Council for Agricultural Research and Economics

Research Centre for Forestry and Wood

Mission, structure and main activities of FW within Italy's leading agri-food research body

CREA at a glance

Italy's main public research body dedicated to agri-food supply chains, supervised by the Ministry of Agriculture, Food Sovereignty and Forests (MASAF), with full scientific, statutory, organisational, administrative and financial autonomy.

Expertise spans agriculture, livestock, fisheries, forestry, agro-industry, nutrition and socio-economics, tackled with a multidisciplinary approach rooted in the circular economy, bioeconomy and innovation transfer.

12

research centres

1,520

researchers and technicians

297

ongoing research projects*

86

experimental farms

* as of 1 June 2026. Headquarters: Via della Navicella 2/4, Rome

Source: www.crea.gov.it

The 12 research centres

Supply-chain centres

Made-in-Italy quality productions and sustainable forest management

- Animal Production and Aquaculture
- **Forestry and Wood**
- Cereal and Industrial Crops
- Viticulture and Enology
- Vegetable and Ornamental Crops
- Olive, Fruit and Citrus Crops

Cross-cutting centres

Disciplinary research across agriculture, food, policy and bioeconomy

- Genomics and Bioinformatics
- Agriculture and Environment
- Plant Protection and Certification
- Engineering and Agro-Food Processing
- Food and Nutrition
- Policies and Bioeconomy

Source: www.crea.gov.it

Research Centre for Forestry and Wood

A supply-chain centre for forests, trees and wood

Mission

The Centre carries out studies and research to manage forests sustainably, improve forest trees genetically, conserve biodiversity and add value to the wood and non-wood products of woodlands and plantations.



Sustainable management

Forests and wood arboriculture managed for the long term



Genetic improvement

Breeding of forest trees and conservation of genetic resources



Biodiversity

Conservation and management of forest biodiversity



Valorisation

Wood and non-wood products of forests and plantations

Source: www.crea.gov.it

Where FW works

Arezzo

Tuscany

Genetics, molecular biology, geomatics, dendroecology, silviculture

Trento

Trentino

Forest planning, inventories, biometrics, medicinal plants

Casale Monferrato

Piedmont

Poplar & willow breeding, wood quality, plantation protection, biomass

Other sites

Rome
Biometeorology and forest nursery labs; "Ovile" experimental farm (~77 ha)

Rende (Cosenza)
Research group: wildlife, sensory analysis, biochemistry & microbiology

San Pietro Avellana (Isernia)
Experimental farm in the Apennines

Source: www.crea.gov.it

Where FW works



Sede principale: AREZZO

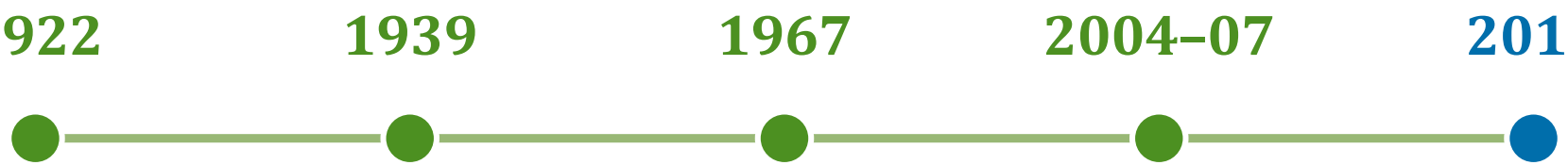


Viale Santa Margherita 80

Permanent staff:

87 persons (**35 researchers**)

A century of forest research



1922 — Royal Experimental Station of Silviculture founded in Florence by Aldo Pavari, Italy's first applied forest research centre

1939 — Poplar Research Institute (ISP) opens in Casale Monferrato

1967 — Experimental Institute for Silviculture (HQ Arezzo); ISAFA for forest management and alpine studies set up in Trento

