validated as ECTS by each University as reported in “Recognition”.

Evaluation method

Each theoretical course has the same evaluation method, i.e., a written exam;
specifically, at the end of each course students have to take tests aiming at evaluating their knowledge and acquired skills.
Tests will be delivered through the e-learning platform Moodle allowing students to take the evaluation tests at their home university in a computer-classroom according to the schedule that will be established at the beginning of each course. For practical courses students will present written reports on activities carried out.
Exams will be considered passed when students earn positive results. Score will be expressed according to students’ home university rules.

ECTS Recognition

Students participating to the HEI-PLADI pilot course may follow the whole program or only the activities of their specific interest.
Each Higher Education Institute partner will recognize and validate in terms of ECTS, students learning achievements and qualifications in theoretical and practical activities.
In particular students, according to their home university rules, may have learning outcomes recognized as:

1. Courses (whole or partially) of their curricula degree
2. Optional courses
3. Training activities (traineeship)
4. Certification in the Diploma Supplement

Information

Website: https://dibt.unimol.it/HEI-PLADI/home/

Contacts

UNIMOL
Gabriella Stefania Scippa
scippa@unimol.it

CIHEAM-MAICH
Ilektra Remoundou
hlektra@maich.gr

PAN OB-CZRB
Wieslaw Podyma
w.podyma@ihar.edu.pl

UBG
Ognyan Iliev
sugarden@mnet.bg
UNICA
Gianluigi Bacchetta
heipladi.erasmusplusunica@gmail.com

ULISBOA
Ana Isabel Correia
aicorreia@fc.ul.pt

UOM
Joseph Buhagiar
joseph.buhagiar@um.edu.mt

HEIPLADI

E-learning

Learning Object organisers: *Rocco Oliveto*, *Simone Scalabrino*
Courses will be delivered as learning objects, on the Moodle platform.

Plant Taxonomy *8 ECTS*

Course organizer: *Paola Fortini* (fortini@unimol.it)
Lecturers: *Paola Fortini, Piera Di Marzio* (UNIMOL), *Anely Nedelcheva* (UBG), *Ana Isabel Correia* (ULISBOA), *Adam Kapler* (PAN OB-CZRB), *Joseph Buhagiar* (UOM), *Ilektra Remoundou* (CIHEAM-MAICH)

OBJECTIVES
Students will achieve the ability to:

- Describe and identify a living plant using botanical terms
- Understand vascular plants classification systems
- Recognize large and common families of European and Mediterranean non flowering and flowering plants
- Identify the most common plant species using dichotomous analytical keys, interactive or traditional, based on macroscopic and microscopic morphology
- Exhibit basic knowledge in anatomical approaches applied to Systematics
- Prepare a representative collection of plant specimens

1

- Taxonomy, Plant taxonomy: introduction, need, aim and importance
- “Taxonomy” and “Systematic”
- Identification. Taxonomic characters
- Nomenclature. Taxa and their ranks. Typification. International Code of Nomenclature for algae, fungi, and plants (ICN)
- Classification. Classification systems. APG III system: molecular-based system of plant taxonomy
- Phylogeny

2

- Pteridophyta: characteristics, morphology, ecology, life cycle and classification.
- Lycopodiopsida, Psilotopsida, Equisetopsida, Marattiopsida, Polypodiopsida (with special emphasis on families: *Lycopodiaceae*, *Isoëtaceae*, *Psilotaceae*, *Selaginellaceae*, *Ophioglossaceae*, *Equisetaceae*, *Osmun- daceae*, *Marsileaceae*, *Polypodiaceae*)

- Gimnosperms: characteristics, morphology, ecology, life cycle and classification.
- Cycadophyta, Ginkophyta, Gnetophyta, Coniferophyta (with special emphasis on Gymnosperms families: *Pinaceae*, *Cupressaceae*, *Taxaceae*, *Ginkgoaceae*, *Ephedraceae*, *Gnetaceae*, *Welwitschiaceae*).

3

- Angiosperms morphology: observing and describing variation in vegetative morphology using botanical terms
- Identification of leaf and phyllotaxy types
- Dissecting flowers and inflorescences and describing floral forms and structures using terms, floral formulas, and flower diagrams
- Identification of fruits, infrutescences and seeds

4

- Origin and diversity of Angiosperms (Eudicot and Monocot)
- Life cycle
- Characteristics, morphology, ecology, classification of the main Eudicots families: *Apiaceae*, *Campanulaceae*, *Compositae* (*Asteraceae*), *Betulaceae*, *Boraginaceae*, *Brassicaceae*, *Caryophyllaceae*, *Ericaceae*, *Euphorbiaceae*, *Fabaceae*

5

- Characteristics, morphology, ecology, classification of the main Eudicots families: *Fagaceae*, *Lamiaceae*, *Oleaceae*, *Ranunculaceae*, *Rosaceae*, *Rubiaceae*, *Scrophulariaceae*, *Solanaceae*

