European Information System on Forest Genetic Resources

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Summary

- European Forest Genetic Resources Programme (EUFORGEN)
- European Information System on Forest Genetic Resources (EUFGIS)
  - Key results of the EUFGIS project
  - EUFGIS Portal
- Assessment and monitoring of forest genetic resources (FGR)

EUFORGEN

- Pan-European programme promoting conservation and sustainable use of forest genetic resources

- Established in 1994 to facilitate the implementation of commitments made by the Forest Europe process
  - Resolution S2: Conservation of forest genetic resources, Strasbourg Conference (1990)
  - Resolution V4: Conserving and enhancing forest biological diversity in Europe, Vienna Conference (2003)
  - Warsaw Declaration (2007)

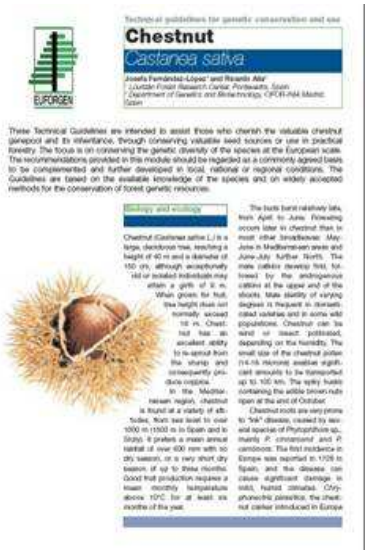
EUFORGEN

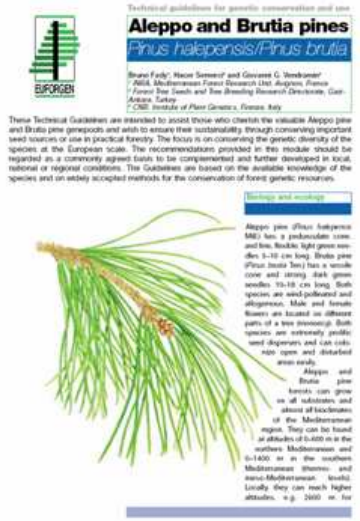
- Member countries (26) (Oct 2010)
- National Coordinators → Steering Committee
- Secretariat (Bioversity International)
- Phase IV (2010-2014) objectives
  1. Promote appropriate use of forest genetic resources as part of sustainable forest management to facilitate adaptation of forests and forest management to climate change
  2. Develop and promote pan-European gene conservation strategies and improve guidelines for management of gene conservation units and protected areas
  3. Collate, maintain and disseminate reliable information on forest genetic resources in Europe

Technical Guidelines

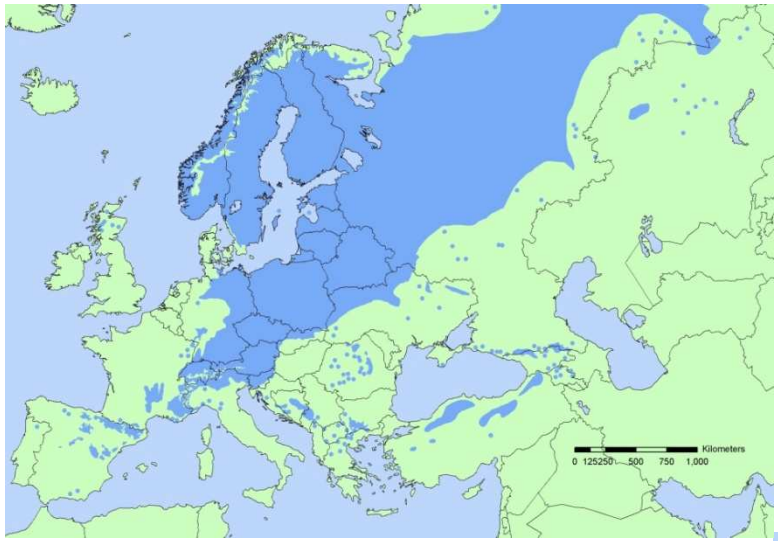
Sycamore (*Acer pseudoplatanus*)
Field map (*A. campestre*)
Black alder (*Alnus glutinosa*)
Italian alder (*A. cordata*)
Silver birch (*Betula pendula*)
Chestnut (*Castanea sativa*)
Common ash (*Fraxinus excelsior*)
Oriental sweet gum (*Liquidambar orientalis*)
Wild apple and pear (*Malus sylvestris*, *Pyrus pyraster*)
Black poplar (*Populus nigra*)
European aspen (*P. tremula*)
Wild cherry (*Prunus avium*)
European white oaks (*Quercus petraea*, *Q. robur*)
Service tree (*Sorbus domestica*)
Wild service tree (*S. torminalis*)
Lime (*Tilia cordata*)
White elm (*Ulmus laevis*)