2004–07 — Casale joins CRA; CRA Centre for Silviculture established in Arezzo

2017 — Reorganisation: Arezzo, Casale Monferrato and Trento merge into CREA FW

Source: www.crea.gov.it

Six research areas

Forest genetics & biodiversity

Long-term monitoring of genetic structures; breeding for wood production; support to forest nurseries for climate adaptation and post-disaster recovery

Ecosystem monitoring

Intensive monitoring of forest extent, structure, health and ecosystem services, including urban green

Sustainable forest management

Response to extreme events and disturbances; restoration; long-term planning for adaptation and mitigation

Wood arboriculture

Sustainable agroforestry; resilience of timber and energy plantations; biotech for tree breeding

Poplar cultivation

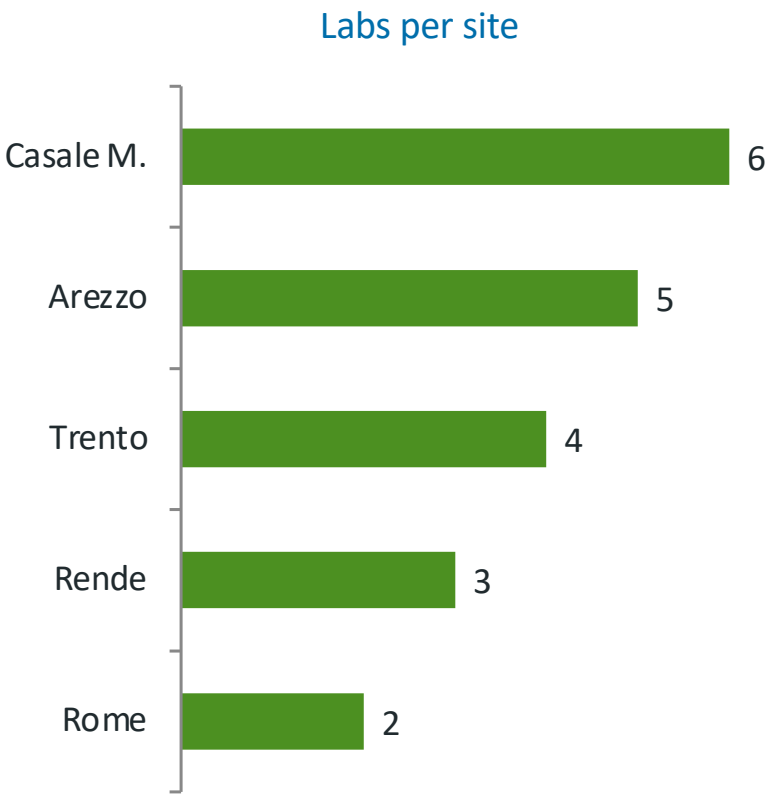
Fast-growing, resistant poplar clones; intensive and extensive models; river and degraded-land restoration

Precision forestry

ICT for data analysis, planning, automated harvesting, short supply chains and traceability from forest to user

Source: www.crea.gov.it

20 thematic laboratories



Casale Monferrato

Salicaceae breeding · in-vitro culture & biotech · wood quality & technology · plantation protection · landscape ecology & economics · arboriculture & biomass

Arezzo

Forest genetic resources · molecular biology · forest geomatics · dendroecology · silviculture & forest ecology

Trento

Forest planning · forest inventories · biometrics & dendrochronology · medicinal plants

Rende / Rome

Wildlife & forest biodiversity · sensory analysis of agro-forest foods · biochemistry & microbiology / biometeorology · forest nursery

