3rd Mediterranean Plant Conservation Week

CHANIA, CRETE, GREECE | 27 SEPTEMBER - 1 OCTOBER 2021

Plant Conservation Strategies: from Science to Practice

The blended program developed within the Erasmus+ K2 Strategic Partnership

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Erasmus+ | AGENZIA NAZIONALE INDIRE

ang AGENZIA NAZIONALE PER I GIOVANI | INDIRE ISTITUTO NAZIONALE DOCUMENTAZIONE INNOVAZIONE RICERCA EDUCATIVA | ISFOL ISTITUTO PER LO SVILUPPO DELLA FORMAZIONE PROFESSIONALE DEI LAVORATORI

Erasmus+

Ministero dell'Istruzione, dell'Università e della Ricerca

Ministero del Lavoro e delle Politiche Sociali

Presidenza del Consiglio dei Ministri
DIPARTIMENTO DELLA GIOVENTÙ E DEL SERVIZIO CIVILE NAZIONALE

Partnership: Botanic gardens, Germplasm banks, HEIs

GENERAL AIMS

❖ **Contributing to the development of a European Area of Skills and Qualifications.**

❖ **Enhancing digital integration in learning, teaching, training and youth work at various levels.**

❖ **Supporting the implementation of reforms in line with the 2011 EU Modernisation Agenda's priority areas.**

HEIPLADI OBJECTIVES

❖**Promote the internationalization of European higher education systems.**

❖**Enhance lifelong learning and the ICT integration in learning, teaching, training and youth work at various levels..**

HEIPLADI OBJECTIVES

❖ **The Global Strategy for Plant Conservation**

I) **Plant diversity understood, documented and recognized;**
II) **Plant diversity is urgently and effectively conserved;**
III) **Plant diversity is used in a sustainable and equitable manner;**
IV) **Education and awareness about plant diversity, its role in sustainable livelihoods and importance to all life on Earth is promoted;**
V) **The capacities and public engagement necessary to implement the Strategy have been developed.**

❖**Societies sustainable development depend on objectives IV and V and related**

Target 14: The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes;
Target 15: The number of trained people working with appropriate facilities sufficient according to national needs, to achieve the targets of the Strategy;
Target 16: Institutions, networks and partnerships for plant conservation established or strengthened at national, regional and international levels to achieve the targets of the Strategy.

HEIPLADI OBJECTIVES

❖**Provide more opportunities for students to gain additional skills on plant diversity issues i.e. conservation, management, monitoring, valorization, exploitation, in an international context!**

HEIPLADI OBJECTIVES

Development of a program which integrates ICT in a blended path of virtual and physical mobility.

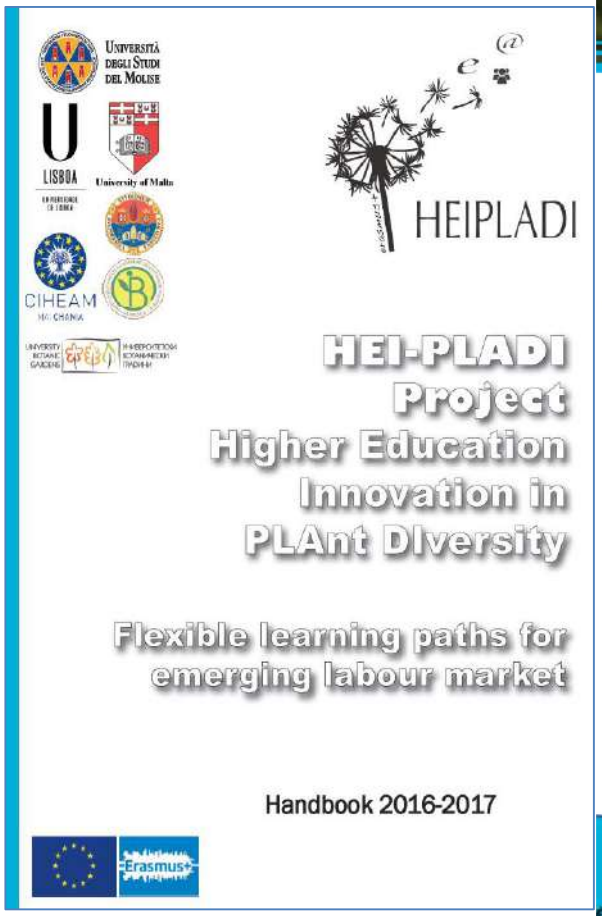
Flexible Learning Path of a Virtual and Physical Mobility to provide students the opportunities to develop advanced knowledge and technical skills to approach multitasks plant diversity issues.

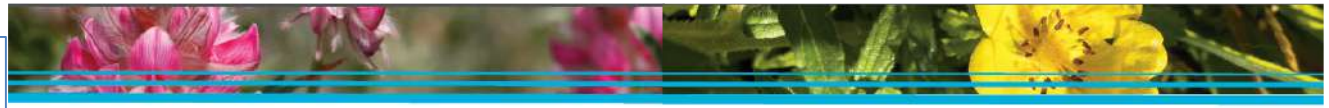
HEIPLADI RESULTS

FLEXIBLE LEARNING PATH

- **Learning Objects**, i.e., modular resources, **Digital** and **web-based**, that can be used and re-used to support learning activities for **plant diversity**.
- Contents of the proposed learning program are tailored to match the interests of students coming from a wide variety of backgrounds, including areas as **BIOLOGY**, **ENVIRONMENTAL AND NATURAL SCIENCES**, **FORESTRY, AGRICULTURAL SCIENCES**
- Students may follow the **whole program** or **just courses** of their specific interest

HEIPLADI RESULTS





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.

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/

HEIPLADI RESULTS

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*)

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 RESULTS

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:

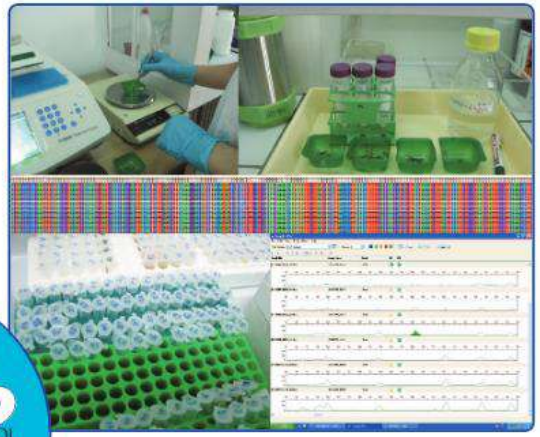
1. Laboratory exercises for the use of taxonomic keys for plant identification (ferns, gymnosperms, angiosperms) using stereoscope and microscope
2. How to realize a scientific herbarium, data-base of herbarium data
3. The use of software-assisted tools for plant taxonomy and morphometric methods

NO. OF PARTICIPANTS: 25 students (five per university)
DURATION (days): 6
PERIOD: March 13-18, 2017
PLACE: UNIVERSITY OF MOLISE, ITALY
ADDRESS: Contrada Fonte Lappone (Pesche - IS)
RESPONSIBLE: Paola Fortini (fortini@unimol.it)

Modern Methods for Plant Systematics 4 ECTS

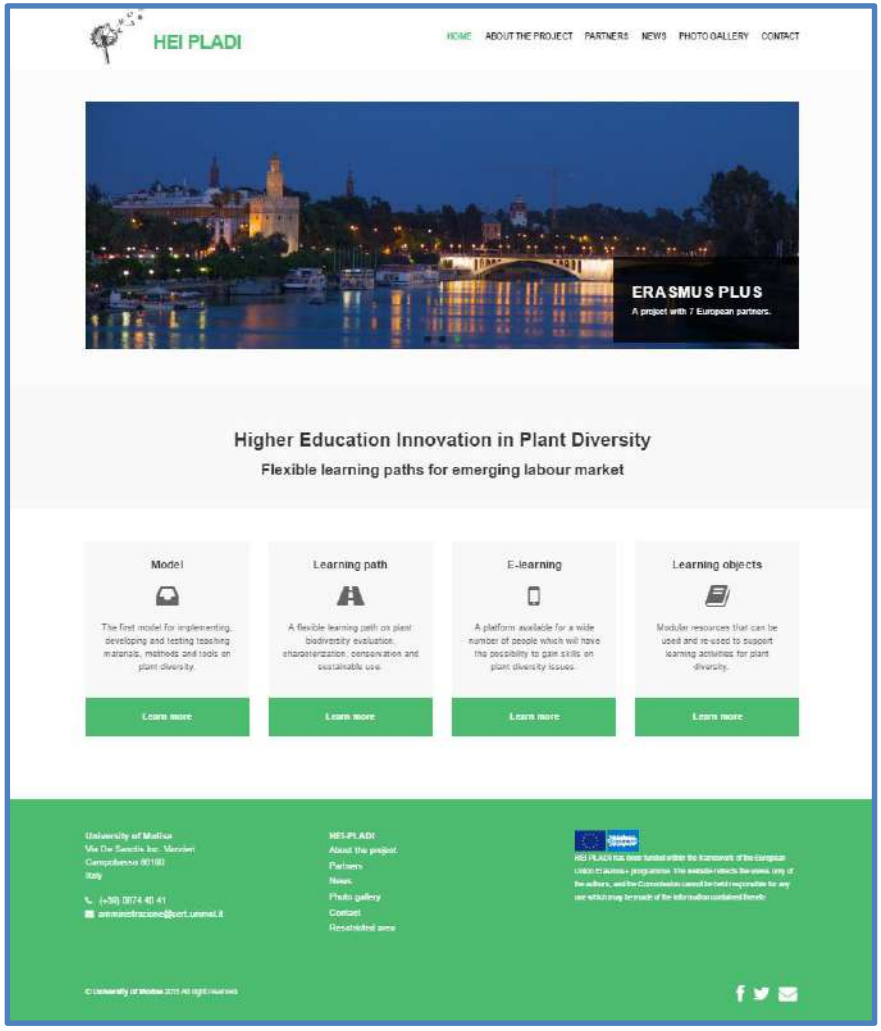
The training will be focused on practical activities related with the theoretical knowledge gained from the e-learning courses and will involve the laboratory activities with molecular techniques to study plant diversity, and activities on the development of a DNA barcode system: markers of choice, specimen 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
RESPONSIBLE: Helena Cotrim (hmcotrim@fc.ul.pt)