6

- Monocots. Characteristics, morphology, ecology, classification of the main Monocots families: *Alliaceae*, *Araceae*, *Arecaceae,* *Cyperaceae*, *Iridaceae*, *Liliaceae*, *Orchidaceae*, *Poaceae*

7

- Plant Identification: using and constructing botanical keys; anatomical methods in systematics
- Techniques in collecting and preserving plant specimens
- Collection of special groups of plants
- Analytical techniques: morphometric methods

8

- Field survey methodologies and techniques practical handbook
- Herbarium collection, Herbaria, Index Herbariorum (IH)

Modern Methods in Plant Systematics *6 ECTS*

Course organizer: Helena Cotrim (hmcotrim@fc.ul.pt)
Lecturers: *Helena Cotrim* (ULISBOA), *Stefania Scippa, Dalila Trupiano* (UNIMOL), *Anna Rucińska* (PAN OB-CZRB), *Joseph Buhagiar* (UOM)

OBJECTIVES
Students will achieve the ability to:

- Recognize the contribution of different fields for Plant Systematics
- Discriminate basic molecular tools for plant phylogeny and population genetics: sequencing, AFLPs, microsatellites SNPs and other molecular markers.
- Report basic criteria on how to choose molecular techniques do study diversity
- Understand the principles of DNA barcode of Life and identify plant DNA barcodes
- Assess concepts of genome, transcriptome, proteome and identify basic proteomic tools
- Summarize the role of proteomic in plant taxonomy
- Exhibit basic knowledge on phytotaxonomy and plant chemotaxonomy

1 Plant Molecular Systematics and Phylogenetics

- Introductory concepts
- The APG classification system and the Angiosperm Phylogeny (a revision)
- Sequencing, the method (Sanger sequencing and next generation sequencing)
- Sequence alignment and matrix construction
- Tree building by maximum parsimony and/or distance methods

2-3 Studying Diversity

- Other molecular techniques to access plant diversity
  - AFLPs
  - The method, requisites, and outputs
  - Data editing and analysis
- Microsatellites
  - What are microsatellites and why they are used
  - Ways of developing microsatellite primers
  - The method; Scoring and Editing
  - Data analysis; Population assignment
- SNPs
  - What are SNPs?
  - Ways of SNP identification and potential use in plants
  - Comparison of molecular techniques to study diversity

HEIPLADI

4

- DNA barcode of Life: identifying species with DNA barcodes
  - What is DNA barcode?
  - Plant DNA barcode
  - What are the Plant DNA barcodes?
  - Plant systematics and DNA barcode

5

- From genome to proteome
- What is a proteome?
- Methods involved in proteomic approach
- Proteomic analysis and plant taxonomy

6

- Defining phytotaxonomy, chemotaxonomy and chemotaxonomic markers
- An overview of the major classes of phytochemicals in different plant groups
- Major chemotaxonomic markers in plants - gauging evolutionary relationships between plants using chemicals.
- Methods involved in chemotaxonomy – equipment, data collection and interpretation
- Plant systematics and chemotaxonomy – case studies, advantages and disadvantages

In situ and *ex situ* Plant Conservation *7 ECTS*

Course organizer: *Marco Porceddu* (porceddu.marco@unica.it)
Lecturers: *Gianluigi Bacchetta, Donatella Cogoni, Giuseppe Fenu, Francesca Meloni, Martino Orrù, Silvia Pinna, Lina Podda, Marco Porceddu, Andrea Santo, Mariano Ucchesu* (UNICA), *Stefania Scippa*, *Dalila Trupiano* (UNIMOL), *Manuela Sim-Sim* (ULISBOA), *Maciej Niedzielski, Maciej Niemczyk, Wiesław Podyma* (PAN OB-CZRB)

OBJECTIVES
After completion of the course, the students should be able to:

- Exhibit basic knowledge on the plant conservation
- Exhibit knowledge and skills on *in situ* conservation techniques
- Demonstrate knowledge on the techniques for collection, study, *ex situ* processing and conservation of germplasm.
- Work in a germplasm bank and “take home” the basic knowledge about seed germination and dormancy breaking techniques

1

- Biodiversity conservation
- Regulations and Conventions on conservation of biodiversity, “CITES”, “Nagoya Protocol”
- The IUCN Red List of threatened species. Strategic plan 2013-2020
- The vulnerability of the Mediterranean flora and Mediterranean Island plants
- The IUCN Red List categories and criteria. A widely understood system for classifying species at high risk of global extinction
- The contribution of developing a European Red List and its role in providing ecosystem services, guiding policy decisions and conservation actions
- International Treaty on Plant Genetic Resources for Food and Agriculture

2

- *In situ* conservation (general concepts)
- Ecological and anthropogenic drivers determining the threatened flora distribution
- Monitoring threatened plant population (concept and methodologies)
- Demographic studies of threatened plant (concept and methodologies)
- Conservation status assessment
- Plant translocations
- Complementary conservation of plant genetic resources
- Genetic reserves
- On farm conservation
- Home garden management