Source: www.crea.gov.it

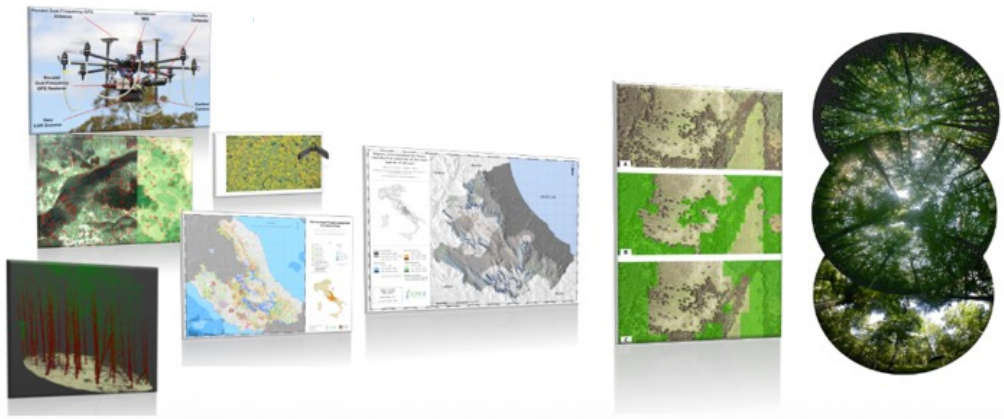
Precision forestry and geomatics

https://forgeolab.crea.gov.it/

Measurement across scales
Optical imagery, LiDAR and photogrammetry describe forests from landscape to single tree.

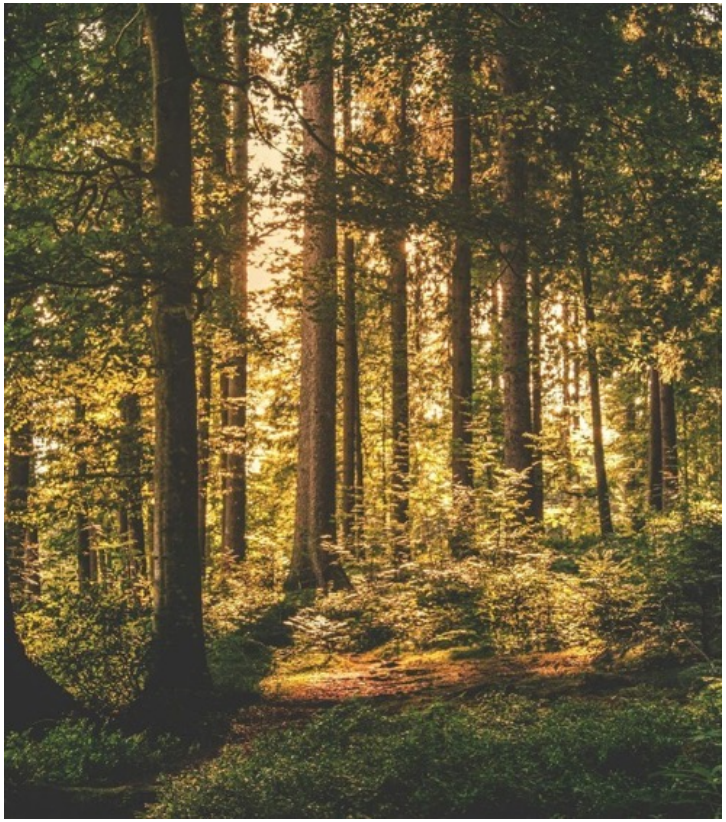
Planning applications
GIS and spatial analysis support forest management and climate adaptation.

Forest attributes
Estimates of stand structure, canopy cover and potential timber assortments.



Source: www.crea.gov.it

Silviculture and ecosystem resilience



Management experiments
Comparing silvicultural treatments and their effects on forest structure and productivity.

Responses to disturbance
Studying damage and recovery to inform restoration strategies.

Ecosystem services
Assessing management options that sustain ecological functions and forest benefits.