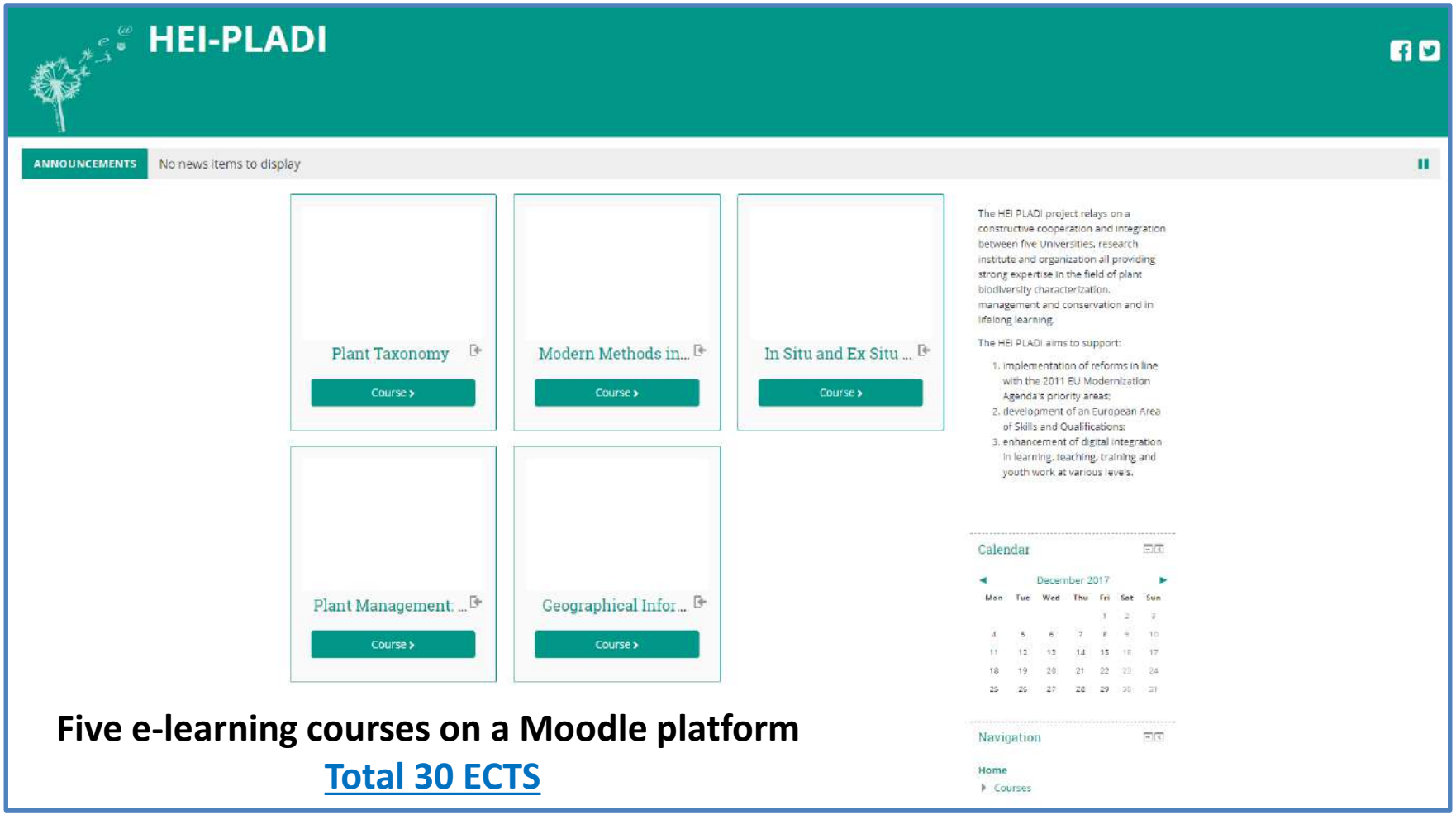


HEIPLADI RESULTS

PROJECT WEB-PAGE



HEIPLADI RESULTS

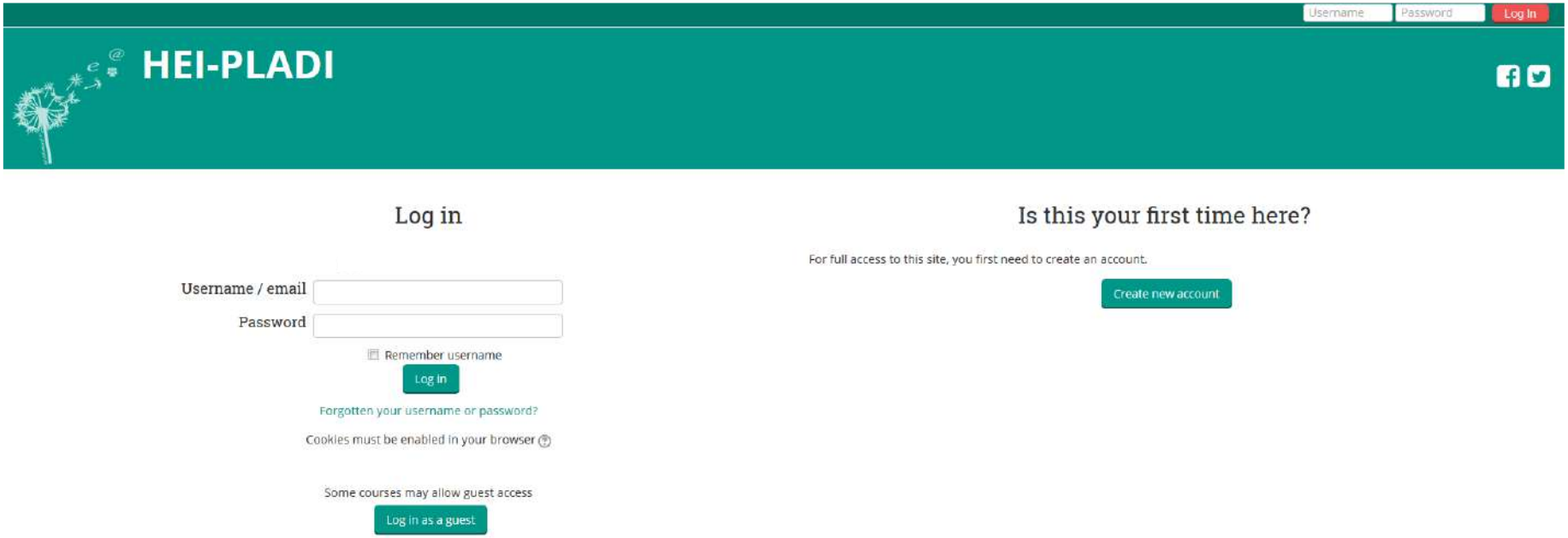


Five e-learning courses on a Moodle platform

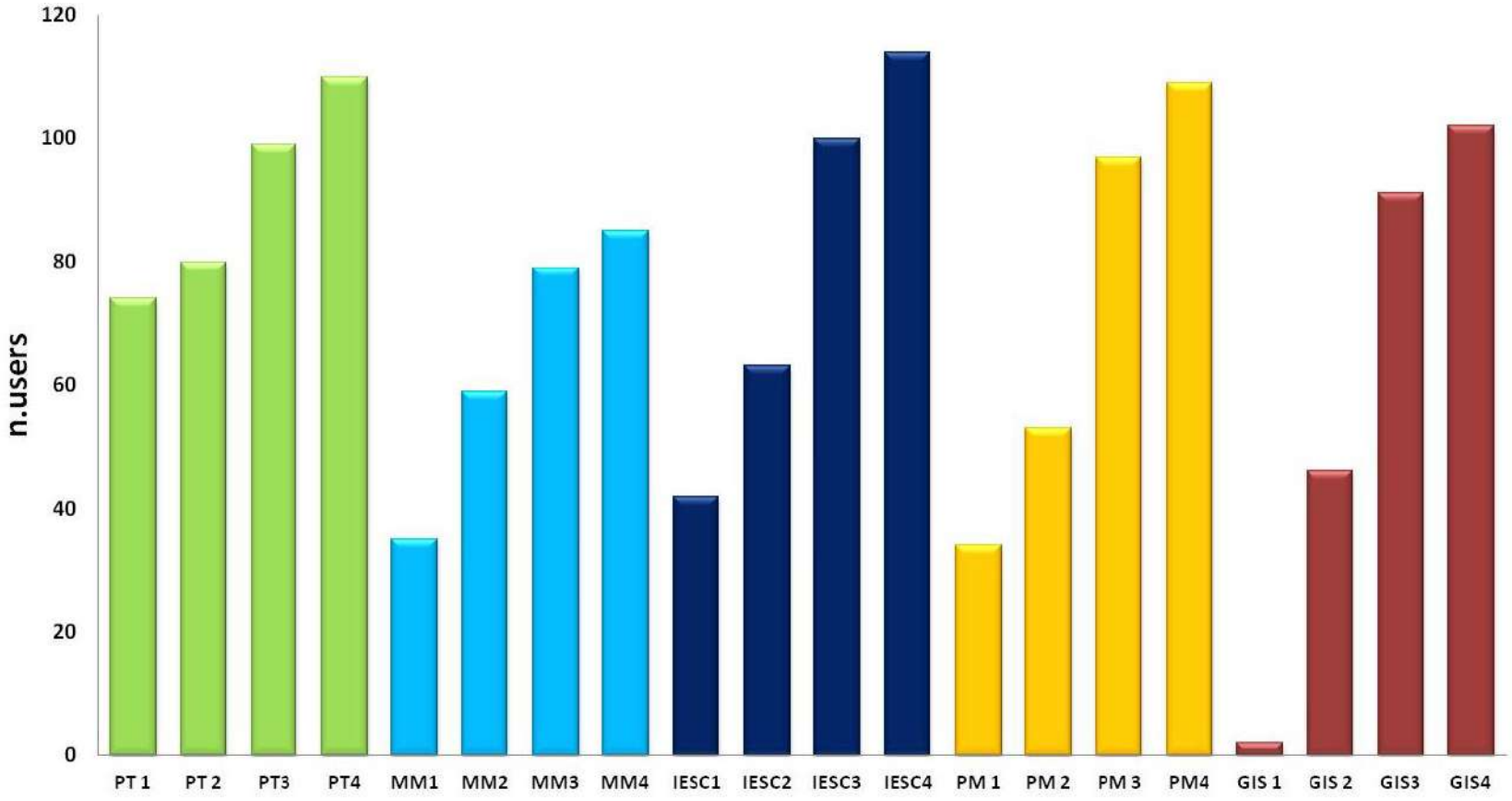
Total 30 ECTS

HEIPLADI RESULTS

VIRTUAL MOBILITY



HEIPLADI RESULTS

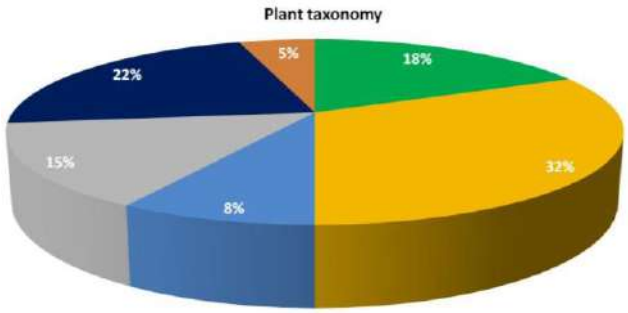


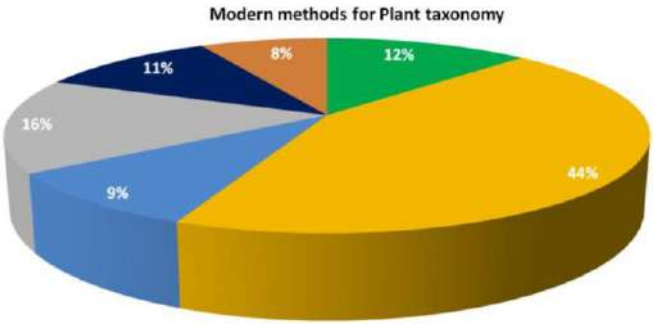
PT: Plant Taxonomy
MM: Modern Methods

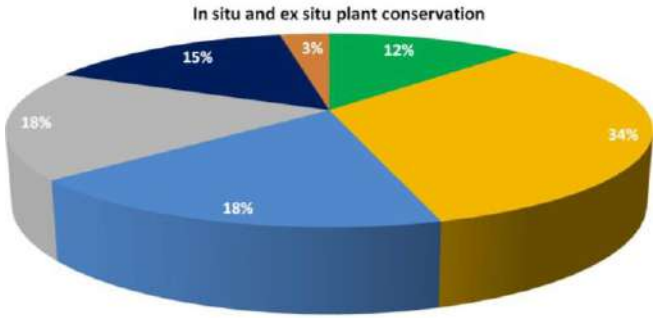
IESC: In situ and ex situ conservation
PM: Plant management : Botanic garden

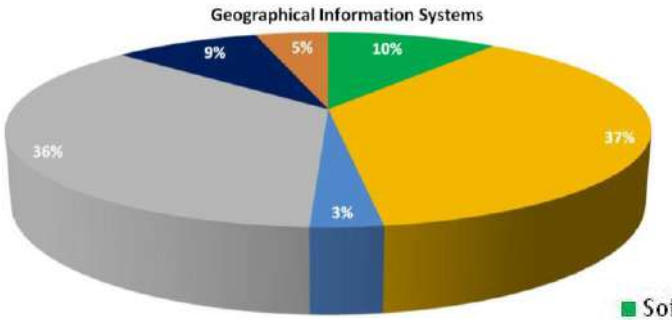
GIS: Gis

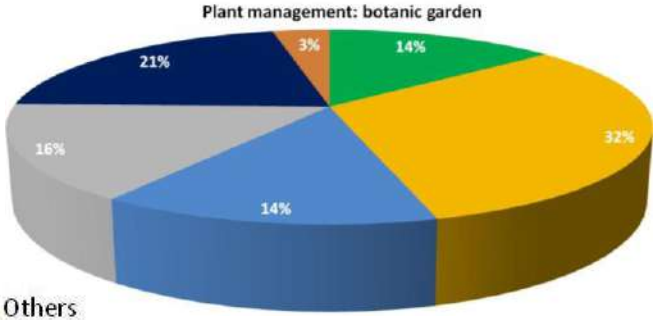
HEIPLADI RESULTS











Sofia Cagliari Malta Molise Lisbon Others

HEIPLADI RESULTS

PHYSICAL MOBILITY

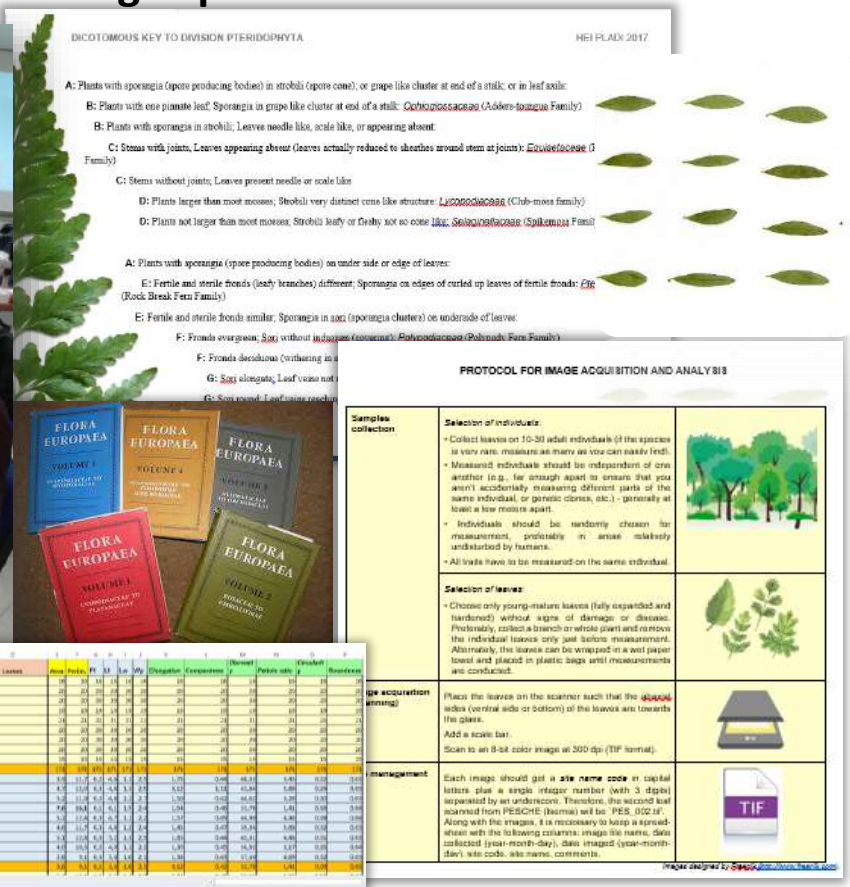
Seven short-term mobility:
field works, practical and laboratory activities focused on developing skills and deepen knowledge gained from the e-learning courses.
Total 30 ECTS

Short term mobility fellowship for 5 students from each partner University

HEIPLADI RESULTS PRACTICAL ACTIVITY

PLANT TAXONOMY University of Molise

Describe and identify a living plant using botanical terms; exercises for the use of taxonomic keys for ferns, gymnosperms and angiosperms identification



HEIPLADI RESULTS

BOTANIC MANAGEMENT PRACTICAL ACTIVITY
University of Sofia