3

- Habitat characterization (concept, guidelines at European level, with emphasis for the Mediterranean region)
- Habitat monitoring (concept and methodologies)
- Habitat conservation and recovery techniques

4

- Alien plants in natural and seminatural habitats: impacts of biological invasions
- Management of invasive alien plants
- Germination ecophysiology of alien plants

5

- Preparing for collecting missions (target species, target environments, etc.)
- Sampling strategy
- Collecting forms
- Codes of good practice for collecting and transfer
- Legal aspects of exchange of accessions

6

- *Ex situ* conservation (general concepts)
- Botanic gardens, arboreta, germplasm banks
- Storage techniques: seed bank, pollen, in vitro culture, field collections
- Seed bank: general seed features and advantages for germplasm conservation
- Types of collections (basic, active, working, core)
- Management of conserved germplasm
- Use of germplasm

7

- Collected seed accession processing (i.e., cleaning, post maturation, drying of seeds, packing, etc.)
- Seed water content measurements, orthodox and recalcitrant seeds
- Seed morpho-colorimetric analysis: preparation and performing of the technique
- Seed viability tests (germination tests, colorimetric assays, conductivity test)
- Seed dormancy (type/level of seed dormancy)
- Dormancy breaking methods
- Seed germination (phases, thermal requirements, pre-treatments, etc.)
- Germination test (final %, T50)
- Environmental stresses on plant growth

Plant Management: Botanic Garden *5 ECTS*

Course organizer: *Ognyan Iliev* (sugarden@mnet.bg)
Lecturers: *Ognyan Iliev, Krasimir Kosev, Lyuba Pencheva* (UBG), *Christian Borg* (UOM), *Ilektra Remoundou* (CIHEAM-MAICH), *Konrad Wolíński* (PAN OB-CZRB)

OBJECTIVES

- Management of the Botanic gardens and arboreta, based on knowledge of national and international biodiversity legislation and network organizations of Botanic gardens
- Knowledge and practical examples on conservation and management of the botanical collections
- Botanic garden guides
- Landscape architecture design in Botanic gardens and arboreta
- General garden care and cultivating methods (watering, pruning, weed control, planting and transplanting, vegetative propagation), plant herbarium and seed banks use of interactive interface to explore plant morphology and Interactive Identification Key role of the Botanic garden in plant biodiversity conservation
- Knowledge and evaluating the significance of the social and educational roles of the Botanic gardens.

1 Introduction

- What is a botanic garden? History, development, significance and perspectives
- Botanical gardens as tools for ecological preservation. *Ex-situ* conservation
- Maintenance of living plant collections
- General maintenance of a botanic garden. Tools and equipment in the botanic garden

2 Plant collection, collection policies and documentation

- Documentation of living collections
- Plant collection and collection policies. Propagation techniques: seed harvesting, transplanting and maintenance
- The Herbarium and seed bank: documentation, identification and preservation of plants
- Using databases to identify and record plant biodiversity in Botanic garden and Arboretum

3 Landscape Planning, Zoning and Design

- Landscape Planning and Zoning
- Plant habitats and how to replicate them
- Contemporary gardening: Principles and Approaches
- Landscape Design: Principles, techniques, styles and practices

4 Botanic garden education

- Education, research and training in botanic gardens. Raising awareness for plant conservation
- Outdoor learning. Interpreting the garden to visitors
- Inquire-based science education (IBSE) activities for different groups of learners in botanical gardens

5 Botanic garden management

- Challenges to modern botanical gardens
- Staff management: recruitment, training and its importance. Volunteering.
- Budgeting and financial planning. Project funding activities.
- Global Strategy for the protection of plant species and botanic gardens
- Strategic planning and SWOT analysis of the construction and development of the botanic garden

Geographical Information Systems *4 ECTS*

Course organizer: *Chariton Kalaitzidis* (chariton@maich.gr)
Lecturers: *Chariton Kalaitzidis* (CIHEAM-MAICH), *Paolo Di Martino*, *Ludovico Frate* (UNIMOL)

OBJECTIVES
Introduce students to GIS:

- Introduce students to the nature of remote sensing data
- Provide basic knowledge of the capabilities of a GIS
- Describe types of spatial data that can be used in a GIS
- Present applications of a GIS on Botanical Garden management, for Decision Support
- Provide practical, hands-on experiences on all of the above

1 Introduction to Geographical Information Systems

- Fundamentals of Cartography (map creation, visual representation of spatial data)
- Projection systems
- Georeferencing of maps/images
- Elements of GIS (vector/raster data, database, spatial analysis, representation)
- Open (Free) GIS software (practical introduction)

2 Intermediate concepts of GIS

- Databases (hierarchical, relational)
- Topology
- Digital Elevation Models and Digital Surface Models
- Data acquisition/generation and pre-processing
- Case studies of real-life projects
- Practicals/Exercise

3 Introduction to Remote Sensing and synergies with GIS

- Remote Sensing principles
- Digital image acquisition
- Combining raster and vector data
- Mapping land cover, topography and environmental parameters
- Management and planning support examples
- Practicals/Exercises

