UNIVERSITÀ DEGLI STUDI DELLA Tuscia

DIBAF

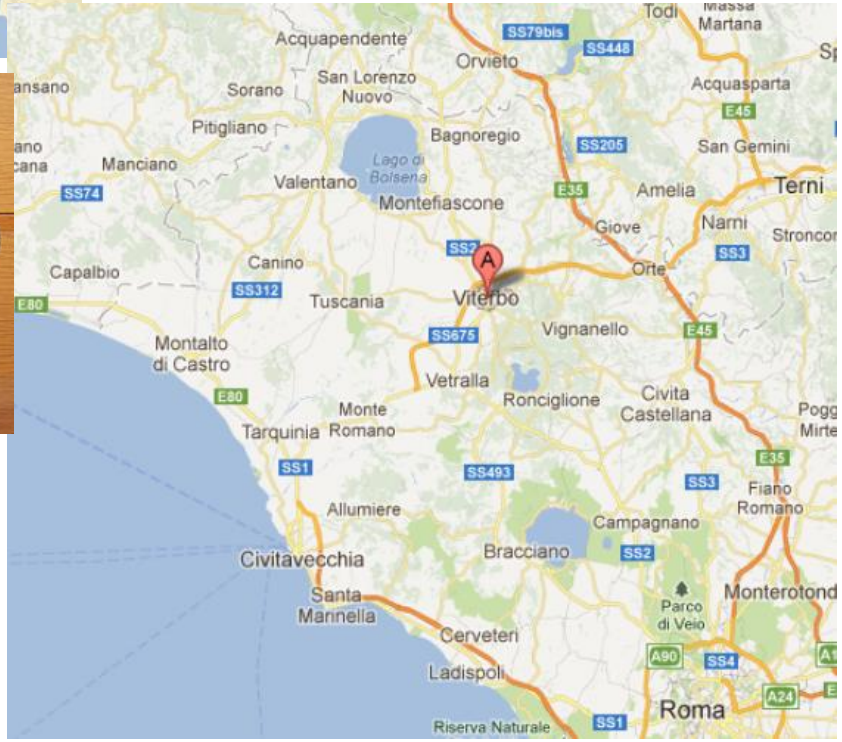
Department for Innovation in Biological, Agro-food and Forest systems



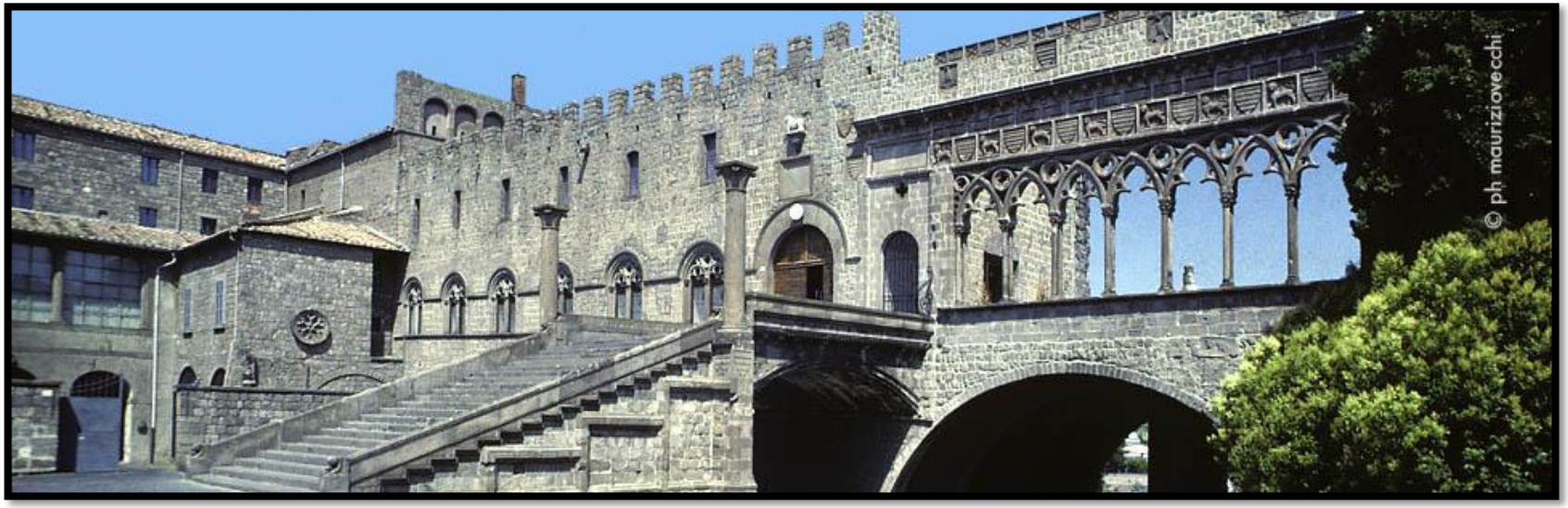
Via San Camillo de Lellis, snc - 01100 Viterbo (Italy)