Source: www.crea.gov.it

Silviculture for different forest systems

Coppice







Uniform standard release

Grouped standard release



High forest





Stand silviculture

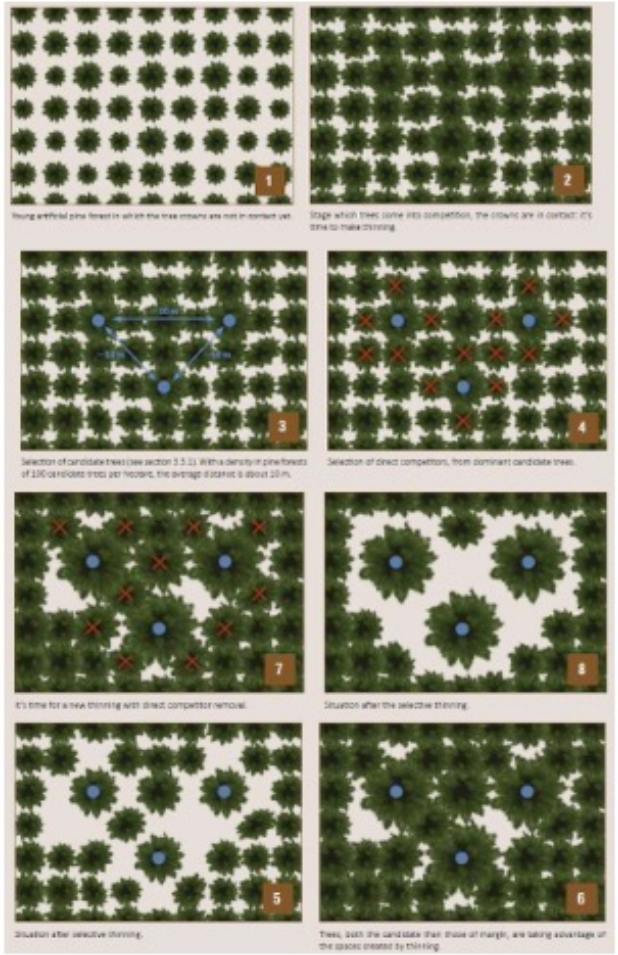


Tree oriented silviculture





Thinning interventions





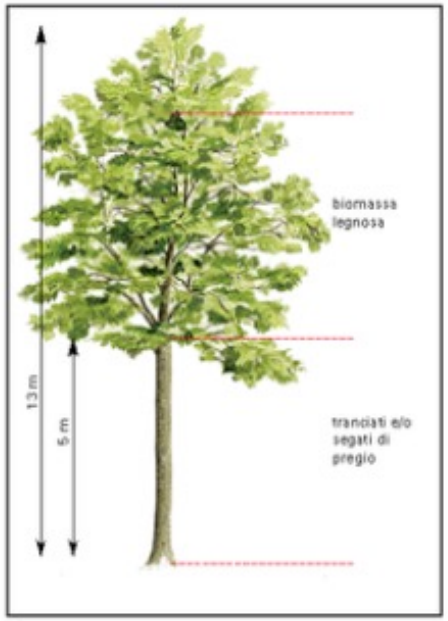


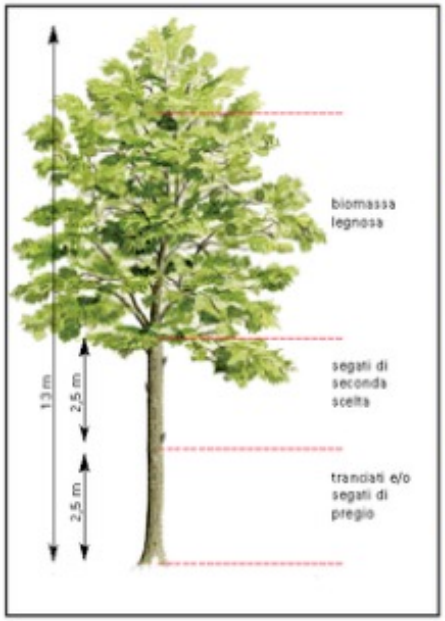




Selective thinning: promotes the growth and development of trees (or groups of 2–3 trees) characterized by the best H/D (high/diameter ratio) and a large and symmetric crown which can guarantee the **highest stand stability** and **C accumulation rates** in the medium- to long-term run.