Silver fir (*Abies alba*)
Norway spruce (*Picea abies*)
Swiss stone pine (*Pinus cembra*)
Aleppo and Brutia pines (*Pinus halepensis / P. brutia*)
Black pine (*P. nigra*)
Maritime pine (*Pinus pinaster*)
Italian stone pine (*Pinus pinea*)
Scots pine (*P. sylvestris*)

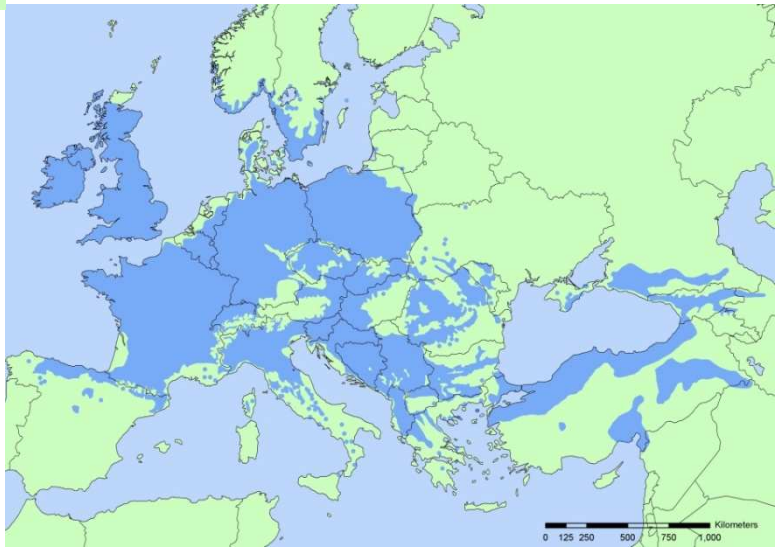

Chestnut
Castanea sativa


Aleppo and Brutia pines
Pinus halepensis/Pinus brutia

www.euforgen.org



Scots pine (*Pinus sylvestris*)



Sessile oak (*Quercus petraea*)

FGR assessment and monitoring

- Assessment of FGR conservation efforts and promotion of further action
- Indicator 4.6 of the pan-European C&I for sustainable forest management
  - area managed for conservation and utilisation of forest tree genetic resources (*in situ* and *ex situ* gene conservation)
  - area managed for seed production
- State of Europe's Forests 2011 (Forest Europe, UNECE, FAO)

FGR assessment and monitoring: lessons

- European countries have organized FGR conservation in various ways (not a problem as such)
  - Variety of documentation and management efforts
- Most countries use similar conservation approach
  - Networks of reserves, protected areas etc
- What is a ‘gene conservation unit’ and how it should be managed?
- Reliable assessment of FGR conservation at pan-European level difficult, if not impossible

EUFGIS project

- Project period: April 2007-March 2011
- Co-funded by the European Commission (DG Agriculture and Rural Development) (50%), total budget € 1,1 million
- Seven partners:
  - Bioversity International
  - BFW, Austria
  - State Forest Tree Improvement Station, Denmark
  - INRA, France
  - National Forest Centre, Slovakia
  - Slovenian Forestry Institute, Slovenia
  - Forest Research, United Kingdom
- Implemented in collaboration with EUFORGEN (member and associated countries)

Key results of the EUFGIS project

- A network of National Focal Points in 35 countries
- Pan-European minimum requirements and data standards for dynamic gene conservation units of forest trees
- Four training workshops in 2009
- EUFGIS Portal launched in Sep 2010

Minimum requirements

Based on the concept of dynamic gene conservation

- The dynamic nature of forest genetic resources (continuous evolution)
- Active efforts are necessary for effective conservation
- Forest genetic resources rarely achieve an optimum 'adaptedness' to a given environmental conditions

Clarifies the role of protected areas and production forests in gene conservation