4 Decision Support System for Botanic Garden Management

- Data manipulation and modelling
- Examples of GIS/RS applications on management and

monitoring of vegetation
- Surveying and *in-situ* data collection
- Practicals/Exercises

Practical activities

Practical Plant Taxonomy *5 ECTS*

The training will be focussed on practical activities related with the theoretical knowledge gained from the e-learning courses:

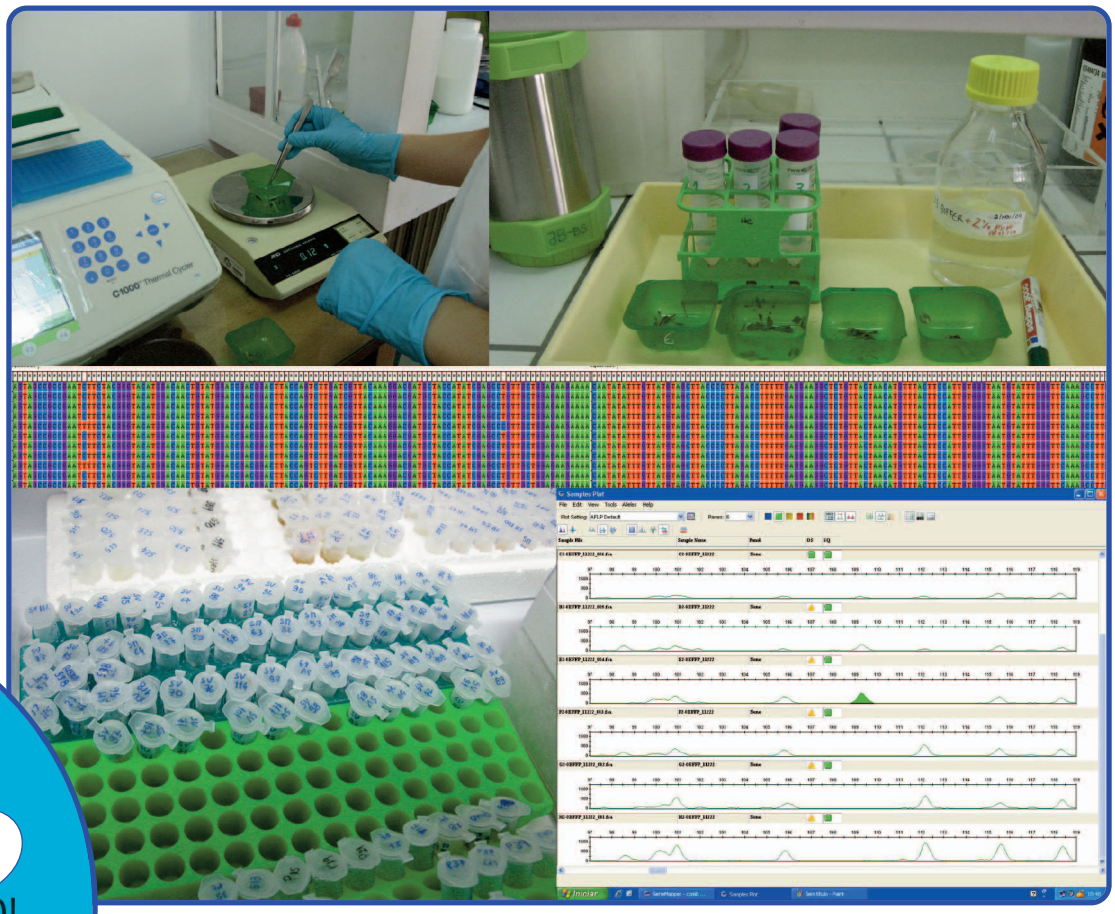
1. Laboratory exercises for the use of taxonomic keys for plant identification (ferns, gymnosperms, angiosperms) using stereoscope and microscope
2. How to realize a scientific herbarium, data-base of herbarium data
3. The use of software-assisted tools for plant taxonomy and morphometric methods

NO. OF PARTICIPANTS: 25 students (five per university)
DURATION (days): 6
PERIOD: March 13-17 2017
PLACE: UNIVERSITY OF MOLISE, ITALY
ADDRESS: Contrada Fonte Lappone (Pesche - IS)
RESPONSABLE: Paola Fortini (fortini@unimol.it)

Modern Methods for Plant Systematics *4 ECTS*

The training will be focused on practical activities related with the theoretical knowledge gained from the e-learning courses and will involve the laboratory activities with molecular techniques to study plant diversity, and activities on the development of a DNA barcode system: markers of choice, specimen preparation, laboratory workflows and data repositories (GeneBank, BOLD databases), sequence analysis, DNA barcode applications in different fields.