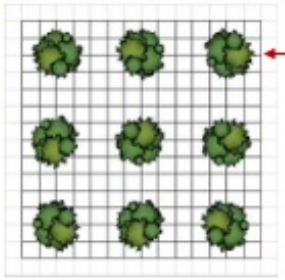
Agroforestry systems





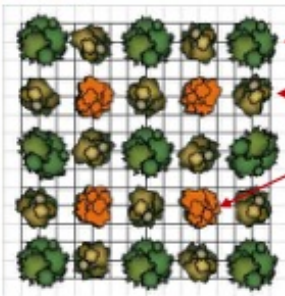
Pure plantation





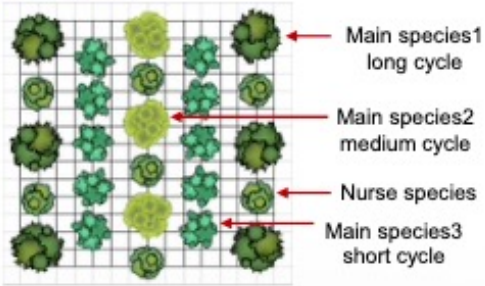
Mixed plantation





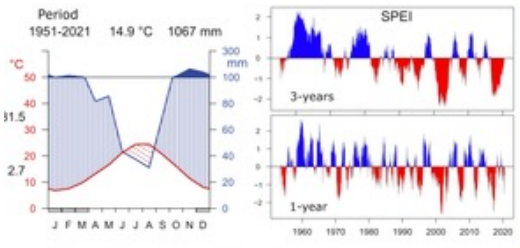
Polycyclic plantation

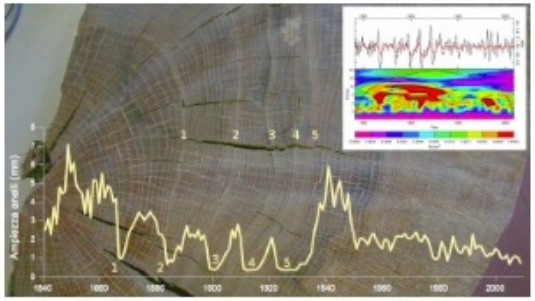




Dendroecology and Climatology

- Tree growth trends and dynamics
- Effects of forest management on Carbon sequestration and stocks for climate mitigation
- Climate-growth relationships to identify tree species' adaptation to climate change
- Tree resistance and resilience to biotic and abiotic disturbances (es: extreme climatic factors)

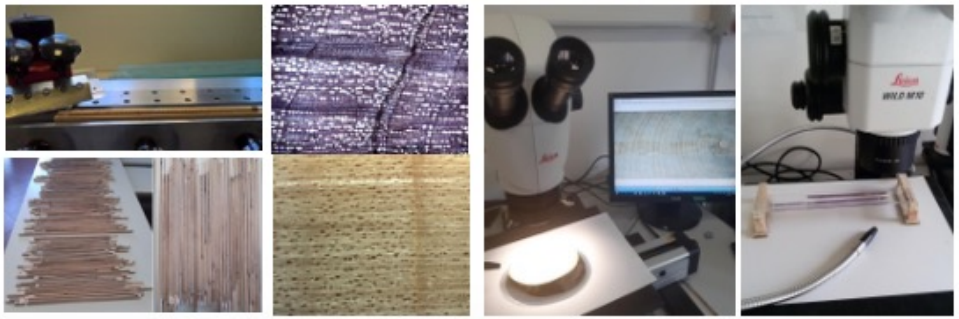




Field work



Laboratory work



Research infrastructures

645

permanent research plots

223

experimental protocols

38

research themes

Italian forest condition monitoring network
Two-level network (Level I and II)

Meteorological & eco-physiological stations
Integrated network set up since the 1990s (CONECOFOR)