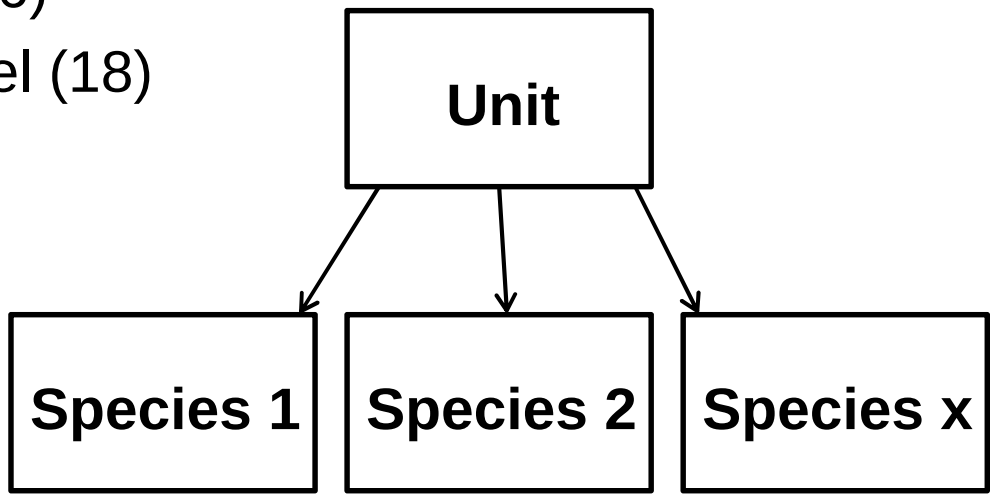
- Most protected areas established for habitat or species conservation, no management intervention often allowed
- Gene conservation can be integrated with other management goals of forests

Data standards

Define the format and accuracy of the data to be entered into the EUFGIS database

Data on the gene conservation units

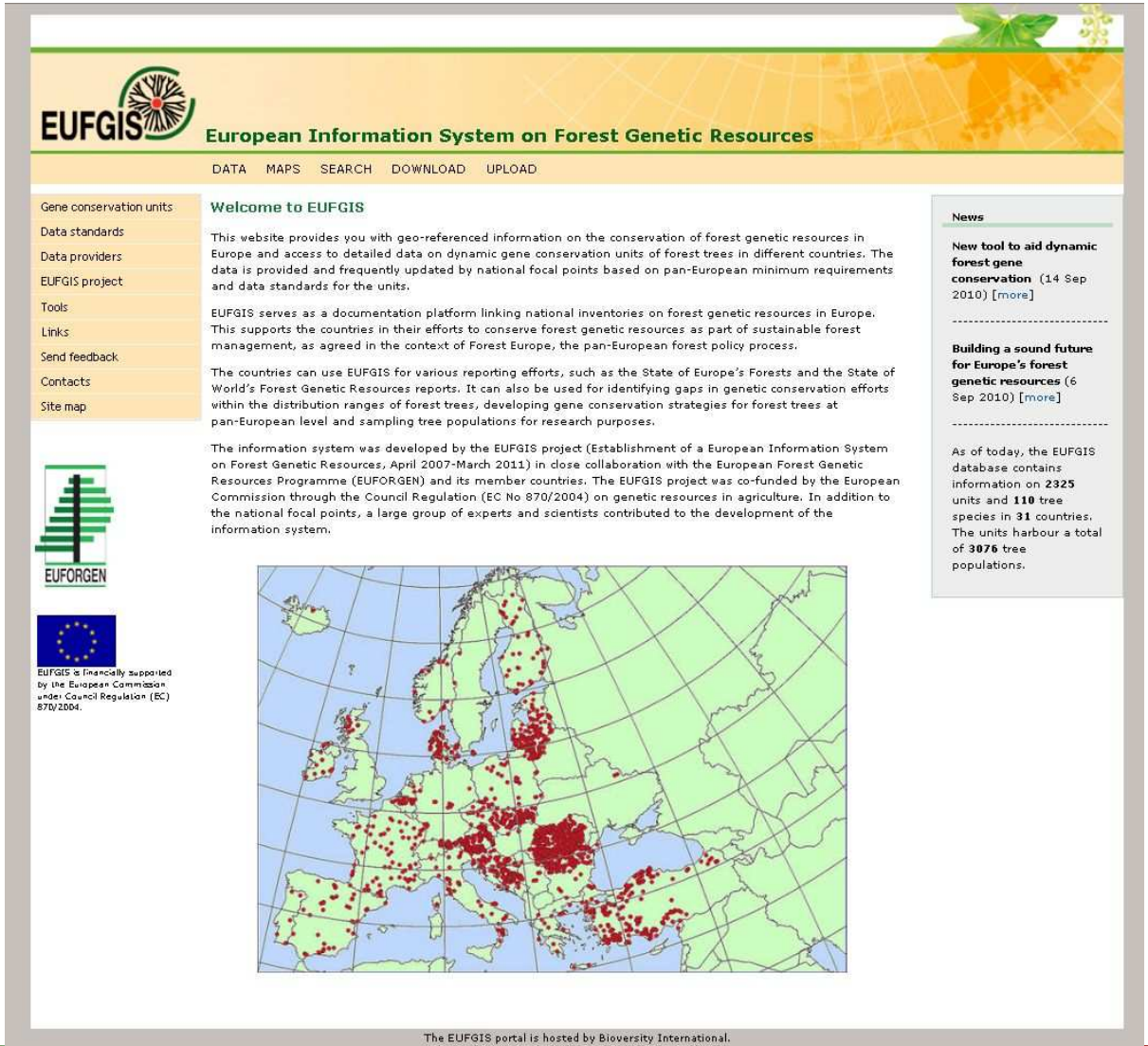
- Unit level (26)
- Species level (18)