• Management of the Botanic gardens and arboretums, based on knowledge of national and international biodiversity legislation and network organizations of Botanic gardens (Washington Convention CITES, United Nation Convention on Biological Diversity, Global Strategy for Plant Conservation, Strategy for management of Botanic Gardens etc.)

• Botanic garden guides

• Knowledge and evaluating the significance of the social and educational roles of the Botanic gardens.

• Landscape and architecture design in Botanic gardens and arboretums

• Knowledge and practical examples on conservation and management of the botanical collections

• General garden care and cultivating methods (watering, pruning, weed control, planting and transplanting), plant herbarium and seed banks
• Key role of the Botanic garden in plant biodiversity conservation

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HEIPLADI RESULTS PRACTICAL ACTIVITY

GIS

Mediterranean Agronomic Institute of Chania

Monday 4/9	Tuesday 5/9	Wednesday 6/9	Thursday 7/9	Friday 8/9
Field data collection using GPS	Field data collection using GPS	Field data collection using GPS	Field data collection using GPS	Field data collection using GPS
Basic Operations in QGIS	Digital Image Analysis	Using Multi Criteria Analysis	Demonstration project	Student GIS project
Lunch break	Lunch break	Lunch break	Lunch break	Lunch break
Generating Data: Digitizing and Database population	Spatial Analysis Methods	Practical examples of Multi Criteria Analysis	Demonstration project	Student GIS project