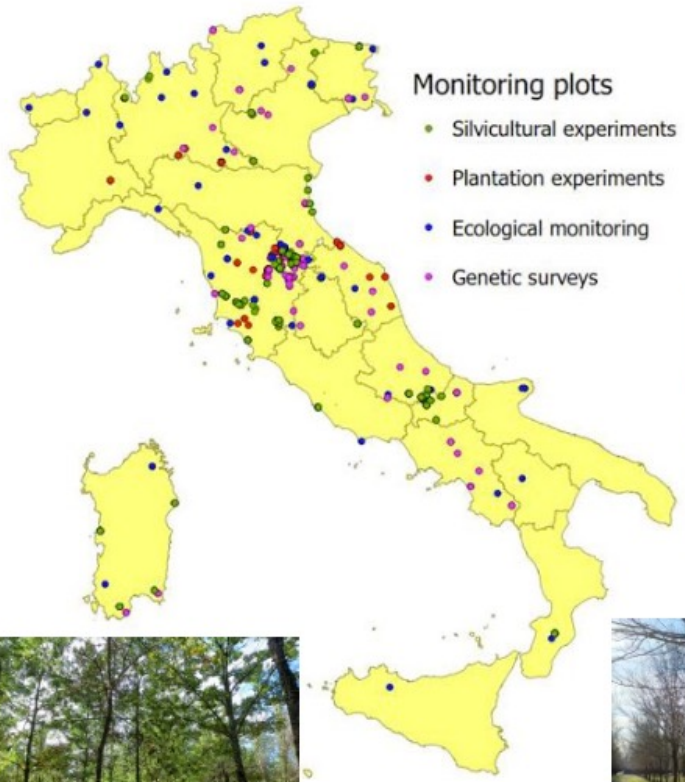
Comparative network for forest genetic resources
Unique in Italy for size and number of trials

Field sites and collections
Ovile farm (Rome), Castelporziano Presidential Estate, Salicaceae germplasm at "Mezzi" farm

Source: www.crea.gov.it









645 permanent experimental plots (some with 50-years-long data series), covering about 240 hectares







Institutional and international roles

FAO	International Poplar Commission · Commission on Forest Genetic Resources · Silva Mediterranea · FRA working group with MASAF
Europe	EUFORGEN (European Forest Genetic Resources Programme) · ENFIN Steering Group · ESFRI-ICOS carbon observation system
ICP Forests	Expert panels on Forest Growth and on Foliage & Litterfall
National	Ministry working group on cork; scientific support to the National Forest Inventory and National Rural Network

Source: www.crea.gov.it

Scientific services and knowledge transfer

Support to public institutions

Technical evidence for forest inventories, planning and national information systems.

Training and technical guidance

Courses and dissemination help practitioners apply research findings.

Scientific publishing

Annals of Silvicultural Research: open-access research on forests and their management.

Source: www.crea.gov.it



International online open access (OJS) journal

http://cra-journals.cineca.it/index.php/asr/index

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second quartile (Q2) for the *Forestry subject category* of the SCImago Journal Rank

Forest genetic resources

Germplasm management, conservation, breeding and phenological monitoring

Forest germplasm management: key species



Castanea sativa

- Clonal and traditional fruit-variety collections recovered and enriched with new accessions
- 76 varieties registered in the EURISCO database (DOI pending)
- 118 genotypes characterised: genetics, morphology, phenology
- Varietal identification by KASP fingerprinting; contribution to the Kastrack database



Pinus pinea

- Selection of genotypes more tolerant to *Leptoglossus occidentalis* and *Diplodia sapinea*
- 400 grafts and 500+ seedlings to build a clonal archive



Pseudotsuga menziesii

- Plus trees identified and characterised (SSR markers, phenotype)
- SNP marker-assisted selection for wood quality
- Catalogue fields and clonal seed orchards

Source: CREA FW, Forest Genetic Resources research group

Biodiversity and forest genetic resources

Inventory and conservation

Inventory, conservation and management of forest genetic resources and biodiversity

Genetic variability

Genetic diversity of forest populations, genetic characterisation and fingerprinting of genotypes

Selection and breeding

Basic materials (seed stands, clones, seed orchards) for quality timber: walnut, cherry, Douglas fir, wild service tree, pear, oaks, ash

Certified nurseries

Supporting a certified, high-quality forest nursery supply chain

Adaptive traits

Adaptive and eco-physiological responses of key forest species to environmental change

Policy support

EU, national and regional rules on forest reproductive material (Dir. 1999/105/EC, Lgs. Decree 386/2003) and illegal timber (Reg. EU 995/2010)

Source: CREA FW, Forest Genetic Resources research group

A conservation model: *Abies nebrodensis*

Genetic Conservation Unit ITA00252

Relict species · IUCN Red List

The relict population in the Madonie massif (Palermo, Sicily) survives in very harsh conditions and is at **risk of extinction.**
A rescue strategy was developed by the former Experimental Institute for Silviculture of Arezzo, today CREA Forestry and Wood.