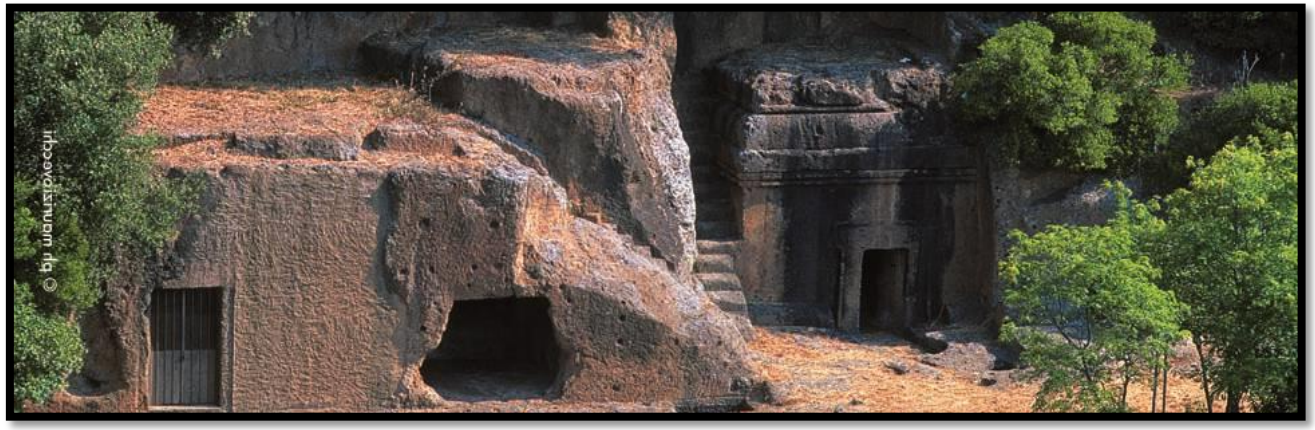
www.dibaf.unitus.it

Viterbo – Lazio – Italy



City of Viterbo: from Middle Age with Etruscan-Roman roots





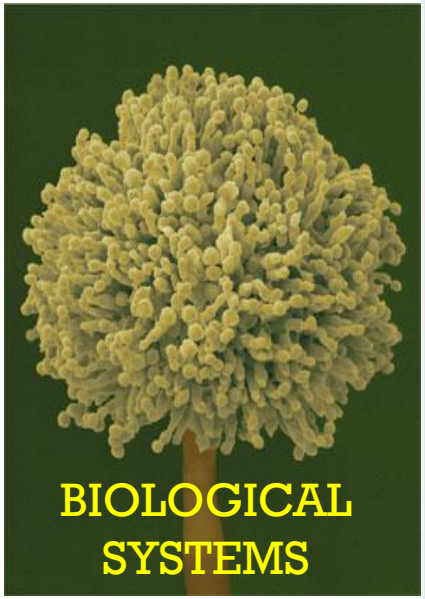
Tuscia: a region of mountains, water, ...

….and forests

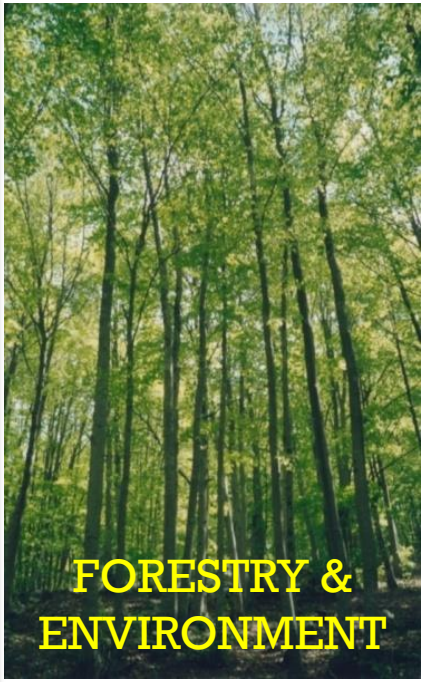
The University: old and new

DIBAF

TECHNOLOGICAL AND SCIENTIFIC INNOVATION



- The Department for Innovation of Biological, Agrofood, and Forest systems (DIBAF) has been established merging several scientific expertise already present in the former Faculties of Agriculture, Biological and Human Sciences
- DIBAF offers and manages bachelor and master degree courses, as well as PhDs where the transfer of knowledge and innovations developed during the research activities play a central role.
- The Department is organized in four scientific and teaching areas which interact and mutually collaborate



AGROFOOD SAFETY AND QUALITY

CULTURAL HERITAGE CONSERVATION TECHNOLOGIES

Research laboratories

Research laboratories are characterized by advanced equipment, in which students have the opportunity to perform training work and to carry out their master and PhD thesis

Field research infrastructures in natural ecosystems, agroforestry and experimental farms suitable for thesis work but also for traineeships

ALPINE RESEARCH CENTRE of the University of Tuscia

Centro Studi Alpino dell'Università della Tuscia
Altopiano del Tesino

Mountain research and teaching infrastructure of the University of Tuscia, located in the Tesino plateau (Trento province, Italian Alps-Dolomites)

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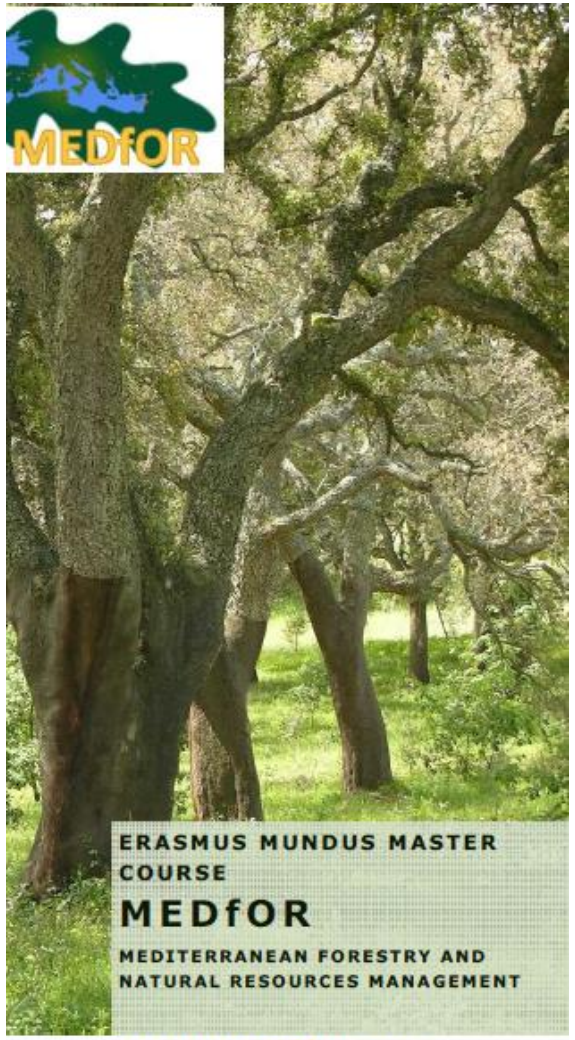
MASTER DEGREES

Curriculum MEDfOR

ENVIRONMENTAL AND FOREST SCIENCES



MEDfOR LOCAL CONTACT
Prof. Paolo DE ANGELIS
E-mail: **pda@unitus.it**
Tel. 0761 357292

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The course consists of three curricula, completely taught in English, designed in close cooperation with other Italian and European universities. The different curricula are designed according to a common training framework, but oriented towards different professional careers.

Curriculum: Forests and Environment

It is the main learning path to complete the formation of the forestry professional profile according to a consolidated group of competences, recognised at national and international level. All the courses will be taught in Viterbo. Field practicals and other training activities will be performed in the laboratories and facilities of DIBAF- University of Tuscia. Furthermore, the students could apply for a mobility period in Europe for study or for traineeship, thanks to a wide network of selected Universities and Research centers and the financial support of the ERASMUS+ programme.