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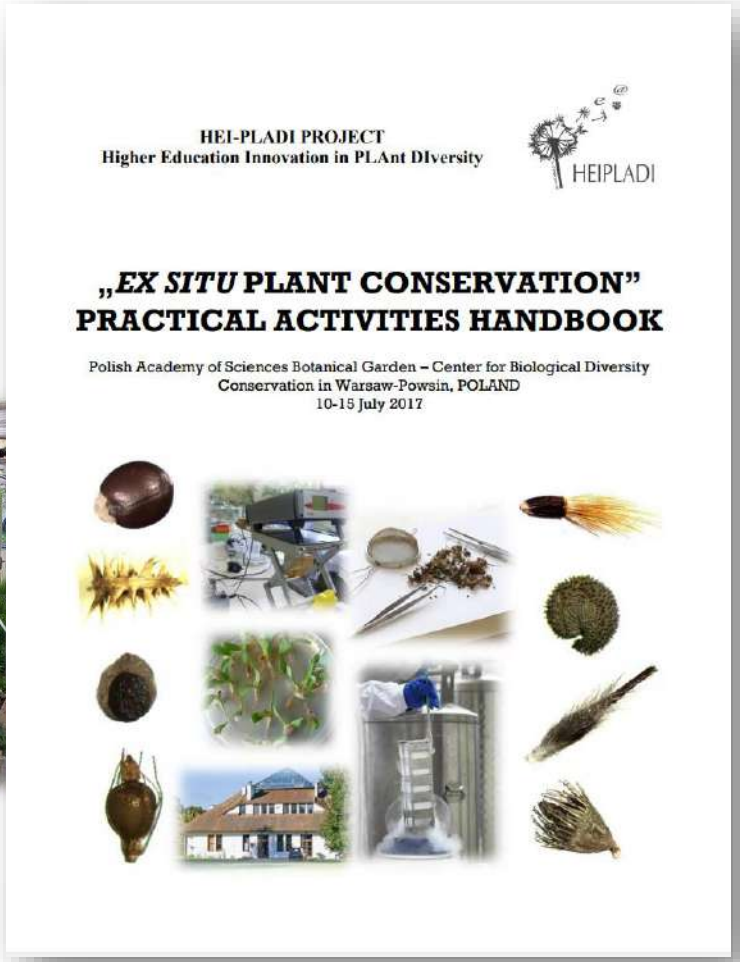
HEIPLADI RESULTS PRACTICAL ACTIVITY
EX SITU PLANT CONSERVATION
Polish Academy of Sciences Botanical Garden-Center for Biological Diversity conservation WARSAW



Monday, 10 July	Tuesday, 11 July	Wednesday, 12 July	Thursday, 13 July	Friday, 14 July
Arrival	Cleaning	Drying II	Germination II	Cryopreservation of apple buds/ excursion on PAS Botanical Garden
	Drying I	Cleaning	Drying II	
	Germination I	Germination II	Packaging and storage	
	Lunch break			
Lecture and seed bank presentation	Drying I	Germination I	Packaging and storage	Assessment
	Germination I	Packaging and storage	Germination II	
	Cleaning	Drying I	Drying II	

HEIPLADI RESULTS PRACTICAL ACTIVITY

MODERN METHODS IN PLANT TAXONOMY
University of Lisbon

Modern Methods in Plant Systematics-practical activity C2
Lisbon, October 30th-November 3rd 2017
Lecturer(s) or Responsible(s): Helena Cotrim and Filipa Monteiro
Location: building **C2**, Faculdade de Ciências da Universidade de Lisboa, Campo Grande 1749-016 Lisboac

SCHEDULE		ACTIVITY	ROOM *
Monday 30 Oct	9.-10.00	Reception of participants	**2.2.22**
	10.00-12.30	**A1**-Plant DNA extraction and quantification. #Groups activity digest: dry out the required volume of DNA solution in the vacuum oven at 60 ºC for all afternoon.	**lab 2.4.37**
	14.00-17.00	**B1**- Amplification of target sequences (Polymerase Chain Reaction) for Sanger sequencing. #Groups activity digest : check if samples are dried if precipitated let them dissolve ON).	**lab 2.4.37**
Tuesday 31 Oct	9.00-12.30	**C1**-Amplified Fragment Length Polymorphisms (AFLPs): preparation and setup of Restriction -Ligation reactions **B2**-Validate PCR results from B1; clean and quantify PCR products to sequence.	**lab 2.4.37**
	14.00-17.00	**C2**- Amplified Fragment Length Polymorphisms (AFLPs): verify Restriction-Ligation reaction and STOP the restriction reaction. **C3**- AFLPs, set up Pre-Selective Amplification. Groups activity digest	**lab 2.4.37**
Wednesday 1 Nov	9.00-12.30	**C4**- AFLPs, set up Selective Amplification.	**lab 2.4.37**
	14.00-17.00	**D2**- AFLP and microsatellite analysis workflow. Groups activity digest **D1**- Primer design for phylogeny and diversity studies. **B3**-Sequence databases and sequence analysis workflow; sequence analysis	**2.4.16** **PC room 2.3.16**
Thursday 2 Nov	9.30-12.30	**E1**-DNA barcode: databases and applications, BOLD.	**2.4.16**
	14.00-17.00	**F1**-Next Generation Sequencing (NGS), overview of techniques and applications: analysis of case studies	**PC room 2.3.16 /2.4.16**
Friday 3 Nov	9.00-12.30	**F2**-Next Generation Sequencing (NGS) techniques: group presentations and discussion	
	14.00-16.00-17.00	**F2**-Next Generation Sequencing (NGS) techniques: group presentations and discussion. **CONCLUSIONS**	**2.4.16**

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HEIPLADI RESULTS PRACTICAL ACTIVITY

PLANT MANAGEMENT: BOTANIC GARDEN
University of Malta

Handling different provenances of new accessions for botanic gardens. Index seminum and herbarium collection samples Propagation of Mediterranean-type plants – seeds, other propagules and micro-propagation. Handling invasive species, disease and pests control .

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HEIPLADI RESULTS PRACTICAL ACTIVITY

IN SITU AND EX SITU PLANT CONSERVATION

University of Cagliari

Practical activity "*In situ* and *ex situ* plant conservation"
Cagliari, May 7th-11th

	Monday 7th May	Tuesday 8th May	Wednesday 9th May	Thursday 10th May	Friday 11th May
Morning: 9,30-13,00	**Arrivals**	**Venue**: Mameli Calvino room **Activities**: Presentation of *in situ* conservation work methods; first part of *in situ* practical activities.	**Venue**: Sant'Elia Cape **Field activities**: 1) Germplasm collection techniques. 2) Naturalistic-archaeological guided visit.	**Venue**: Natural Park Molentargius-Saline **Field activities**: *In situ* monitoring of alien plants.	**Venue**: Room B, Botanical Section **Activities**: Individual or group preparation for the exam.
Afternoon: 14,30-18,00	**Venue**: Botanical Gardens **Activities**: 1) Welcome of participants Guided visit of Botanical Gardens, Museum, and Sardinian Germplasm Bank (BG-SAR). 2) Presentation of the examination method.	**Venue**: Mameli Calvino room **Activities**: Presentation of *ex situ* conservation work methods; first part of *ex situ* practical activities.	**Venue**: Poetto sea / Sant'Elia Cape **Field activities**: *In situ* monitoring of plant diversity.	**Venue**: Mameli Calvino room **Activities**: 1) Oral presentation about "How to write a scientific paper".	**Venue**: Mameli Calvino room **Activities**: Oral exposition for the course evaluation (exam).

HEIPLADI RESULTS

EVALUATION: Virtual Mobility

Student course satisfaction questionnaire

A. General

a. **Gender** ☐M ☐F
b. **Age** ____
c. **University & Country**_____
d. **Education level:**
☐ undergraduate, ☐ master, ☐ PhD, ☐ not enrolled
e. **Previous knowledge of plant diversity conservation issues:**
☐ very good knowledge, ☐ good knowledge, ☐ basic knowledge, ☐ no knowl
f. **IT experience (using computers):**
☐ very good, ☐ good, ☐ basic, ☐ none
g. **Attitudes to new technology:**
☐ think it is essential, ☐ willing to learn, ☐ neutral, ☐ not attracted
h. **The web browser I was using was:**
☐ Internet Explorer, ☐ Mozilla Firefox, ☐ Google Chrome, ☐ Safari, ☐ Opera,
_____
i. **Learning style:**
☐ abstract, ☐ concrete, ☐ active, ☐ reflective, ☐ not sure/don't know
j. **Previous experiences of Erasmus and/or similar international programs (chec**
☐ None, ☐ Erasmus Studies, ☐ Erasmus Traineeship, ☐ Erasmus virtual mobi
specify):
_____

B. Enrolment in the HEIPLADI pilot program

I learnt of the HEIPLADI pilot program from:
☐ HEIPLADI web page, ☐ Erasmus office, ☐ Other students, ☐ University web page, ☐
☐ Other (please specify): _____

Statement	Strongly Agree	Somewhat Agree	Ne
I enrolled in the program because:			
I'm very interested in topics related to "plant diversity"	☐	☐	
the flexibility allows me to choose modules I am interested in	☐	☐	
I got enough prior information about the studies within this program by:			
reading the handbook of HEIPLADI	☐	☐	
contacting involved lecturers	☐	☐	☐ ☐ ☐
I got enough prior information about:			
the ECTS recognition for taking exams within HEIPLADI	☐	☐	☐ ☐ ☐
the assessment criteria of the courses (exams)	☐	☐	☐ ☐ ☐

C. Attitude of students to e-learning methods

Statement
The use of the Moodle e-learning platform:
was easy to understand and use
has provided a flexible study method
played an important role facilitating my studies
facilitated efficient communication with lecturers and
facilitated efficient communication with other student (individually or in study groups)
has helped me to deal with problems related to my stu programme
does not offer any advantage over face to face lecture
allows flexibility to manage your own study time

D. Access to information

Statement
Direct access to the lecture material
Information was easy to access and digest
Very helpful for people living far away from the Univer
Useful source of information and communication path if used consistently
It was very convenient to have information relevant to course accumulated in one place

E. Platform functionality, interface and appearance

My opinion of the following statements:	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
"The platform is slow and tricky to use and not well structured and organised".	☐	☐	☐	☐	☐
"Lectures are not well organized, making hard to for study."					
"If you do not have a modern computer you will b to use the platform."					
"The color scheme used in the platform was not w pleasant"					
"I was having problems with the way the material presented."					
"Video and/or animation was not presented prop					
"It was not clear which links I should click on, to a sections of the platform I wanted."					

F. Evaluation of the course content

Please rate your overall satisfaction with the
☐ Excellent, ☐ Good, ☐ Average, ☐ Poor, ☐

Statement
Syllabus accurately described course content and
Course organization and difficulty were appropria
The Learning Objects included in the course adeq covered the subject
The Learning Objects were clear and well-written
Exams and quizzes reflected important course asp
Textbooks, articles and other material uploaded o Moodle platform were useful
I would recommend that this current teaching ma continue to be used
The course increased my interest in the subject
Having completed the course, I feel more knowled the subject
The course contributed to the completeness of my
I would recommend this course to other students

What are the major strengths of this course?