Gene conservation units

- Should have a designated status as genetic conservation areas of forest trees at national level
  - legal status, administrative status or similar arrangements
- Can be located in forests managed for multiple uses, protected areas or seed stands (not in seed orchards)
- Should have a certain minimum size
- Should be managed for genetic conservation of target tree species
- Should be monitored frequently

EUFGIS Portal (http://portal.eufgis.org)



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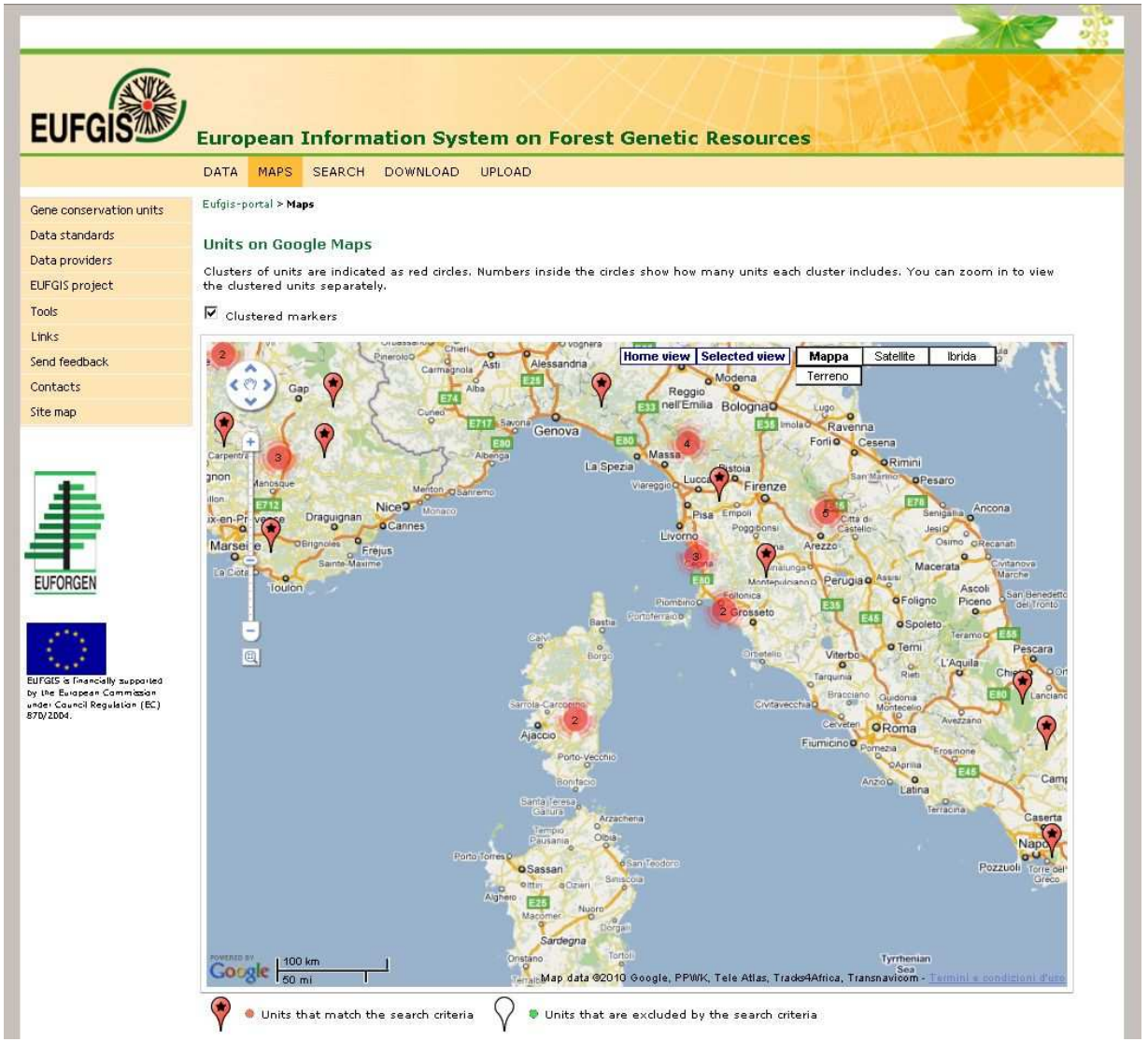