Curriculum: Mediterranean Forestry and Natural Resources Management – MEDfOR

Co-funded by the Erasmus+ Programme of the European Union

It welcomes students from all over the world interested in expanding their knowledge and competencies in the sustainable management of Mediterranean forests.

Students will get multiple degrees in at least two countries, by attending all the courses of the **first year** at one of the three universities where these are held: **University of Lisbon** (Portugal), **University of Lleida** (Spain), **University of Padova** (Italy), and the **second year** in a different partner University and country. Students which have been enrolled for the first year in Lisbon or Lleida could choose the MEDFOR curriculum offered at the University of Tuscia, Viterbo, where they will be asked to complete 30 credits (ECTS) and where they can work on their final dissertation (30 ECTS). For the admission and other info see: **http://www.medfor.eu/**

Curriculum:Management and design of Urban Green Infrastructures - UGI

It is a double degree program with Peoples' Friendship University of Russia, Moscow; it aims to provide students with all necessary competencies in the field of urban forestry and green infrastructures. **First year** courses will be held at **Moscow** University – PFUR/RUDN, while **second year** courses will be given in **Viterbo**.

All activities related to the preparation of the final dissertation will take place at the labs and the trial areas of DIBAF – University of Viterbo and the PFUR/RUDN in Moscow.

RUDN University

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ACTIVITIES IN THE FIELD AS WELL IN THE LAB WITH THE FULL INVOLVEMENT OF STUDENTS

Second Year
at University of Tuscia (Viterbo - Italy)

- **30 ECTS** specialization sub-programme: *Advanced tools for sustainable management of Mediterranean forests.* The University of Tuscia will provide advanced scientific tools that are relevant for a modern sustainable management of Mediterranean forests that is the focus of the EMMC objectives.

- **30 ECTS** for Thesis (including internship in our or external laboratories)

Starting date of the class activities – 30 September 2019 (but for logistic reason you should arrive in the period **23-25 September**)

Standard class and lab/field activities: October – December

I examination session: January – February

Additional examination sessions: every month from March to June

II examination session: July and September

Thesis sessions: June, July, September, November, December, February

Second Year
at University of Tuscia (Viterbo - Italy)

- **30 ECTS** specialization sub-programme: *Advanced tools for sustainable management of Mediterranean forests* 30 ECTS specialization sub-programme

You will select 5 courses among the 6 available according to your background and interest (you can decide after the first month of class activities)

Courses

- Forest biotechnology (6 ECTS)
- Forest ecophysiology (6 ECTS)
- Monitoring soil quality (6 ECTS)
- Principles of remote sensing and modelling in forestry (6 ECTS)
- Research support for sustainable forest management (6 ECTS)
- Forest tree cropping (6 ECTS)

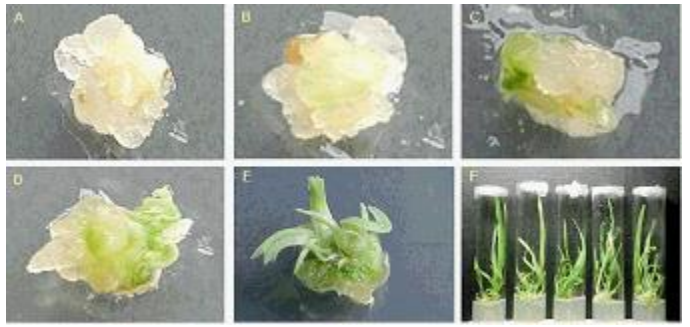
Student services and support by International Office and Department tutor

- Support to obtain the permit of stay and for VISA renewal
- Support for the application to the Regional Agency for free student residence and supporting scholarship (only for self-funded students) – *inform the local contact before the end of June*
- Support for the reservation in the student residence or to rent an apartment – you will be contacted from our ERASMUS Office (*we need the final list before the end of June*)
- A department tutor will facilitate the relationships with the academic secretaries, and the management of the web services

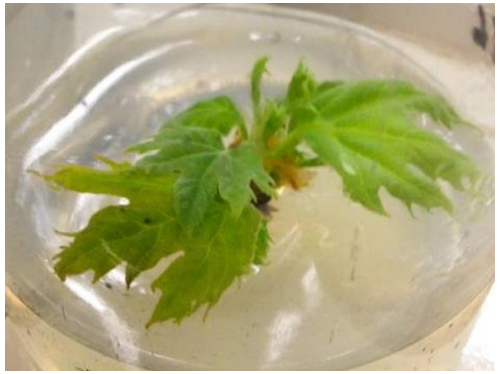
Forest Biotechnology (6 ECTS)

Lecturer: Prof. Elena Kuzminsky

To know basic elements and methods of forest biotechnology and to gain familiarity with the potential of biotechnology for Mediterranean forest tree improvement by means of the techniques and technologies currently used.



- In vitro culture of Mediterranean forest trees
- Methods of genetic transformation of forest trees
- Applications of recombinant DNA technology for the improvement of Mediterranean forest trees
- Molecular markers and Marker Assisted Selection



On-going research topics (1)

Micropropagation of historical garden trees

Platanus orientalis coming from Villa Lante -Viterbo

"Symbol tree" in the Renaissance Villas

Genetic and phenotypic characterization of the "symbol tree"

- Dendrometrical trait and phytosanitary survey
- Genetic identification by *LEAFY* gene analysis
- Genetic variability: ISSR analysis
- Susceptibility to *Ceratocystis platani*

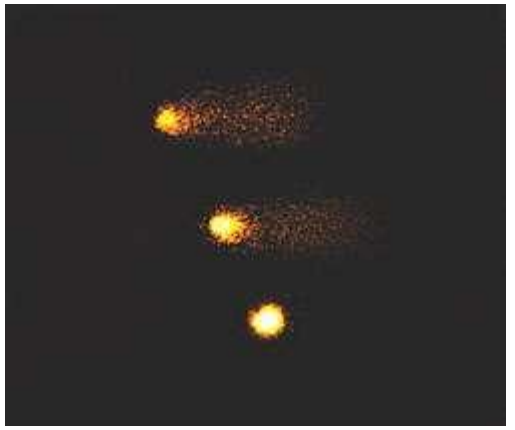
Vegetative propagation

- Propagation by woody cutting
- Micropropagation

On-going research topics (2)