What are the major weaknesses of this course?

Do you have any suggestions for improving the course?

F. Overall, how satisfied are you with your experience on HEIPLADI programme?

☐ Very satisfied, ☐ Satisfied, ☐ Neutral, ☐ Dissatisfied, ☐ Very dissatisfied

G. How would you rate the following aspects of your experience on HEIPLADI program:

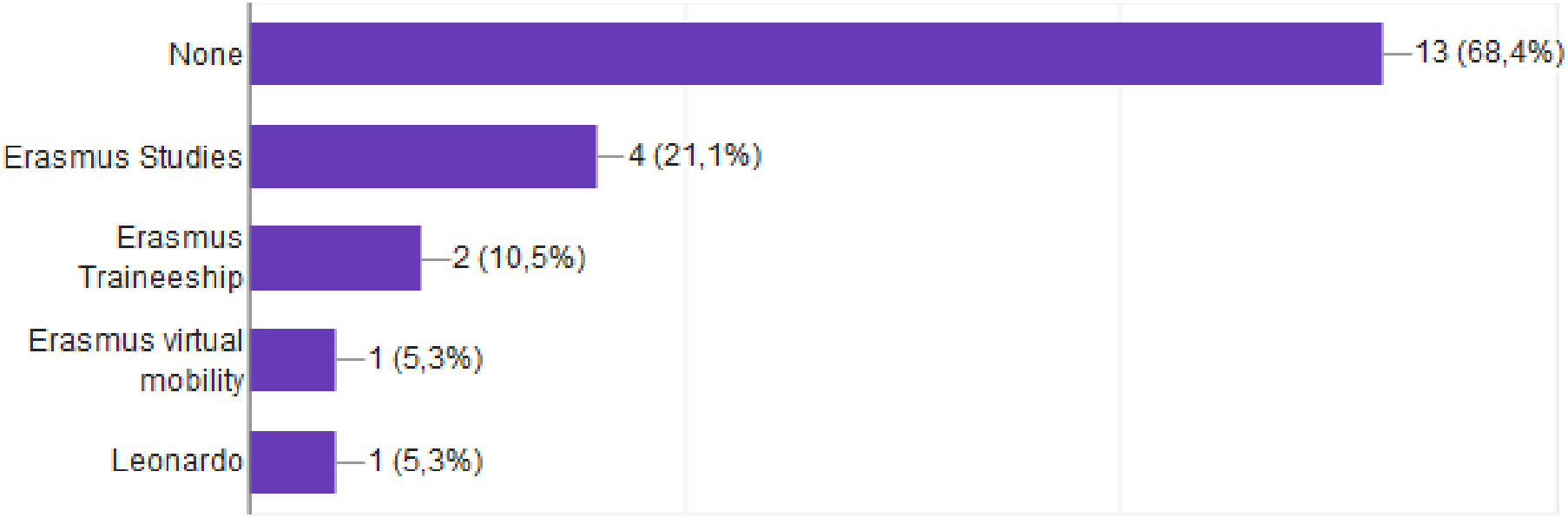
	Excellent	Very good	Good	Fair	Poor
Quality of the learning material	☐	☐	☐	☐	☐
Course availability	☐	☐	☐	☐	☐
Course support	☐	☐	☐	☐	☐
ECTS recognition	☐	☐	☐	☐	☐
Course assessment	☐	☐	☐	☐	☐
Value of knowledge acquired	☐	☐	☐	☐	☐

H. Is there anything else you would like to share about your level of satisfaction with your HEIPLADI educational experience?

HEIPLADI RESULTS

EVALUATION: Virtual Mobility

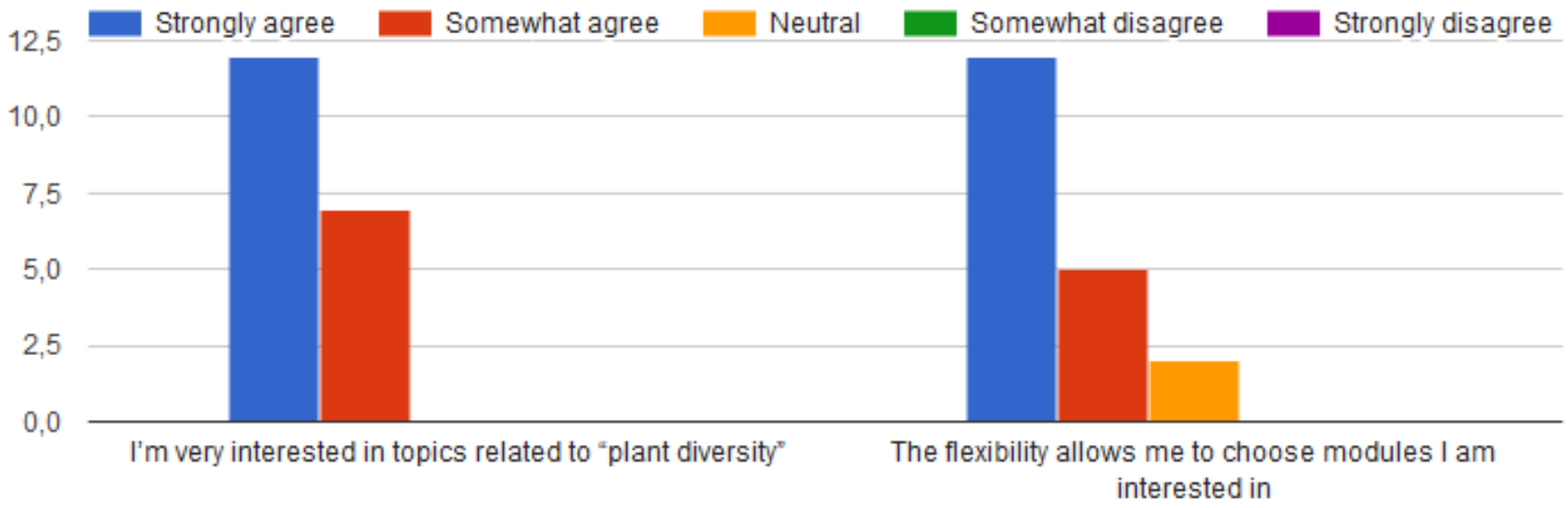
Previous experiences of Erasmus and/or similar international programs