FGR assessment and monitoring

Currently the EUFGIS Portal includes data on 2325 units and 110 tree species in 31 countries (a total of 3076 tree populations)

Gap analysis for plant genetic resources conservation (e.g. Maxted et al. 2008, Diversity and Distributions 14: 1018-1030)

- assessment of genetic conservation efficiency and representativeness
- formulation of truly pan-European gene conservation strategies for forest trees

Better data for international reporting purposes (e.g. State of the World's FGR Report)

FGR assessment and monitoring

The pan-European minimum requirements for the units have increased discussion and action at national level

- Documentation efforts
- Designation of the units
- Management plans

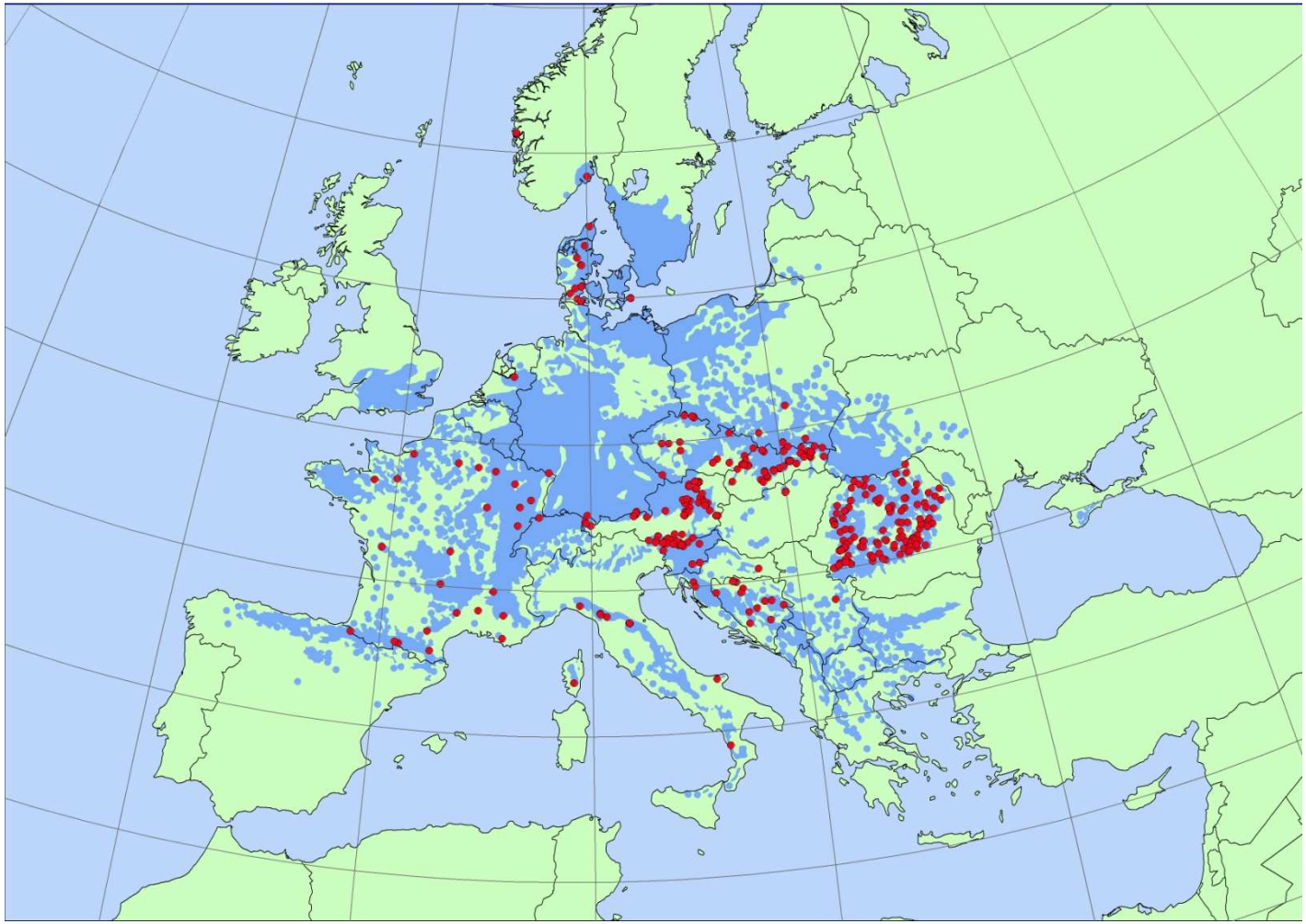
What are we interested in assessing and monitoring?