1992 · Assisted migration

Clonal copy of the whole population: all genotypes, about 30 individuals

Why

Protect the gene pool from rising isotherms due to climate change and frequent, extensive wildfires

Today

Source of forest reproductive material (FRM), aiming to return enriched diversity to the site of origin

Source: CREA FW, Forest Genetic Resources research group

Ex situ dynamic conservation

The 1992 collection at Pomaio became the source of grafts and seedlings for two further conservation areas.

Site of origin
Madonie massif, Sicily



Pomaio (Arezzo)
Ex situ collection · cones, seedlings and grafts









Viamaggio pass & Papiano
New dynamic conservation areas (Arezzo)





Source: CREA FW, Forest Genetic Resources research group

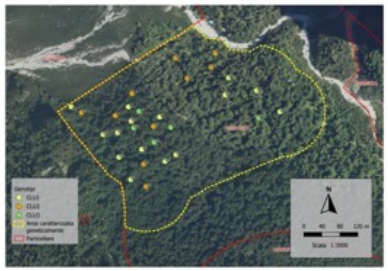
Conservation and new forest basic materials

In situ and ex situ conservation of key species

By ecologically homogeneous zone, for the relevant species and provenances

Abies alba, A. cephalonica	Mediterranean firs
Acer campestre	*Cupressus sempervirens*
Juglans regia & hybrids	Mediterranean pines (FAO-bis)
Prunus avium	*Quercus robur, Q. suber*
Sorbus spp.	





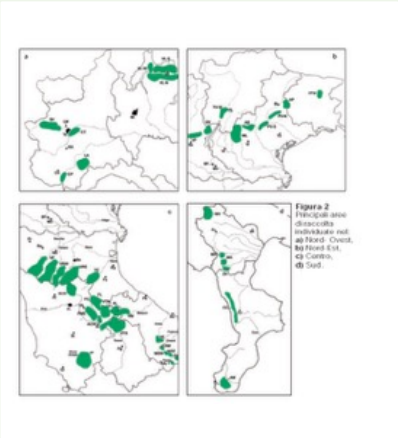
Identifying new Forest Basic Materials (FBM)

Scientific and technical support to reviewing and identifying new FBM through the genetic and phenotypic characterisation of stands.

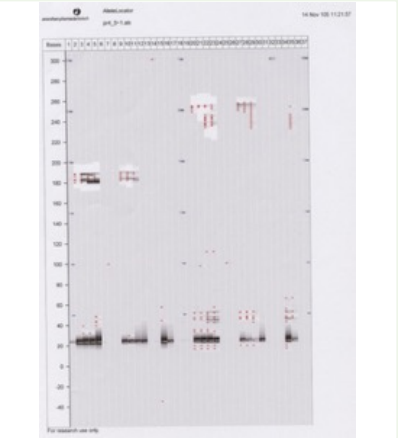
Source: CREA FW, Forest Genetic Resources research group

Noble hardwoods: selection and breeding

Genetic improvement to enrich biodiversity and support quality wood production



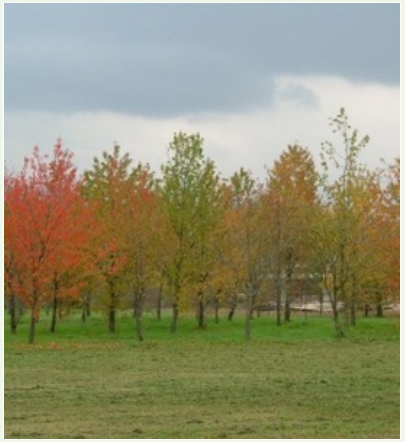
1 **Exploration and inventory of genetic resources**



2 **Genetic analysis**



3 **Phenotypic selection**



4 **Conservation of diversity**

Source: CREA FW, Forest Genetic Resources research group

In vitro culture and biocontrol

In vitro culture

Organogenesis, somatic embryogenesis and micropropagation of *Prunus avium, Sorbus* spp. and other forest species.
Plantlets are used for comparative trials and germplasm conservation.