DNA damage by Single Cell Gel Electrophoresis (SCGE) called also Comet Assay

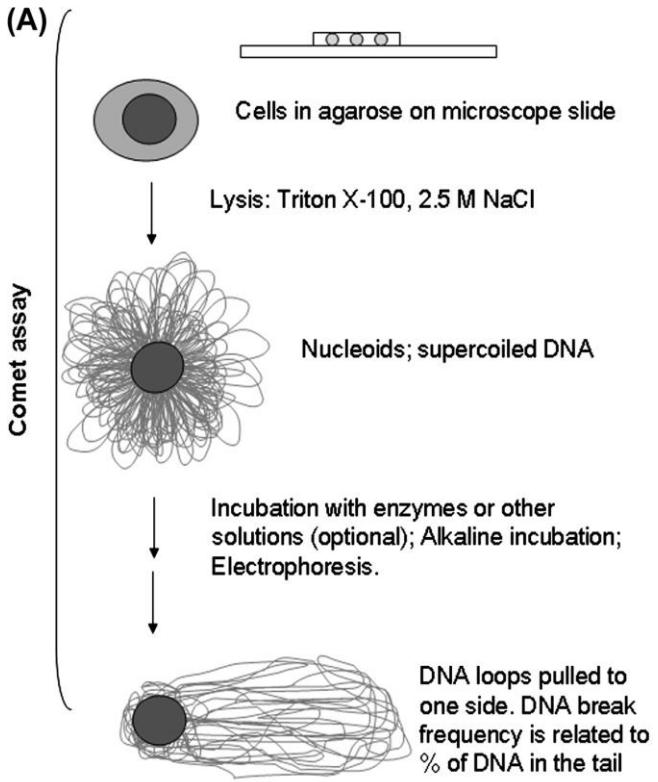
Plants in hydroponic solution under heavy metals stress (Zn)



DNA damage

The **Comet Assay** is a sensitive and rapid technique for **quantifying and analyzing DNA damage** in individual cells.

While most of its applications have been to study animal eukaryotes, there have been **few reports of successful application in the study of plant cells**.



Forest Ecophysiology (6 ECTS)

Lecturer: Prof. Paolo De Angelis

To know the environmental constrains of the main physiological processes, at tree and stand levels; to understand the acclimation responses to climate changes and to water scarcity; to gain familiarity with techniques and methodological approaches used in tree ecophysiology

- Morphologic and functional features of the main organs of forest trees: adaptation and acclimation
- Growth and development of forest trees and responses to environmental factors and stresses
- Tree architecture and microclimate within forest ecosystems
- Transpiration and water stress
- Photosynthesis and carbon cycle of forest ecosystems
- Quantitative methods for forest ecophysiological analyses
- Introduction to mathematical models for Mediterranean ecosystem analyses

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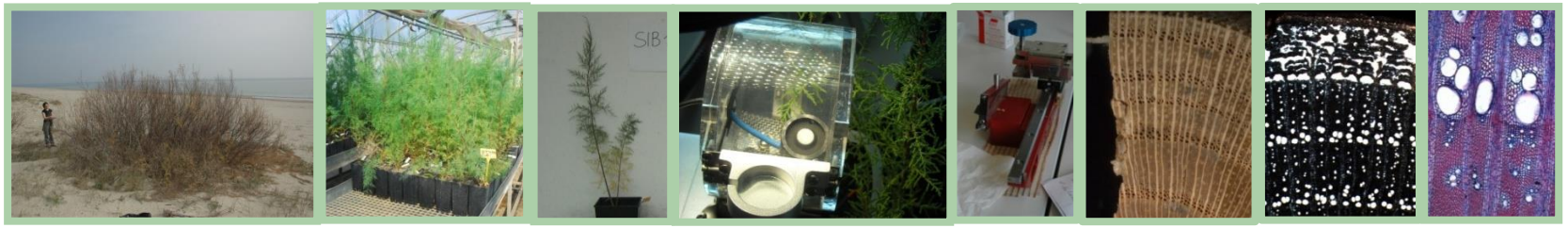
Studies on adaptive traits in trees

Tamarix spp.: ecological and physiological characterisation of Italian populations and provenances



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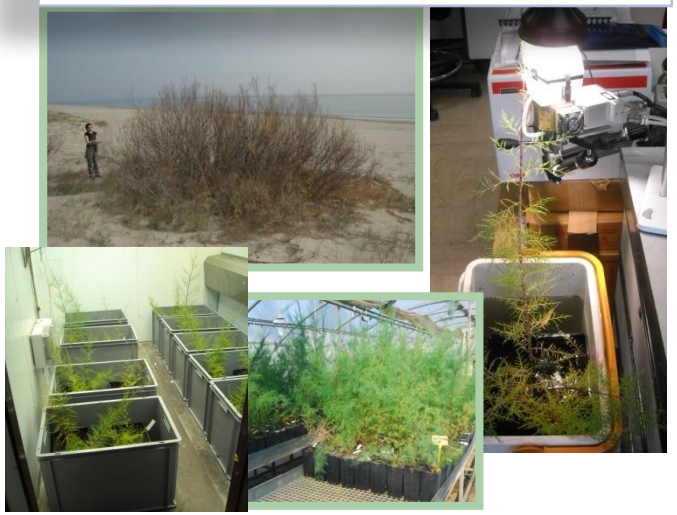
Impacts of environmental constraints on plant ecophysiology

Impact of salt water and aridity on *Tamarix* spp. natural populations



Improving seed recruitment and plant soil water relations in semi-arid environment using woody biochar

Impact of naturally occurring aridity on plant community gas-exchanges

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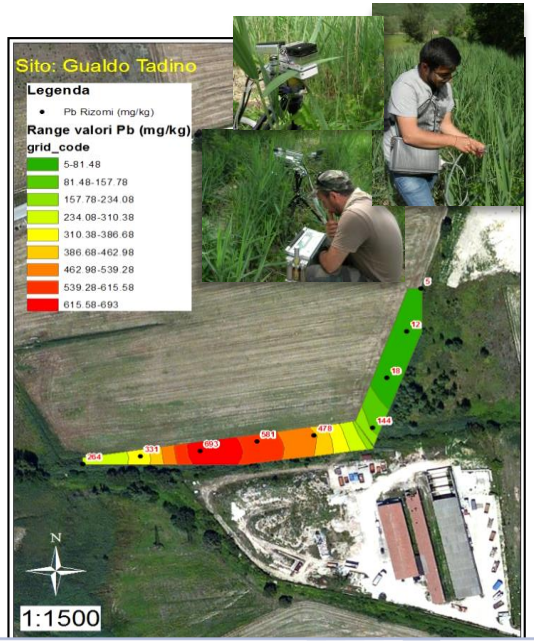
Impacts of environmental pollutants on plant physiology