- Geographical coverage of FGR conservation efforts
- Genetic diversity
- Genes
- Adaptive traits

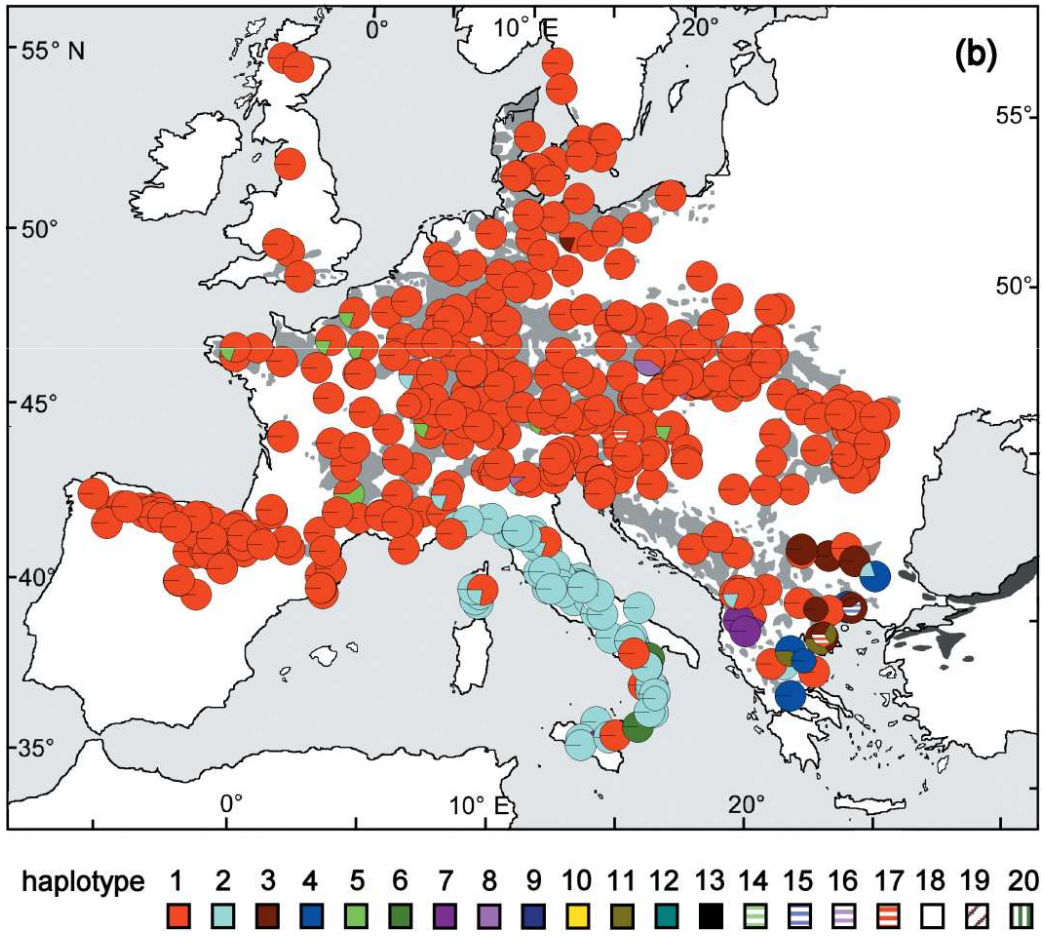
FGR assessment and monitoring

- European beech (*Fagus sylvatica*) is a widely-occurring and economically important tree species
- Provenance trials have shown that beech is a plastic species, i.e. a given seed source can perform well in different sites and climatic conditions