NO. OF PARTICIPANTS: 20 students (four per university)
DURATION (days): 5
PERIOD: June 19-23 2017
PLACE: UNIVERSITY OF LISBOA, PORTUGAL
ADDRESS: Campo Grande Bloco C2. Lisboa
RESPONSABLE: Helena Cotrim (hmcotrim@fc.ul.pt)

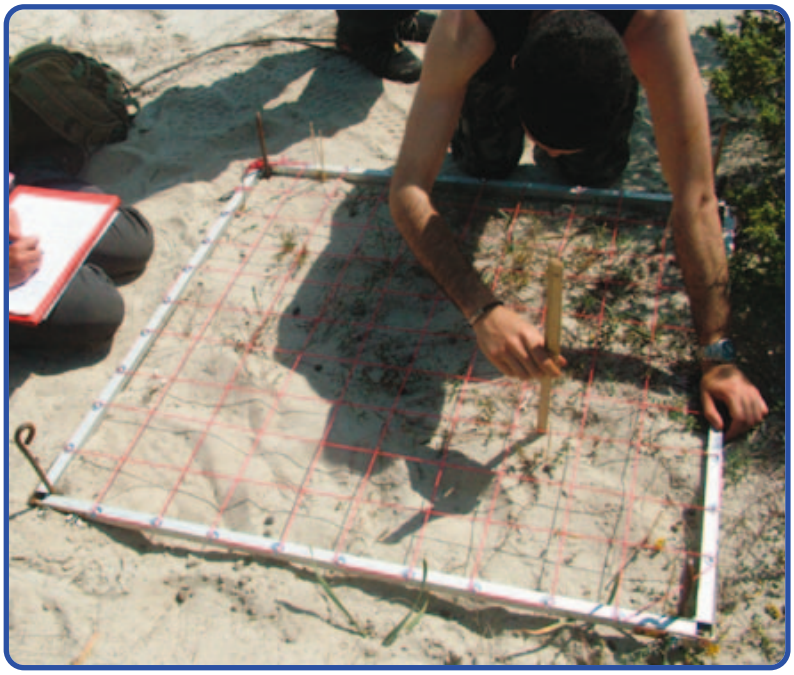


HEIPLADI

In situ and *ex situ* Plant Conservation 5 *ECTS*

The training will be focussed on practical activities related with the theoretical knowledge gained from the e-learning courses and will involve the *in situ* conservation of natural populations (in particular those of endemic and endangered plant species) and the *ex situ* management and conservation of genetic resources in seed banks. Evaluation of plant conservation status following the principal international procedures; *in situ* conservation activities (plant translocation or protective measures) through the analysis of case studies. The practical activities will be carried on the endemic or threatened plants currently studied by the centre.

NO. OF PARTICIPANTS: 25 students (five per university)
DURATION (days): 6
PERIOD: May 2018 (II week)
PLACE: UNIVERSITY OF CAGLIARI, ITALY
ADDRESS: Viale Sant'Ignazio da Laconi, 13, 09123 Cagliari
RESPONSABLE: Francesca Meloni
(heipladi.erasmusplusunica@gmail.com)

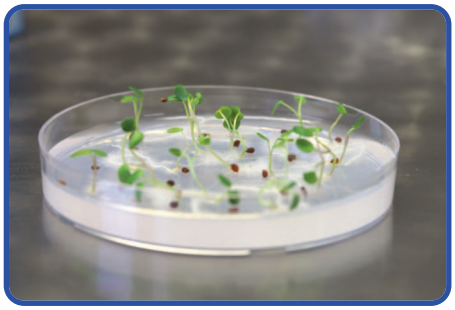


HEIPLADI

Ex situ Plant Conservation *4 ECTS*

The training will be focussed on practical activities related with the theoretical knowledge gained from the e-learning courses and will involve the hole process of the genetic material that enter in the seedbank: cleaning, weighting, drying, packaging and storing, applying consolidated international protocols in order to maintain the viability of the collected material.
Research experiments on propagation protocols will be carried out, in order to obtain information on germination requirements of the targeted plant species. For each plant species, under laboratory conditions, there will be examination of: seed dormancy type, seed dormancy release treatments, effect of light and temperature on germination.

NO. OF PARTICIPANTS: 25 students (five per university)
DURATION (days): 5
PERIOD: July 11-15 2017
PLACE: POLISH ACADEMY OF SCIENCES BOTANICAL GARDEN, POLAND
ADDRESS: Prawdziwka 2, 02-973 Warszawa
RESPONSABLE: Maciej Niemczyk (maciej.niemczyk@zygro.nazwa.pl)



HEIPLADI

Plant Management: Botanic Garden *4 ECTS*

The training will be focussed on practical activities related with the theoretical knowledge gained from the e-learning courses and will involve the: methods for the collecting, storage and cultivating of rare and endangered species; conservation of autochthonic endangered species on the territory of the Botanic garden; breeding, reproduction and exposure of species with conservation significance and with decorative quality/capacity; general garden care – horticultural methodology.