Biocontrol agents

Trichoderma spp. are used to test pathogen resistance and to boost root development and field growth of high-value species such as *Quercus suber* and *Castanea sativa*, for greater climate resilience and more sustainable, productive nurseries.





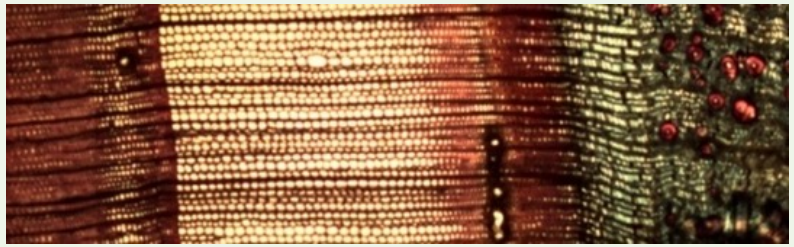
Source: CREA FW, Forest Genetic Resources research group

Phenological monitoring

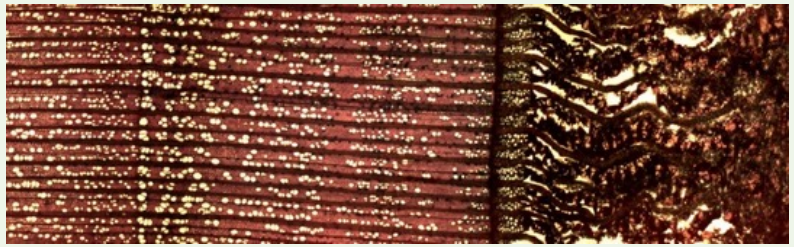
Adaptation to climate change for conservation and sustainable forest management, *in situ* and *ex situ*

Cambial phenology

Pseudotsuga menziesii



Prunus avium

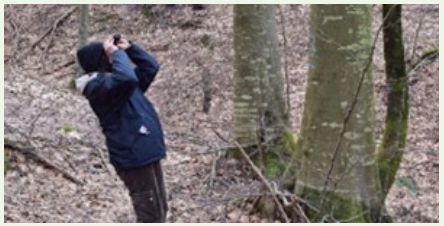


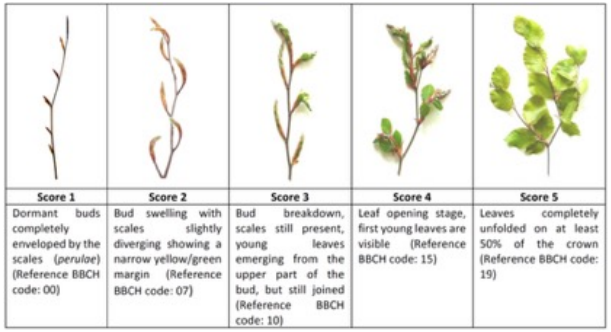
Leaf phenology

Remote monitoring



In situ monitoring





Score 1	Score 2	Score 3	Score 4	Score 5
Dormant buds completely enveloped by the scales (*perulae*) (Reference BBCH code: 00)	Bud swelling with scales slightly diverging showing a narrow yellow/green margin (Reference BBCH code: 07)	Bud breakdown, scales still present, young leaves emerging from the upper part of the bud, but still joined (Reference BBCH code: 10)	Leaf opening stage, first young leaves are visible (Reference BBCH code: 15)	Leaves completely unfolded on at least 50% of the crown (Reference BBCH code: 19)

Source: CREA FW, Forest Genetic Resources research group

Thank you for your attention

Research Centre for Forestry and Wood · National Centre for the Study and Conservation of Forest Biodiversity

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