Ecophysiological analysis of riparian vegetation in a lead contaminated zone

Phytoremediation of polluted sludges

ECO phys LAB

Phytotoxicity of polluted leachates

www.facebook.com/ECOphys.UNITUS/

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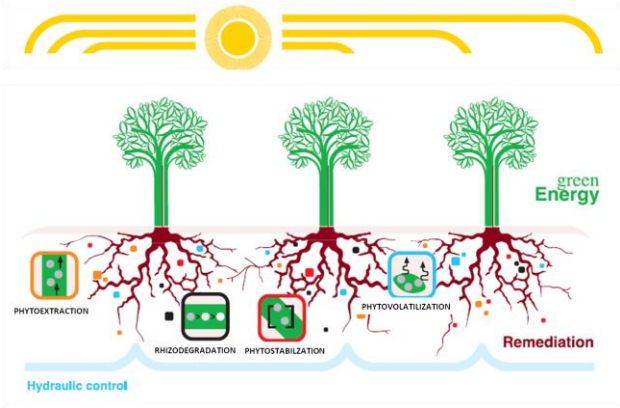
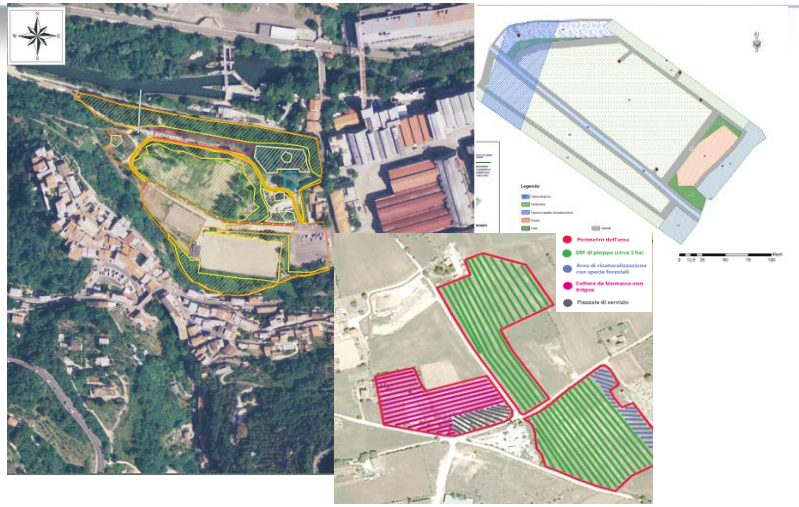
progetto REMIDA
Remediation / Energy Production / Soil & Carbon Management

The REMIDA Initiative

Using trees and agroforestry systems for remediation of polluted sites and for bioenergy production

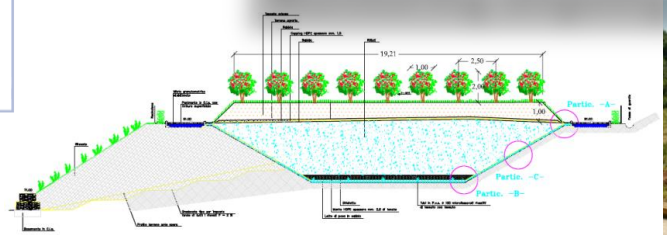


Design of phyto-remediation solutions



Testing new bio-materials and developing pilot systems

Monitoring ongoing systems



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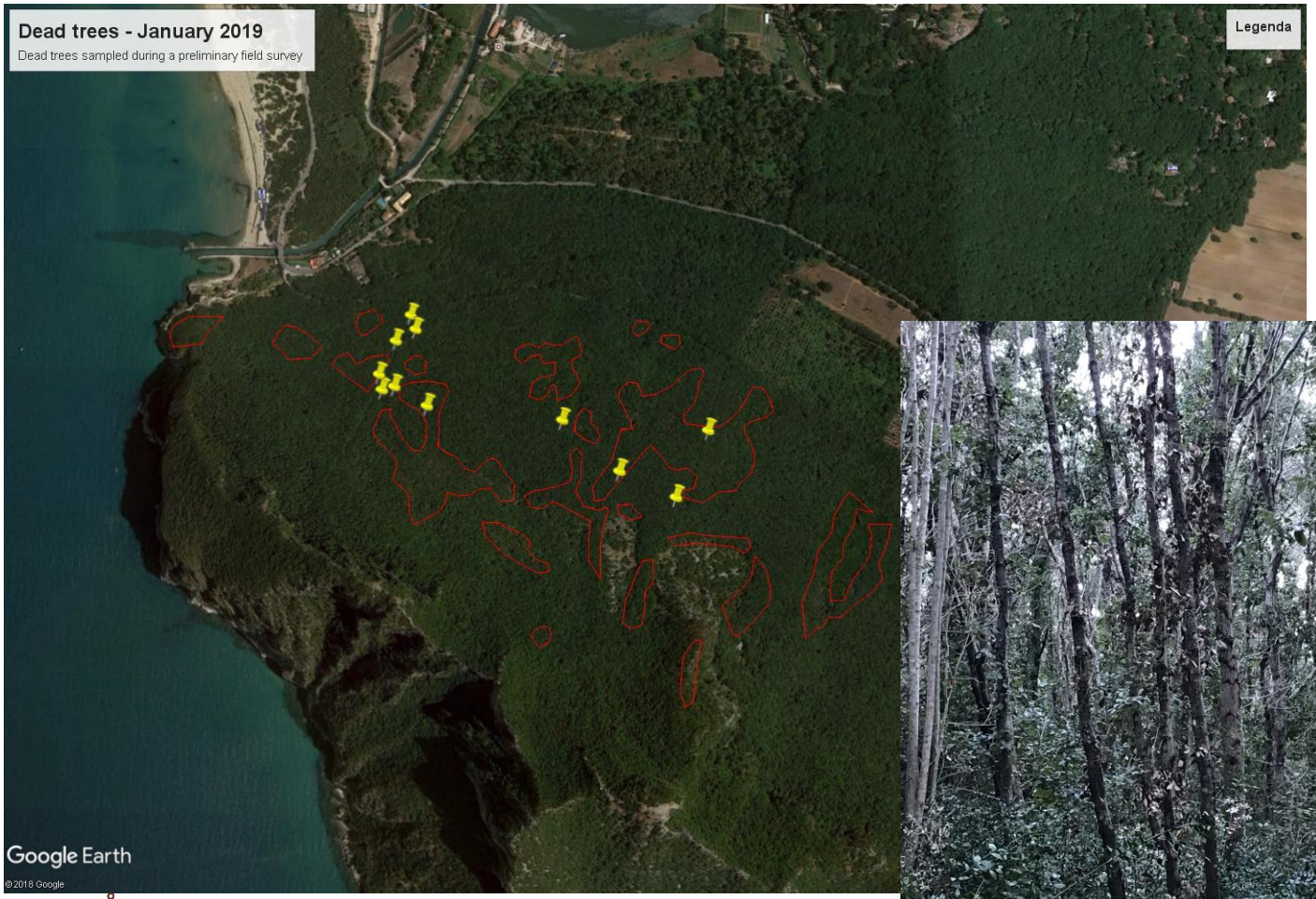
Impacts of biological pests on forest ecosystems processes