NO. OF PARTICIPANTS: 25 students (five per university)
DURATION (days): 5
PERIOD: May 2017 (II week)
PLACE: UNIVERSITY OF SOFIA, BULGARIA
ADDRESS: UBG - Varna and UBG - Balchik
RESPONSABLE: Ognyan Iliev (sugarden@mnet.bg)

Geographical Information Systems *4 ECTS*

The training will be focussed on practical activities related with the theoretical knowledge gained from the e-learning courses and will involve the concept of Geographic Information Systems. The type of data that can be handled by a GIS (vector, raster, alphanumerical) and the manner in which they are structured in a geo-database will be explained. The basic data interrogation and spatial analysis techniques will be described and implemented in practice, using computers and relevant software. Data will be collected in situ and imported in a geo-database. Particular applications of monitoring and management of vegetation populations in situ will be demonstrated and the students will have the opportunity to use GIS on these applications.

NO. OF PARTICIPANTS: 25 students (five per university)
DURATION (days): 5
PERIOD: September 2017
PLACE: MAICH, GREECE
ADDRESS: Alsyllio Agrokepio, 1Makedonias str Chania, Crete, 73100
RESPONSABLE: Chariton Kalaitzidis (chariton@maich.gr)

HEIPLADI

Plant Management: Mediterranean Botanic Garden *4 ECTS*

The training will focus on practical activities related with the theoretical knowledge from the e-learning courses and will involve botanic garden management with a special emphasis to Mediterranean flora. Practical activities will focus on the following themes:

- Handling different provenances of new accessions for botanic gardens – index seminum, live plant exchange between BG and field collections;
- Regulations covering exchange of plant material including reference to CITES protected material and IPEN;
- Keeping records for new accessions, databases and generation of labels;
- Propagation of Mediterranean-type plants – seeds, other propagules and micro-propagation;
- Aspects of Mediterranean garden management – plant summer dormancy, tolerance for shade and sun, heat and water stress;
- Handling invasive species, disease and pests control; Additional roles of botanic gardens – education, sustainability and plant conservation.

NO. OF PARTICIPANTS: 20 students (four per University)
DURATION (days): 5
PERIOD: April 2018
PLACE: ARGOTTI BOTANIC GARDENS, UNIVERSITY OF MALTA, MALTA
ADDRESS: Triq Vincenzo Bugeja, Floriana
RESPONSABLE: Christian Borg (christian.borg@um.edu.mt)

HEIPLADI

Partners

University of Molise
(UNIMOL)

The University of Molise is composed of 6 Departments involved in research and teaching, whose areas are the following: Department of Agricultural, Environmental and Food Sciences, Department of Economics, Management, Society and Institutions, Department of Humanities, Education and Social Sciences, Department of Biosciences and Territory, Department of Law and Department of Medicine and Health Sciences.

The University of Molise counts 4 University campuses, 9000 students, 105 PhD students and about 600 among teaching and non-teaching staff.
The Department of Economics, Management, Society and Institutions has been carrying out a number of LLP projects (particularly Grundtvig and Leonardo da Vinci) in the fields of active and European citizenship, intergenerational learning and focusing on the identification of success measures of social inclusion, employability enhancing factors, establishing virtual communities of practice and social connectivity. The International Relations Office of the University is active in international programs, among which LLP for students, teachers and staff mobility for study and placement (Erasmus) and support to several other internationalisation projects, especially in the framework of LLP. Particularly relevant is also the support given to projects having as subjects gender issues and gender mainstreaming. Due to the fact that the University of Molise has a specialised International Relations Office she has a lot of expertise in managing the finances of provided European projects in order to ensure a good financial management of their part in a European project. Besides this the International Relational Office has her own management guidelines in order to realise the needed products (for which they're responsible) for European projects in time and to ensure a good contribution in the consortium.

University of Cagliari
(UNICA)

The University of Cagliari (UNICA) is one of the largest enterprises in Sardinia thanks to its international policies and research and its numerous agreements with prestigious universities in Europe and outside Europe. The University of Cagliari is a public state University and

has about 25000 enrolled students, over 1100 teaching staff and more than 900 professionals at the technical-administrative staff.

The University of Cagliari has been operating with the international academic community and has developed significant international strength in research in eight major themes which include globalisation, cancer, genetics, neuroscience, immunology, communications and intelligent systems, nano and materials science as well as Italian language and culture. The University of Cagliari offers an interesting and complete educational experience across a range of disciplines in the arts, humanities, economics, law, engineering, architecture, science, human, social and health sciences.

UNICA has a good record of publications in high-impact journals, and a track record in winning research funding which is among the best in the country.

At present the University of Cagliari has the following faculties: Faculty of Biology and Pharmacy, Faculty of Engineering and Architecture, Faculty of Medicine and Surgery, Faculty of Sciences, Faculty of Economic Sciences, Law and Political Sciences, Faculty of Humanities. Besides that, yearly about 200 visiting professors come to Cagliari's University. UNICA hosts intellectually strong students from Italy and abroad and offers facilities to students with disabilities. Several places every year are kept for economically disadvantaged students as we strongly believe that the right to education must be granted to all. The community of students at the University of Cagliari is enriched by an international mix of students 500 of which are from outside Italy and 76 are from outside the European Union, with these numbers increasing every year. UNICA's students have various opportunities to study abroad, in other leading European and extra-EU universities thanks to UNICA's more than 500 partnership agreements.