HEIPLADI RESULTS

EVALUATION: Virtual Mobility

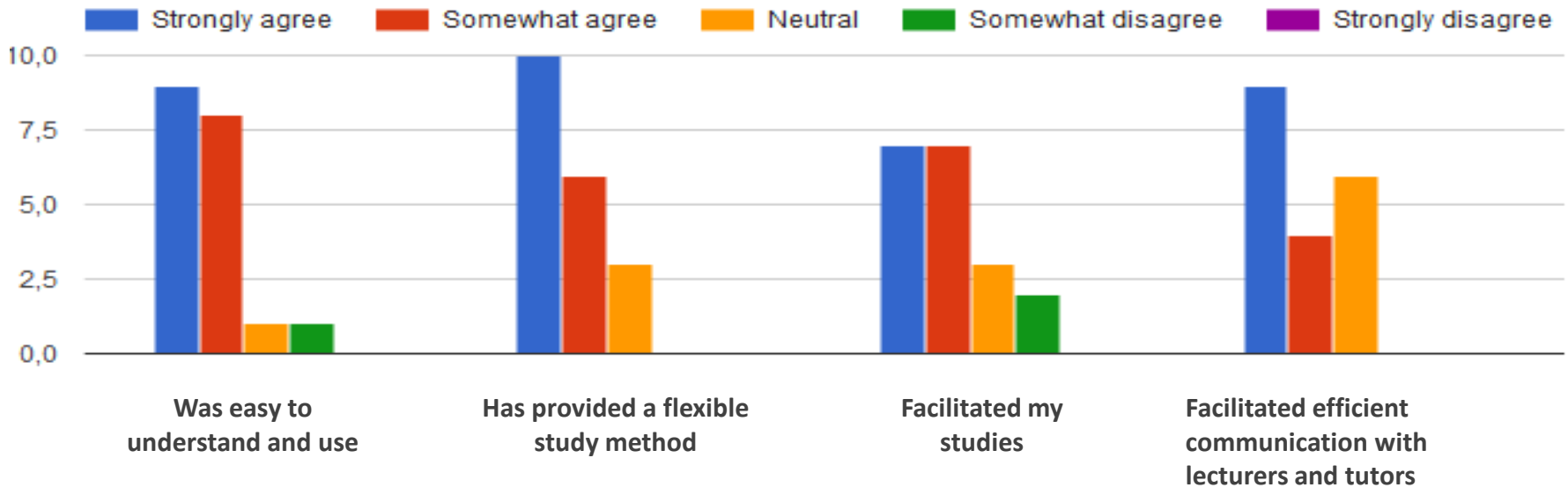
I enrolled in the program because



HEIPLADI RESULTS

EVALUATION: Virtual Mobility

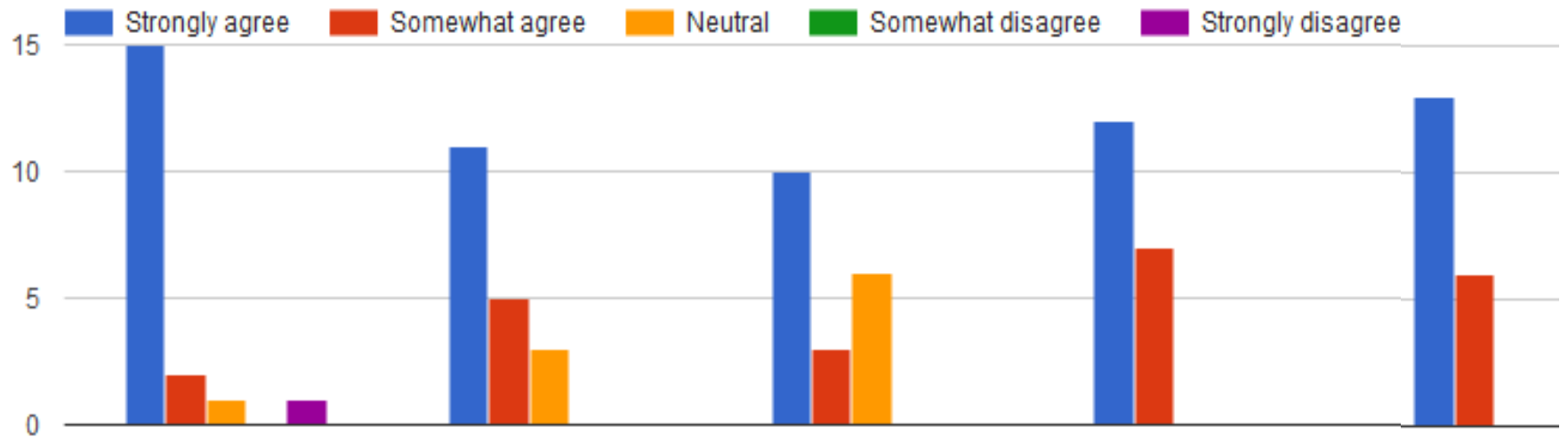
The Moodle e-learning platform



HEIPLADI RESULTS

EVALUATION: Virtual Mobility

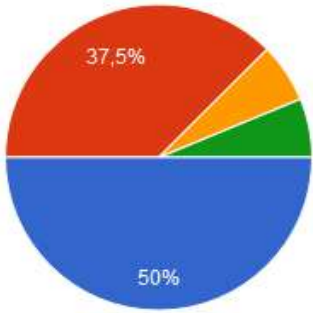
The Moodle e-learning platform



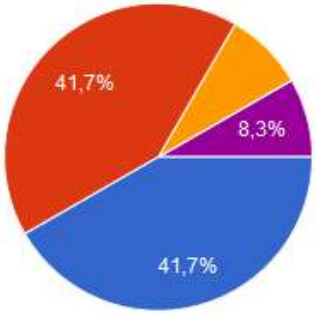
HEIPLADI RESULTS

EVALUATION: Virtual Mobility

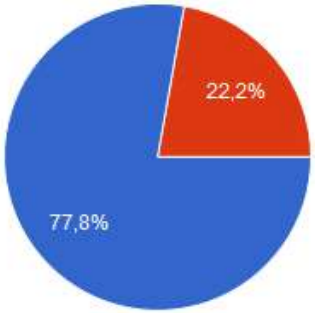
Overall satisfaction with the e-learning course on Plant Taxonomy



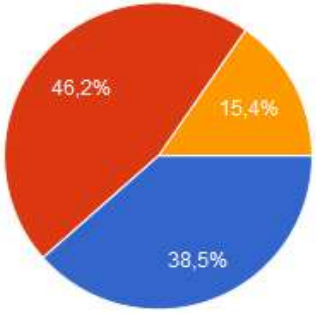
Overall satisfaction with the e-learning course on In situ and Ex situ Plant Conservation



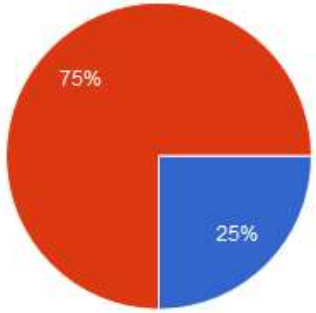
Overall satisfaction with the e-learning course on Plant Management Botanic Garden



Overall satisfaction with the e-learning course on Modern Methods in Plant systematic

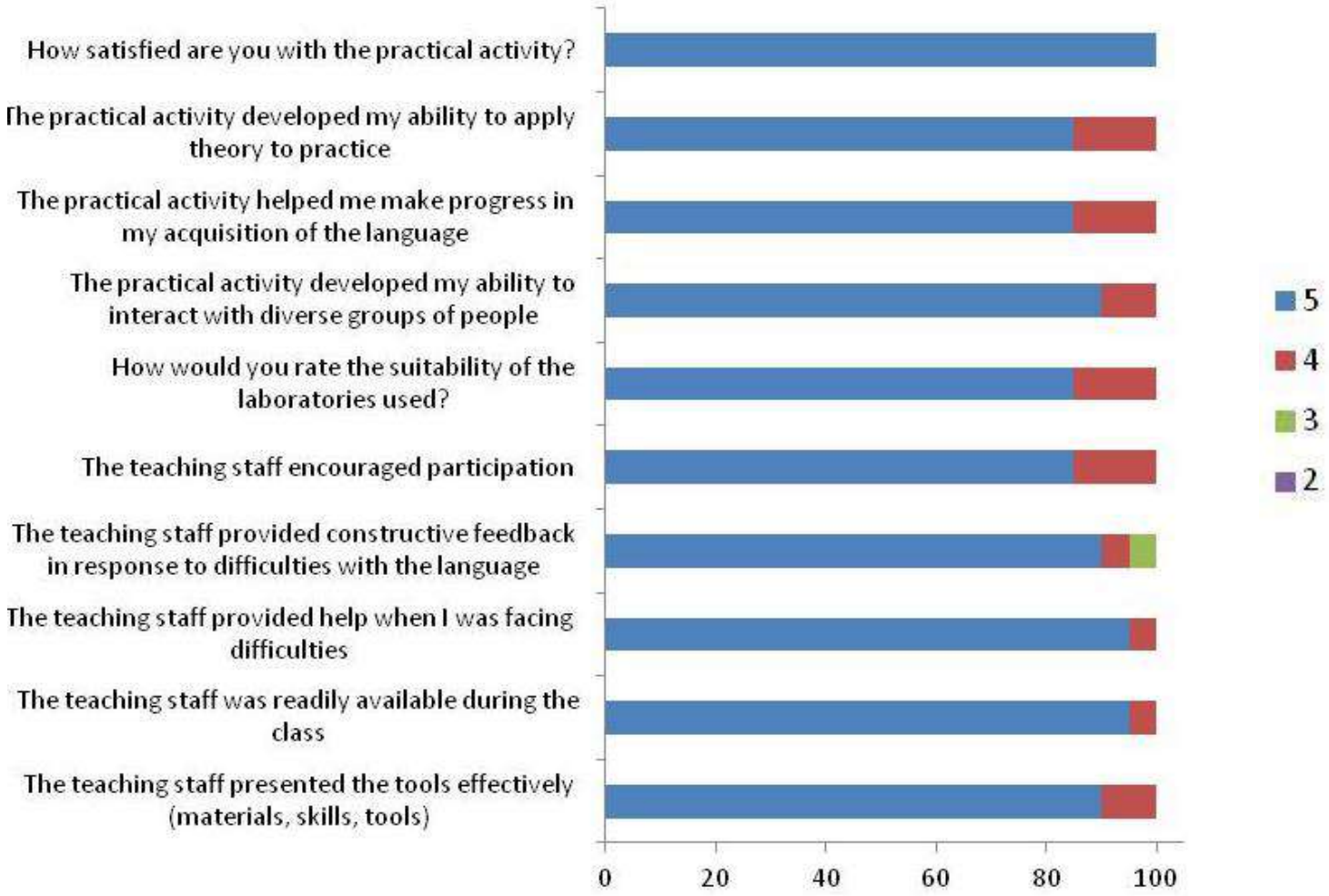


Overall satisfaction with the e-learning course on GIS



HEIPLADI RESULTS

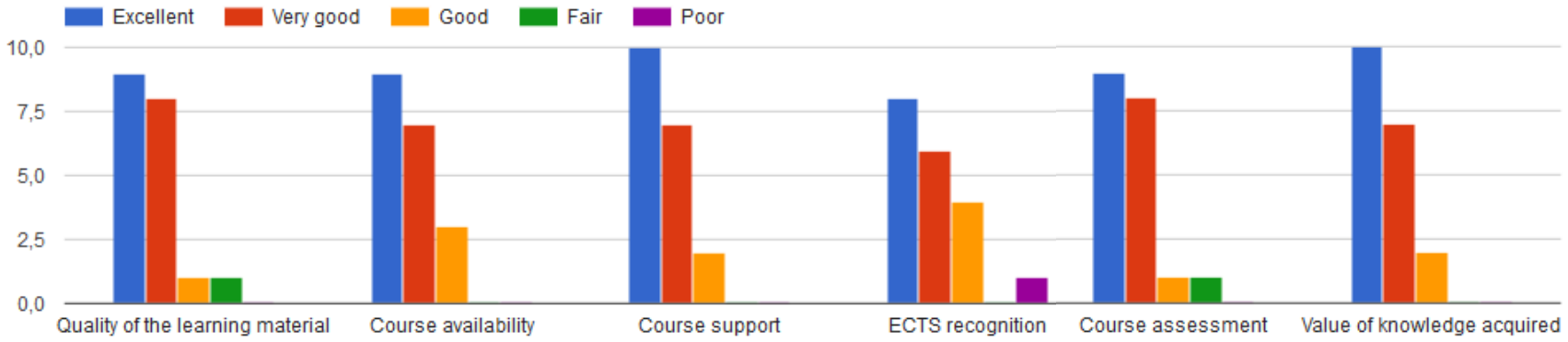
EVALUATION: Physical Mobility



HEIPLADI RESULTS

EVALUATION

How would you rate the following aspects of your experience on HEI-PLADI program



Is there anything else you would like to share about your level of satisfaction with your HEI-PLADI educational experience?

5 risposte

Compare works carried out by others universities
i would like to go to some more courses!
It is perfect and I appreciated this program
HEI-PLADI is the perfetct example of learning platform, and takes opportunities for students to deepen their knowledge and to doing extra experiences in the botanic.
None

Overall satisfaction

Overall, how satisfied are you with your experience on the HEI-PLADI programme?

19 risposte

HEIPLADI RESULTS

OUTPUTS

THE FEULGEN'S PROCEDURE FOR STAINING OF THE CHROMOSOMES

The karyotype is the set of the all chromosomes complex inside the cell. We study the karyotype of the eukaryotic cells because we can get some information about the evolutionary history of that group. The study of the karyotype is based on the measurement of the arms and the relationship among them. The most important characteristics of the karyotype are: number of the chromosomes, length ratio among chromosomes; ratio among the length of long arm/ small arm; degree of symmetry; number and position of the satellites.