SAMFIX
SAving Mediterranean Forests from Invasions of Xylosandrus beetles and associated pathogenic fungi

Monitoring soil quality (6 ECTS)

Lecturer: Dr. M. Cristina Moscatelli

Laboratory of Soil Chemistry and Biochemistry

Course aims:

To present soil as a living, dynamic natural resource
To introduce the concepts of soil quality and soil security
To present a basic set of indicators to monitor soil quality
To provide tools to select the proper indicators in relation to specific case studies in forest environment

Course structure:

1. Lectures in class
2. Integrative seminars
3. Laboratory activity:
   Determination of soil respiration: alkali traps, respirometry (BOD)
   Determination of enzyme activities: colorimetric and fluorimetric methods
4. Working group: reading and discussion of specific articles selected from the recent literature and presentation to the class

Suggested prerequisites

Fundamentals of soil science, basic concepts of biochemistry and microbiology

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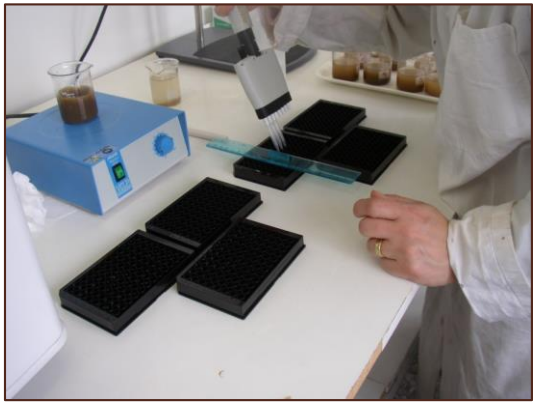
Monitoring soil quality: working group and laboratory activity

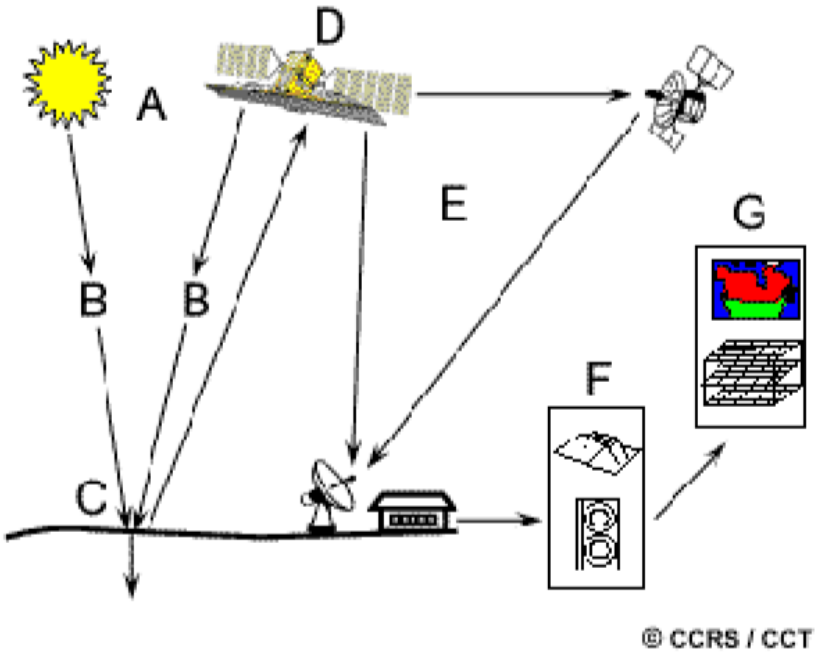


Principles of remote sensing and modelling in forestry (6 ECTS)

Lecturer: Prof. Dario Papale

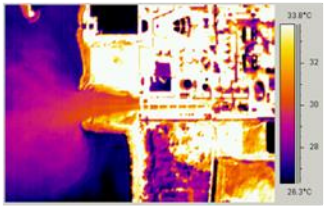
The course will give an introduction to the remote sensing and modelling in environmental application, with emphasis on the practical exercises

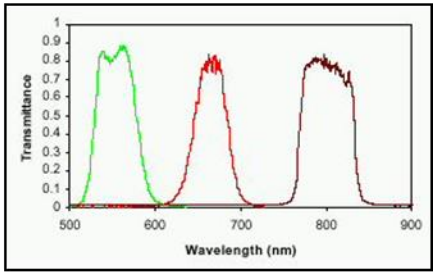
The theory, the remote sensing system, the data correction and processing and the main applications will be presented and applied to practical examples



Airborne remote-sensing systems use and development

Applications in forestry, agriculture, urban and semi-urban environment, fresh water





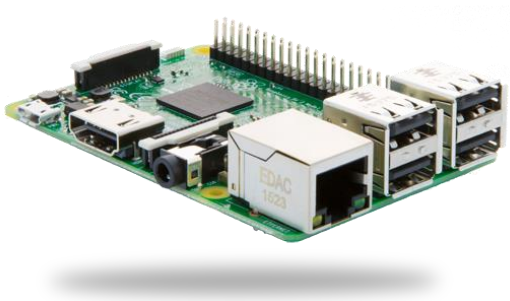
Micrometeorology and ecosystem monitoring

Linking remote sensing, modeling and ecosystem monitoring in the context of green house gases

ICOS Ecosystem Thematic Centre

The Department hosts the Ecosystem Thematic Centre of the ICOS European infrastructure giving possibilities of thesis and activities related to the GHGs monitoring:

- Eddy covariance
- Proximal sensing
- Distributed sensors based on micro-computers
- Database and data mining