University of Malta
(UOM)

The University of Malta traces its origins to the founding of the Collegium Melitense by the Jesuits in 1592. The College was raised to University status by Grand Master Manoel Pinto de Fonseca in 1769. Situated at Msida, it is the highest teaching institution of the State by which it is mainly financed and is open to all those who have the requisite qualifications. Over the past few years, the University has reviewed its structures in order to be in line with the Bologna process. Conscious of its public role, the University strives to create courses which are relevant and timely in response to the national, regional and international needs. The supreme governing bodies of the University are the Council and the Senate. There are over 11,000 students including over 1000 foreign/exchange students from nearly 84 different countries, following full-time or part-time degree and diploma courses.

The University has been involved as coordinator and partner in numerous externally funded and EU-funded projects including Framework Programme, Lifelong Learning Programme, Tempus and various other international and regional programmes and initiatives. The University is also represented in a number of European and international University networks and groups. Argotti Gardens form part of the Biology Department within the Faculty of Science and as such we are in a good position to teach and participate in the full academic activities of the University. The gardens are involved in a number of Research areas including extraction and bioactivity of phytochemical extracts, waste biotechnology especially wastewater treatment and vermicomposting, conservation of endangered plants using conventional methods and micropropagation as well as lab studies and rehabilitation.

Polish Academy of Sciences Botanical Garden Centre for Biological Diversity Conservation in Powsin
(PAN OB-CZRB)

Polish Academy of Sciences Botanical Garden - Centre for Biological Diversity Conservation in Powsin (PAN OB-CZRB) has a long standing tradition in research on preservation of plant biodiversity and popularisation of the plant botany and evolution subjects. Botanical Garden was established in 1974 as research unit of the Polish Academy of Sciences. Botanical

Garden of the Polish Academy of Sciences is a special institution of rather broad activity. From one side is the research institution on plants in the areas of botany, plant physiology and biochemistry, genetics, molecular biology, biotechnology, ecology and horticultural sciences. On the other hand, garden serves to the public as an institution for popularisation of the knowledge about plants, education centre and recreation place.

Research areas: *ex situ* conservation of rare, endangered and protected species of Polish flora, biosystematics and analysis of plant biodiversity, collection and storage of genetic resources of crop wild relatives and crops, and their use for research and agricultural production, use of biotechnology in research on plant organisms, growth of plants in the conditions of the urban and industrial environments, biomonitoring of environmental pollution, functional anatomy and development of woody plants.

In the Garden plants, depending on its morphological features, use, or origin, are grouped in the so-called collections. There are the following collections: Polish flora, trees and shrubs (arboretum), roses, and bulbous plants, perennials, ornamental fruit plants, medicinal plants and spices, vegetables and plants from warm climate zones which are grown in greenhouses. In total, plant exhibitions, occupy an area of over 30 hectares of land and 2000 m^2 greenhouses. Totally in the end of the 2014 year 9469 taxa where gathered in the collections. The plant collections are used in the garden for displays opened for public visitors as well as for research and conservation purposes. The Seed Bank in the PAN OB-CZRB was established in 1991 for long-term seed storage studies. The main goal of the Department of Plant Biodiversity Research and Conservation of PAN OB-CZRB is collecting and preserving the gene pools of the rarest and most endangered populations of the native Polish flora. Botanical Garden serve also as national collection of cultivated plants: rye (*Secale*) and apple trees (*Malus*). There are 82 persons employed in the Botanical Garden, 11 of them are research staff, 20 persons are gardeners and educators.

Mediterranean Agronomic Institute of Chania (CIHEAM-MAICh)

The Mediterranean Agronomic Institute of Chania (MAICh) was created in accordance with Law 4443/64, which established Greece as a founder-member of the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM). Its foundation took place under Law 1537/85, which was passed by the Greek Parliament following the provision of Article 28, paragraph 1 of the Constitution. The Centre constitutes an international organisation whose aim is the development of scientific cooperation in the sectors of economics, rural development, management, and applied biological,

technological and environmental sciences, addressing to problems in the Mediterranean area. The Mediterranean Agronomic Institutes of Bari (Italy), Montpellier (France) and Saragoza (Spain) are constituent Institutes of the same organisation. The Mediterranean Agronomic Institute of Chania offers post-graduate specialist studies (over a period of two academic years), leading to the degree of Master of Science (M.Sc.). Courses are conducted in the English language by visiting professors from Greek, European, American and Mediterranean Universities in cooperation with the Institute. An important comparative advantage is that the competence in the development of cooperation is highlighted within the European Union, the Mediterranean basin and Balkan countries, both in the provision of post-graduate training of executives and academics from these countries, as well as in the contribution to their economic development through common research and development projects.