1. Take the apices (1 cm) and put inside the colchicina (0,05%). Leave the apices in the colchicina 1-3 hours at the ambient temperature;
2. Wash with distilled water and fix the apices with the Carnoy for 1/2 hour at the ambient temperature;
3. Wash with distilled water and proceed to hot hydrolysis with the hydrochloric acid HCl 1 N at 60°C for 7-8 minutes;
4. Wash with distilled water and submerge the apices in the Fucsina for 2-3 hours at the ambient temperature;
7. It adds a drop of 45% Acetic acid, and proceed to crush all with a brass pestle, until you get a cell suspension.
9. At this point, you can close the glass slide with the micro cover glass. It is ready for a first observation under the microscope.
10. To avoid the entry of air inside of the glass slide, using the bonding agent (gel mounting). You can deposit the bonding agent with a brush on the cover glass slide edges. However, to obtain a permanent glass slide, you need a liquid nitrogen.

The glass slide is immersed in nitrogen for a few seconds, until it reaches approximately the same nitrogen's temperature (when this occurs the liquid ceases to boil);

Materials

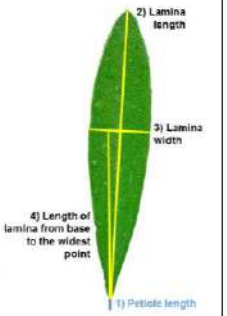
For applying the Feulgen method you need:

- 1 cm of root apices;
- Feulgen colorant (Fucsina Leucobasica)
- Colchicina (0,05%) or 8-Idrossichinolina
- Carnoy (ethyl alcohol 45%, 2: 1 Glacial Acetic acid)
- Hydrochloric acid HCl 1 N
- Acetic acid 45%
- Glass slides
- Razor blades
- Pestle

PROTOCOL FOR IMAGE ACQUISITION AND ANALYSIS

Samples collection	*Selection of individuals:* • Collect leaves on 10-30 adult individuals (if the species is very rare, measure as many as you can easily find). • Measured individuals should be independent of one another (e.g., far enough apart to ensure that you aren't accidentally measuring different parts of the same individual, or genetic clones, etc.) - generally at least a few meters apart. • Individuals should be randomly chosen for measurement, preferably in areas relatively undisturbed by humans. • All traits have to be measured on the same individual.	
	Selection of leaves: • Choose only young-mature leaves (fully expanded and hardened) without signs of damage or disease. Preferably, collect a branch or whole plant and remove the individual leaves only just before measurement. Alternately, the leaves can be wrapped in a wet paper towel and placed in plastic bags until measurements are conducted.	
Image acquisition (scanning)	Place the leaves on the scanner such that the abaxial sides (ventral side or bottom) of the leaves are towards the glass. Add a scale bar. Scan to an 8-bit color image at 300 dpi (TIF format).	
File management	Each image should get a *site name code* in capital letters plus a single integer number (with 3 digits) separated by an underscore. Therefore, the second leaf scanned from PESCHE (Isernia) will be "PES_002.tif". Along with the images, it is necessary to keep a spread-sheet with the following columns: image file name, date collected (year-month-day), date imaged (year-month-day), site code, site name, comments.	

Images designed by Freepik (http://www.freepik.

Petiole length (Pl) **Lamina length (Ll)** **Lamina width (Lw)** **Length of lamina from base to widest point (Wp)**	*Open the image:* File → Open → Choose image file → Apri or double click 1) *Measure petiole length:* Straight-line tool or Freehand-line tool → Draw the petiole (double-click on the button to alter the line width) → Analyze → Measure (or type "m") 2) *Measure lamina length:* Straight-line tool or Freehand-line tool → Draw the line from the petiole to the apex of the leaf (double-click on the button to alter the line width) → Analyze → Measure (or type "m") 3) *Measure lamina width:* Straight-line tool or Freehand-line tool → Draw the line from a side to the other of the leaf with the maximum width (double-click on the button to alter the line width) → Analyze → Measure (or type "m") 4) *Measure Length of lamina from base to widest point:* Straight-line tool or Freehand-line tool → Draw the line from the base of the leaf to the widest point of the leaf (-click on the button to alter the line width) → Analyze → Measure (or type "m") *Save results:* Select the rows → Edit → Copy (ctrl + C) → paste (ctrl + V) Repeat the process for all the leaves.	*Make the lines permanent:* Edit → Draw When drawing a line, the status bar shows the angle (from horizontal) and the length. 
Number of lobes	*Open the image:* File → Open → Choose image file → Apri or double click *Count lobes:* Multi-point tool → click on the lobes (only the right side of the leaf) to add points → Analyze → Measure (or type "m")	
ImageJ web site: https://imagej.nih.gov/ij/		

3rd Mediterranean Plant Conservation Week

CHANIA, CRETE, GREECE | 27 SEPTEMBER - 1 OCTOBER 2021

Plant Conservation Strategies: from Science to Practice

HEIPLADI RESULTS

OUTPUTS

HEI-PLADI PROJECT
Higher Education Innovation in PLAnt DIversity

HEIPLADI

„*EX SITU* PLANT CONSERVATION" PRACTICAL ACTIVITIES HANDBOOK

Polish Academy of Sciences Botanical Garden – Center for Biological Diversity
Conservation in Warsaw-Powsin, POLAND
10-15 July 2017

LESSON 1 – CLEANING

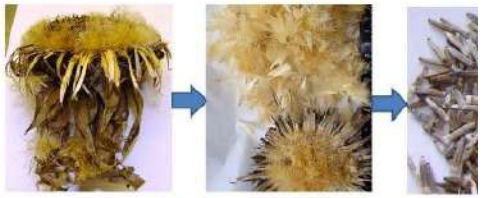
Seed cleaning - removing of all parts and tissues surrounding seeds and species. It is time consuming process and requires laboratory space and spe for it to be carried out. The main benefits of this process are:

- It saves the space in the drying room,
- It allows to inspect the seed lot for empty, immature, damaged or inf their removal,
- It removes pathogens (fungi, bacteria and viruses) which are more lik in the plant debris than the seed,
- It's easier to determined seed quantity with cleaned rather than uncl

Seeds should be cleaned immediately after harvest or registration in the see are moist, it is recommended to dry the seeds within the fruits (to about 1 content) before cleaning.

Variety of seed morphology of native Polish flora species

It might be difficult to clean the seeds of wild species. Staff need to have s about the seed and fruit morphology and how to interpret structures under such that techniques applied to seed cleaning remove structures that are storage and does not cause the damage of seed. Adapting techniques for d fruit/seed is therefore the key to good seed cleaning. Seeds of wild species s cleaned manually but the use of certain mechanical cleaning equipment (e.g is acceptable. Some collections, especially derived from populations of thre may number only a few seeds.



Stages of *Carlina onopordifolia* seeds cleaning.

Modern Methods in Plant Systematics-practical activity C2
Lisbon, October 30th 2017
Lecturer(s) or Responsible(s): Helena Correia and Filipa Monteiro
AFLP protocol

HEIPLADI

ACTIVITY AIM

Amplified fragment length polymorphism (AFLP) is a PCR-based technique that uses selective amplification of a subset of digested DNA fragments to generate and compare unique fingerprints for genomes of interest. Polymorphisms in band patterns map to specific loci, allowing the individuals to be genotyped or differentiated based on the alleles they carry.

LEARNING OBJECTIVES

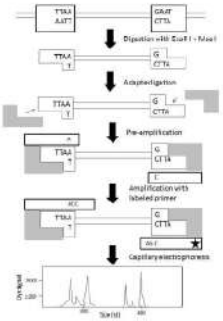
After completing this exercise, you should be able to:

1. Perform Restriction-Ligation of a DNA of a given concentration.
2. Complete Pre-Selective and Selective amplifications.
3. Prepare samples for capillary electrophoresis

BACKGROUND

Introduction

AFLP was first described by Vos et al. (1995) and is still a technique with multiple applications nowadays. Several modified protocols have been reported, but all typically include five main steps: (1) restriction of genomic DNA and ligation of adaptors to restricted fragments; (2) preselective PCR amplification of a subset of the restricted fragments; (3) selective PCR amplification, reducing further fragment number; (4) electrophoretic separation of amplified DNA fragments; (5) scoring and interpretation of the data



HEIPLADI

How to manage courses on the e-learning platform

Adding resources

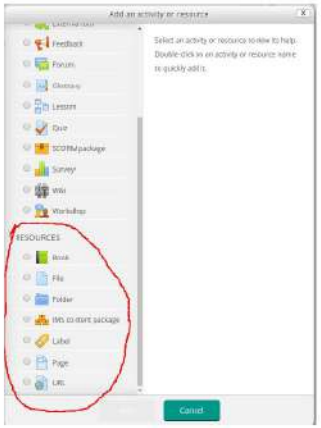
Resources are any kind of digital material that could be used by students. Example are books, generic files or pages. In order to enable the insertion of new resource course (I will use "Plant taxonomy" as working example) and click on the green editing on":

Now, you have entered in the editing mode. In such a mode, you are also able resources (e.g., learning objects); please, be careful, and try to go back to the normal the red button "Turn editing off") as soon as you have added your desired resources.

At this point, you should see cross-arrows on the left of each resource (in this c objects) and the menu "edit" on the right. Finally, you should see "Add an activity o the bottom of each credit.

Clicking on the cross-arrows will allow you to move resources and to re-order the resources, drag and drop them clicking on the cross-arrow icon. Clicking on the "Edit will be able to edit a resource. Clicking on the button "Add an activity or resource" y a resource to the current credit. Please, note that you can add a resources (1) to the or (2) to a single credit, depending on what "Add an activity or resource" button you use. For example, if you use the button at the end of "Credit 2", you will add a resource to the section "Credit 2". This means that students will use such a resource only when they will study "Credit 2" (e.g., a detailed explanation of a specific topic covered by "Credit 2"). Alternatively, adding a resource to the whole course (Top section, after "Announcements") will indicate that such a resource is important for the whole course (e.g., a book).