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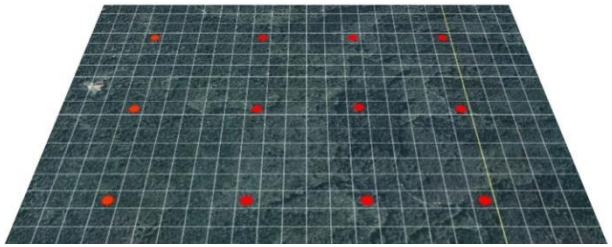
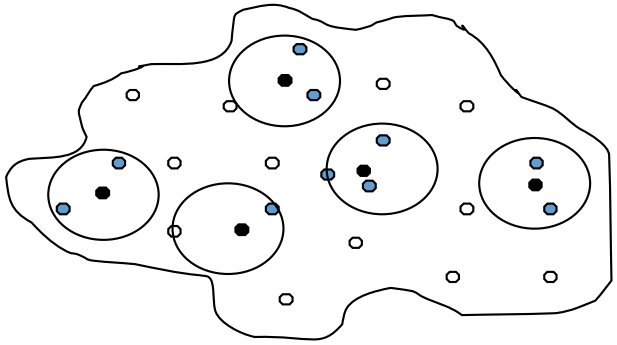
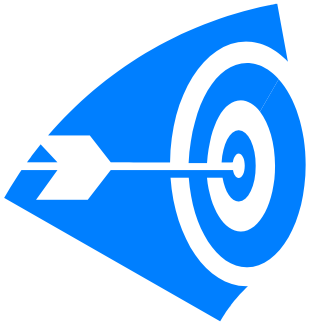
Research support for sustainable forest management (6 ECTS)

Lecturer: Prof. Anna Barbati





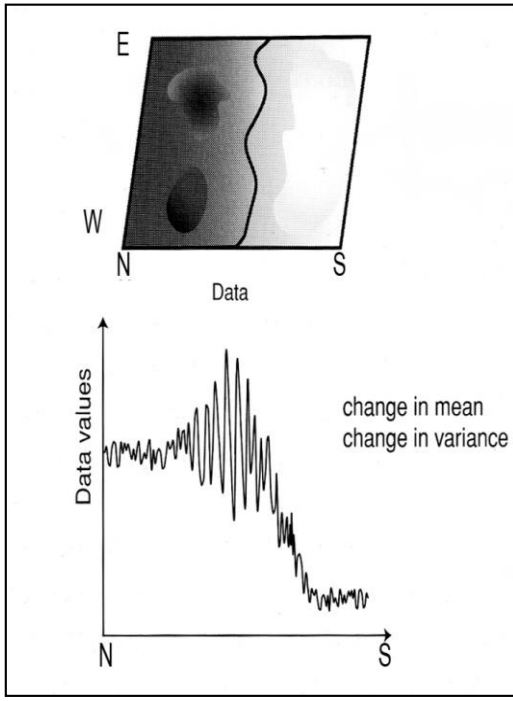


COURSE GOAL

To gain conceptual and practical understanding
of statistically-designed inventories as tools for monitoring forests and sustainability of forest management

What is SFM monitoring about?

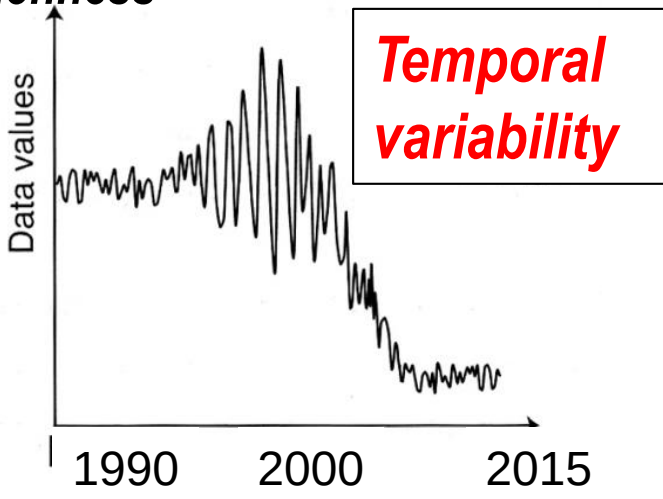
Spatial variability



SUSTAINABLE FOREST MANAGEMENT:
information needs

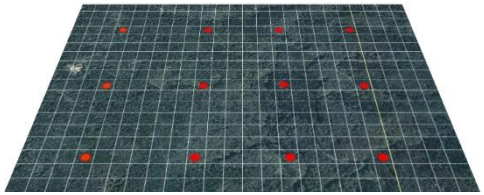
- *WHAT IS THE AREA OF FOREST?*
- *WHAT ARE THE STOCKS AND GROWTH RATES OF THE FORESTS?*
- *WHAT IS THE BIOMASS of FOREST?*
- *HOW MUCH FOREST AREA IS DAMAGED BY ABIOTIC OR BIOTIC DISTURBANCES EACH YEAR?*
- *WHAT IS THE PROPORTION OF PURE and MIXED FOREST?*
- *(…)*

DATA COLLECTION
SFM indicators
- Growing stock
- Biomass
-Species richness
…

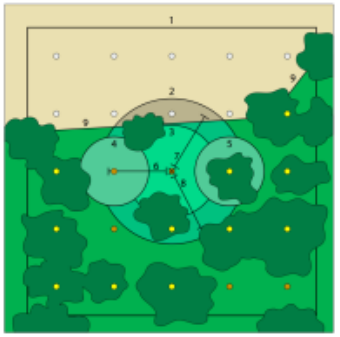


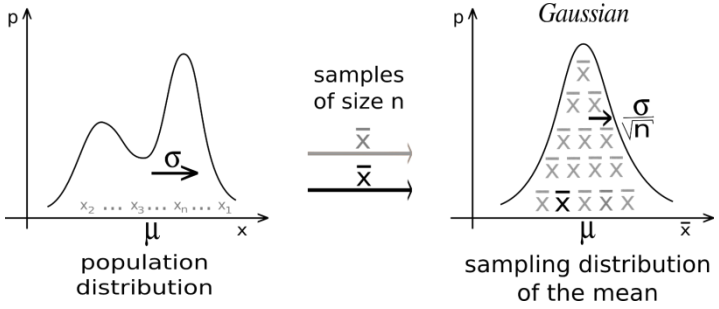
Temporal variability

Course pillars



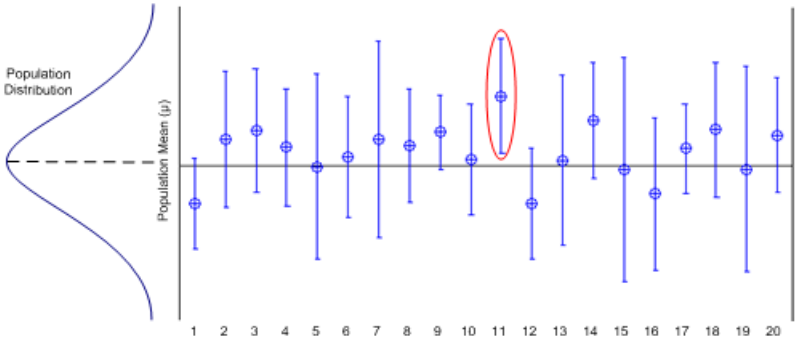
1. identify appropriate remote sensing and/or forest inventory techniques for sampling SFM indicators