MAICh functions in 6 different strategic axes: 1) Centre for Sustainable Rural Development and the Competitiveness of Agro-business Firms, 2) Centre for the Management and Protection of the Natural Environment, 3) Centre for the Quality, Healthiness and Safety of Fresh and Processed Agricultural Produce (Food Quality Management and Chemistry of Natural Products, Sustainable Production of Agricultural Produce), 4) Centre for the Application of Genetic Improvement and Biotechnology (Genetic Improvement and Biotechnology of Agricultural Produce, Natural Products and Biotechnology), 5) Centre for Development of Integrated Support to Information Systems, 6) Centre for Vertically Organised Conference Services.

University of Lisbon
(ULISBOA)

Following an outstanding scientific and cultural tradition inherited from its prior institutions, Universidade de Lisboa was created in July 2013, as a result of the merger of Universidade Técnica de Lisboa and Universidade de Lisboa (tracing its origins to the establishment of the Portuguese University in 1290). Universidade de Lisboa has 18 schools and over 100 research units, around 50,000 students, 4.000 lecturers, 2.500 non-academic staff and 400 degree courses. Teaching, research, science, technology and innovation are central elements of the work at Universidade de Lisboa. We aim to enhance our position as a "reference university", not only at the national level, but also in Europe.

Universidade de Lisboa awards 1st cycle and 2nd cycle degrees, as well as 3rd cycle Degrees (Doctor) and the title of "Agregado". It also has alternative offerings, such as programmes for continuing education, postgraduate studies and specialization courses aimed at meeting the training demands of emerging labour markets, at boosting economic competitiveness and promoting innovation. The Universidade de Lisboa also comprises the European Institute of the Faculty of Law, which has played a key role in the dissemination of EU studies throughout Portugal.
The 18 schools of the Universidade de Lisboa are independent legal entities according to National Law, and participate with their own PIC in the Research and Innovation funding programmes. Faculty of Sciences, one of the University schools, is the Portuguese partner in the project. This project is encompassed on its mission of expanding the limits of science and technology into society and promote research-based student education.

University Botanic Gardens (UBG)

UNIVERSITY BOTANIC GARDENS УНИВЕРСИТЕТСКИ БОТАНИЧЕСКИ ГРАДИНИ

University Botanic Gardens are an autonomous unit of the Sofia University "Saint Kliment Ohridski" - public state university, established in 1888. University Botanic Gardens represent three gardens in three locations – the cities of Sofia and Varna and the town of Balchik.

The University Botanic Garden - Sofia was founded in 1892. It is situated in the city centre of the capital, area: 0.5 ha, including greenhouses revealing the beauty and unique diversity of tropical species of orchids, bromeliads, aroids, subtropical plants, as well as collections of palms, cycads, cacti and other succulents, ferns. Number of species: over 1500 species.
The University Botanic Garden - Balchik was created in 1955 on the territory of the former queen's residence, today it stretches on an area of 19.4 ha and has botanical collections containing more than 5000 species, 3794 of which are cacti and succulents. The biggest attraction is the permanent exhibition of cacti and succulents. The doyen is 90-years-old *Opuntia streptacantha* Lem., endemic to Mexico. Some species with high conservation status include: used in Aztec rituals, *Digitostigma caput–medusae* D.R.Hunt, *Roseocactus fisuratus* (Engelm.) A.Berger, the endemic to the Galapagos Islands *Opuntia echios* Howell var. *gigantea*, better known as "Galapagos prickly pear", *Aloe bakeri* Scott-Elliot, and

the critically endangered species from the island of Madagascar - *Aloe descoingsii* Reynolds.

The territory of this Botanic Garden was declared Protected Area. The historical part of the University Botanic Garden - Balchik is now an ensemble cultural heritage – a monument of garden and park art since 2002 year.

An adapted garden was designed especially for the people with limited abilities. Spreading on an area of 1.1 ha, it shows visitors the beauty of seasonal flower compositions, Alpine spots, water areas, etc.

University Botanic Garden Balchik is rescue center for rare and endangered plants on CITES Convention.

Balkan Ecological Center was established to University Botanic Garden - Balchik. It provides master's degrees on Eco-management.

The University Botanic Garden - Varna was established in 1977 as the first Eco-park in this country and combines itself both man-made and natural ecosystems. The park lies on an area of 36.0 ha. The Arboretum includes more than 1000 species of exotic trees, shrubs and grass plants from around the world – from 556 genus and 131 families. Seasonal displays present collection roses, irises, day-lilies as well as flower carpet beddings.

On the territory of the University Botanic Garden – Varna were discovered archeological findings from the II-IV century AD.

The University Botanic Gardens primary task is to expand the knowledge about the plant kingdom and to carry out activities on ex situ preservation of rare and endangered plant species. UBG have a scientific, educational and cultural mission as well as growing social role. UBG was partner in PLANTCAFE and INQUIRE EU educational projects.

The University Botanic Gardens are member of the Botanic Gardens Conservation International (BGCI), European Botanic Gardens Consortium, Environmental and Botanic Garden Education Network (EBGEN) and takes part in the international seed exchange (Index Seminum) among botanic gardens from all over the world.

https://dibt.unimol.it/HEI-PLADI/home/

HEIPLADI