After clicking on "Add an activity or resource", you will see menu shown in the picture below:



While you are able to add both activities and resources, this document does not describe activities. In order to add a resource, scroll the page to the bottom and click on one of the available resources. The column on the right will show a description about the selected resource. The most useful resources are:

- File: a generic file. You can use "File" to upload PDF documents, PowerPoint presentations and so on.
- Page: a page with content, directly accessible from the platform. This resource can be used to provide detailed information about a specific topic.
- Book: similar to "Page", but it can be divided in chapters. Differently from a page, a book is designed to contain heterogeneous information. You can use this resource if you have the content in a textual format. You cannot upload PDF files using the "Book" resource. In order to do this, use the "File" resource.

Clicking on one of the available resources, will enable the button "Add". Click on this button to add the selected resource.

3rd Mediterranean Plant Conservation Week

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Plant Conservation Strategies: from Science to Practice

HEIPLADI RESULTS

OUTPUTS

ERASMUS+ HEI-PLADI PROJECT

Higher Education Innovation in PLAnt DIversity (HEI-PLADI)

Flexible learning paths for emerging labour market

The pilot program HEIPLADI funded by the Erasmus+ K2 Strategic Partnerships follows the priorities of 2011 EU Modernization Agenda to equip young generation with transversal skills for new emerging green labour markets related with environmental protection and conservation. The program includes ICT techniques in a blended path of virtual and physical mobility, and it relies on the constructive cooperation and the successful integration of expertises of Botanic Gardens, Germplasm Banks and Higher Education Institutes. HEIPLADI flexible program includes 5 e-learning modules and 7 practical activities (60 ECTS).

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

The Erasmus+ Strategic Partnership pilot program on Higher Education Innovation in Plant Diversity - "HEIPLADI"

Gabriella Stefania Scippa[1], Paola Fortini[2], Rocco Oliveto[1], Simone Scalabrino[2], Piera Di Marzio[1], Paolo Di Martino[1], Dalila Trupiano[1], Gianluigi Iacchetta[2], Francesco Meloni[2], Marco Porceddu[2], Ilektra Ramoundou[3], Charlton Kalaitzidis[4], Wiesław Podyma[4], Konrad Wolitzki[4], Maciej Niemczyk[4], Ana Isabel Correia[5], Helena Catrin[5], Manuela Sim-Sim[5], Joseph Buhagiar[6], Christian Borg[6], Marco Iannaccone[6], Lyuba Pencheva[7] and Ognyan Iliev[7]

The project "Higher Education Innovation in Plant Diversity: flexible learning paths for emerging labour market" HEIPLADI relays on constructive cooperation and integration of expertise between Botanic Gardens, Germplasm Banks, Herbarium and Higher Education Institutes from University of Molise (Italy), University of Cagliari (Italy), University of Lisboa (Portugal), University of Sofia (Bulgaria), University of Malta, Polish Academy of Sciences Botanical Garden centre for Biological Diversity Conservation (Poland) and the Mediterranean Agronomic Institute of Chania (Greece). The project is financed within the Erasmus+ K2 Strategic Partnerships (2015-2018).

The main outcome of the HEIPLADI project is the development of a flexible learning path of virtual and physical mobility. HEIPLADI also provides more opportunities for students - in an international context - to gain additional skills on plant diversity conservation, management, monitoring, valorization and exploitation.

Virtual mobility. Five e-learning modules are available on a dedicate e-learning platform as "open learning objects" for a world wide number of different stakeholders: students, educators, technicians from herbarium, museum, germplasm banks, botanical gardens, natural parks, arboreta, and plant nurseries.

Users of Moodle platform and downloading e-learning modules from April 2017 to May 2018

Users evaluated e-learning modules throughout a "satisfaction questionnaire".

Evaluation of the e-learning module on Plant Management: botanic garden

Physical mobility. Seven short-term training courses organized as field works, field visit and laboratory activities to develop skills and deepen knowledge of e-learning modules.

Participants had the opportunity to get trained in different research and educational interactive activities related to plant conservation issues.

Highlights

- HEIPLADI significantly enhances the integration of ICT in learning, teaching, training and youth work in the field of plant diversity conservation, management and exploitation.
- The project allows to reach a wide number of different learners promoting the idea that conservation and sustainable use of plant diversity have a pivotal role in the new emerging labor market.
- Throughout the integration of virtual and physical mobility HEIPLADI promotes the role of Botanic gardens in education, training and job market.

HEI PLADI Project: virtual and practical mobility. Education through botanic gardens.

Theme D: Role of Botanic gardens in the Educational programs

Provide on-line resources for students and general public

Authors: Ognyan ILIEV, Anaiy NEDELCHEVA, Vera DYANKOVA, Lyuba PENCHEVA
University Botanic Gardens, Sofia University "St. Kliment Ohridski", Sofia, Bulgaria

TheHEI-PLADI (Higher Education Innovation in Plant Diversity: flexible learning paths for emerging labour market) project relays on a constructive cooperation between seven different educational institutions, botanic gardens and a research institute: University of Molise (Italy) - coordinator of the project, University of Cagliari (Italy), University of Lisboa (Portugal), University Botanic Gardens (Bulgaria), University of Malta, Polish Academy of Sciences Botanical Garden-Centre for Biological Diversity Conservation (Poland) and the Mediterranean Agronomic Institute of Chania (Greece).

Main output the HEI PLADI project is to provide teaching materials available as "open learning objects" in an e-learning platform for a wide number of professionals beside students.

The project developed also seven short-term training activities as part of the "flexible blended pilot program" which includes field works, field visits, practical and laboratory activities focused on developing skills and deepen knowledge on topics treated in the e-learning courses.

Flexible learning path of a virtual and physical mobility to provide students the opportunities to develop advanced knowledge and technical skills to approach multitasks plant diversity issues.

VIRTUAL MOBILITY

Course of Plant taxonomy 5 ECTS
Course of Modern methods for Plant taxonomy 4 ECTS
Course of in situ and ex situ plant conservation 7 ECTS
Course of Plant management: botanic garden 5 ECTS
Course of Geographical information systems 4 ECTS

PHYSICAL MOBILITY

Practical Plant taxonomy 5 ECTS University of Molise (Italy)
Plant management: botanic garden 4 ECTS Ulbi at Sofia University (Bulgaria)
Ex situ plant conservation 4 ECTS Polish Academy of Science (Poland)
Geographical Information Systems 4 ECTS Mediterranean Agronomic Institute of Chania (Greece)
Modern methods for plant taxonomy 4 ECTS University of Lisboa (Portugal)
Plant management: botanic garden 4 ECTS University Malta (Malta)
In situ and ex situ plant conservation 5 ECTS University of Cagliari (Italy)

Plant Management: Botanic Garden

University Botanic Gardens are coordinator of the "Plant management: Botanic Gardens" topic. Partners involved in this output are University of Malta, Polish Academy of Sciences Botanical Garden-Centre for Biological Diversity Conservation (Poland) as well as the Mediterranean Agronomic Institute of Chania (Greece).

E-learning courses and practical activities includes 5 learning object:

- Botanic garden's history and contemporal development;
- Plant collection and collection policies;
- Landscape planning and zoning;
- Education, research and training at botanic gardens;
- Management of the botanic gardens and arboretums -

based on knowledge of national and international biodiversity legislation and network organizations of Botanic gardens;

Plant Management: Botanic Garden

Two practical activities at University Botanic Gardens, Bulgaria and Argotti Botanic Gardens and Resource Centre at University of Malta, Malta

Participants from several European universities (5 students from a university; totally 25) had an opportunity to take part in a series of interactive activities, fieldwork, theoretical, educational and research tasks: planting of specimens, maintenance, labelling and documentation; general garden care; plant identification and role of herbaria; plant adaptations; principals in landscape design; landscape planning, zoning; creating a Master Plan; SWOT analysis, creation of a short-strategic plan etc.

The courses were designed in accordance with the missions of the botanic gardens and the trends specified in the Manual for the Management of Botanic Gardens, issued by the BGCI."

RESULTS

- As a long-lasting result HEI PLADI promotes the idea that conservation and sustainable utilization of plant diversity have a pivotal role.
- Constructive cooperation and integration between botanic gardens, universities, research institutes and organization can continue providing strong expertise in the field of plant biodiversity characterization, management and conservation and in lifelong learning.
- Furthermore HEI PLADI works towards emerging green labour market.
- The Convention on Biological Diversity (CBD), the Global Strategy for Plant Conservation (GSPC) and International Agenda for Botanic Gardens shall be recognized as important documents to build scientific and technological skills in plant taxonomy, in situ biodiversity management and ex situ conservation of both wild and domestic biodiversity.

Conclusion

HEIPLADI RESULTS

- **Implemented an Higher Education Program based on "virtual" and "physical mobility"**
  - **Courses and teaching materials available on the Moodle platform *in open access***
- **Tested the use of e-learning in an international context**
  - **Enhanced interest of students in plant diversity issues**
- **Promoted the internationalization**
  - **Contributed to developing the European dimension in Higher Education**

Conclusion

❖ Strength

- Flexibility, Easy access to a wide range of information on plant diversity conservation and botany issues, Updated information
- Integration, International, Flexibility, Easy access
- Expertise, Collaboration between HEIs
- Easy access to a wide range of information on plant diversity conservation and botany issues, Updated information
- Very well organizes learning material which is easy to navigate, understand and memorize; the information is very well systematized and specific

❑ Weakness

- ✓ ECTS recognition
- ✓ More exercises, unprintable,
- ✓ Like student I need some frontal lecture
- ✓ Too much material
- ✓ Some of the lectures could be summarized
- ✓ Quizzes may be included

Conclusion

Constructive cooperation and the successful integration of expertise between Botanic Gardens and Germplasm Banks from 5 Universities, i.e., Molise (IT), Cagliari (IT), Lisboa (PT), Malta (MT), Sofia (BG), and 2 research institutes, i.e., Mediterranean Agronomic Institute of Chania (GR), Centre for Biological Diversity Conservation in Powsin (PL).

Erasmus+

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CIHEAM-MAICH
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Chariton Kalaitzidis

UOM
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Christian Borg
Marco Iannaccone