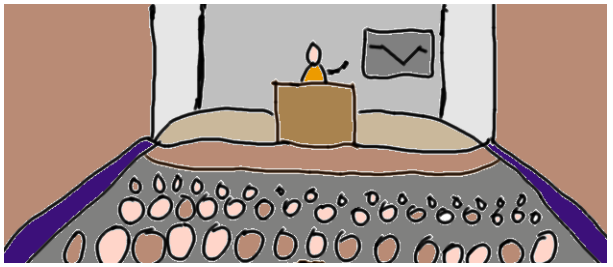
Apply the theory and concepts of probability behind commonly used forest sampling designs

3. correctly calculate estimates of SFM indicators from sample data



Teaching organization

- 50% Lectures



- 50% Lab activities: problem sets with sample, remote sensed and GIS data requiring the use of spreadsheets and QGIS software

Forest tree cropping (6 ECTS)

Lecturer: Prof. Maurizio Sabatti

Teaching activities are oriented to provide basic elements and methods of forest tree cropping and to gain familiarity with the techniques and technologies currently being used. The context of forestry and agroforestry plantations under the Mediterranean environment is also emphasized.

- Basic concepts of forest tree plantations
- Short rotation forestry (SRF) for energy production
- Agroforestry
- Phytoremediation using trees
- Forestry plantations, landscape and biodiversity conservation in the Mediterranean environment

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Conservation of poplar germplasm at the Experimental Farm (EF) of the University of Tuscia

DIBAF started germplasm collections of native european poplars (*Populus alba* and *P. nigra*) from 1988. Currently:

- ✓ more than 500 poplar genotypes (*P. alba* and *P. nigra*) are in collections in the EF;
- ✓ breeding activities generated more than 2500 poplar genotypes of F_1, F_2, and Backcross generation conserved in the EF;
- ✓ a clonal archive of poplar species from Europe, America, Middle and Far east is hosted at the EF, including many hybrid poplars used in traditional poplar cultivation

Active collaboration with private companies in Italy involved in the agroenergetic market of SRF

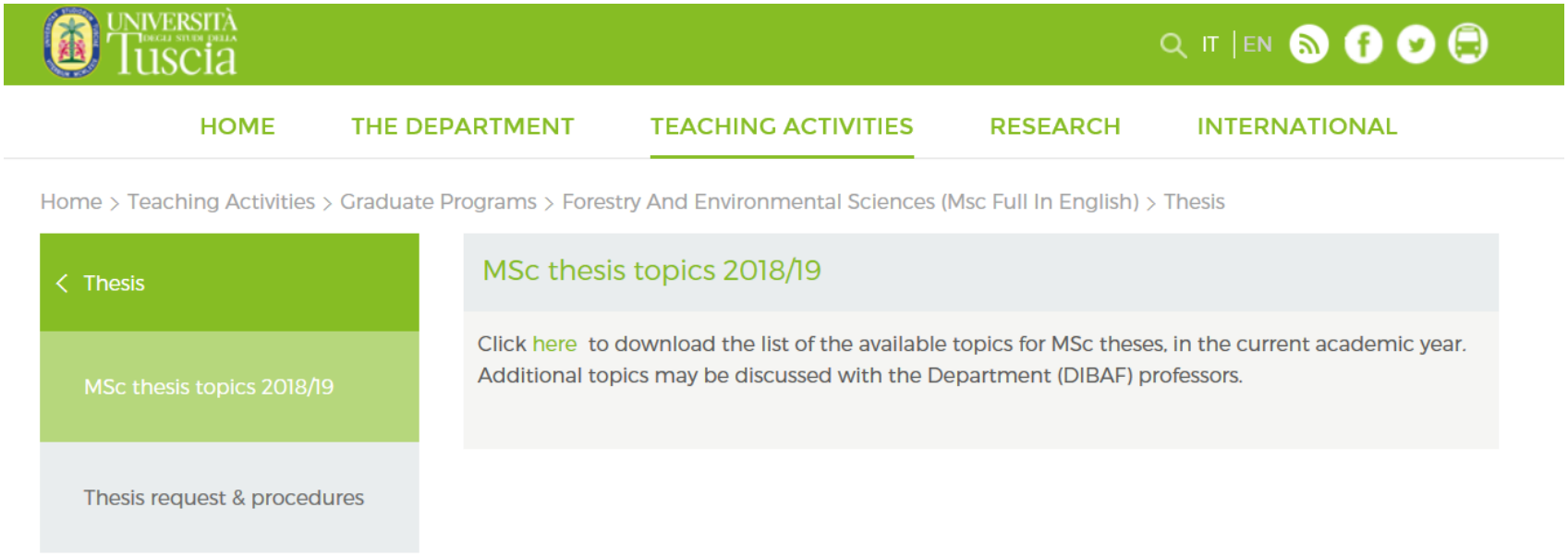
Italy has a long tradition of poplar growing and use.

An active poplar breeding programme is managed by a private company to produce new genotypes for SRF

Available thesis topics

The updated list of thesis topics will be available on the web page:

www.unitus.it/en/dipartimento/dibaf/scienze-forestali-e-ambientali/



Additional opportunities

As a regularly enrolled student at the University of Tuscia, you can apply to other ERAMUS+ and International programmes, if the general principle that exclude the double scholarship is respected (self-funded students and after your scholarship period).

- ERASMUS mobility for traineeship: 3-6 months in European Research Centres and Innovative Companies
- ERASMUS KA107: supporting thesis in non-EU countries
- ERASMUS CBHE: International Internships in Russia and China in the sector of Urban Green Infrastructure and Rural/Forestry sustainability (TAURUS programme)
- Bilateral International programmes