- Large variation among beech provenances across Europe (COST Action E52)
  - Survival
  - Growth
  - Phenology (bud burst, bud set)
  - Drought tolerance
- The impact of climate change on conservation and use of beech genetic resources?

Beech gene conservation units

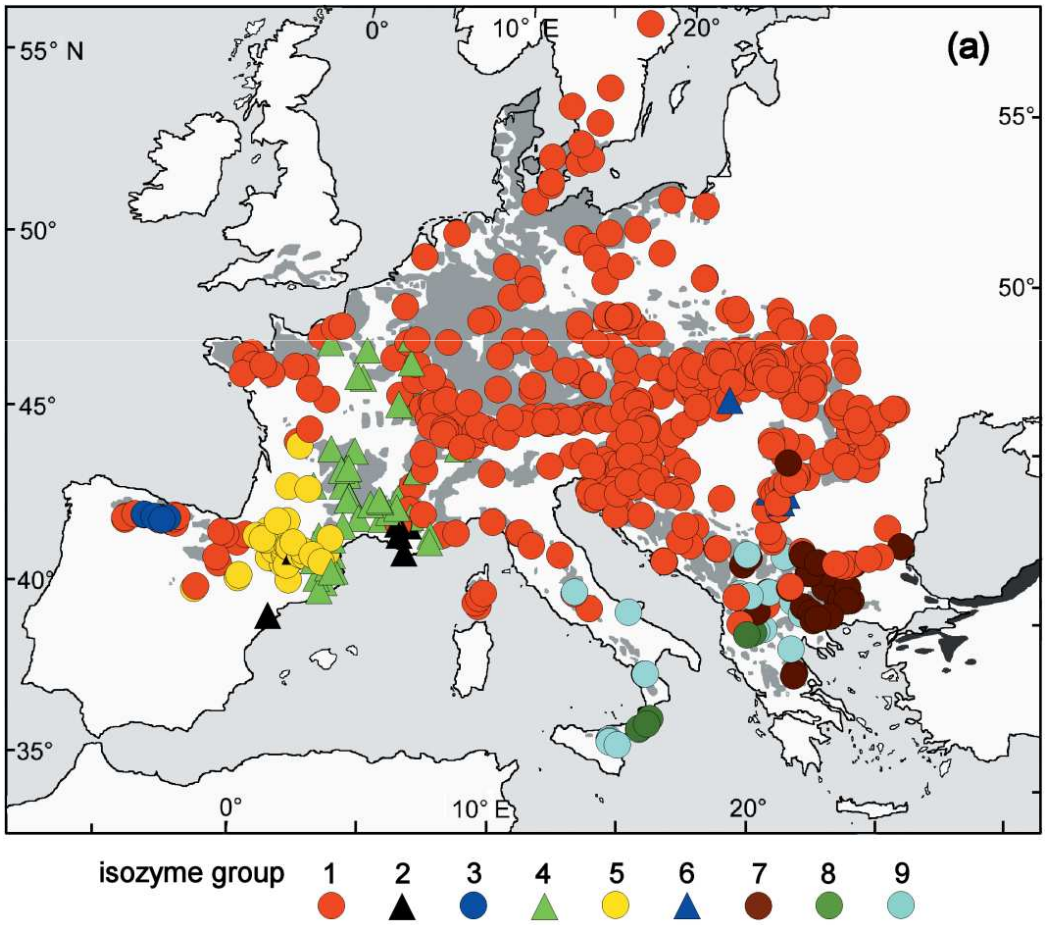


Beech genetic diversity (SSRs)



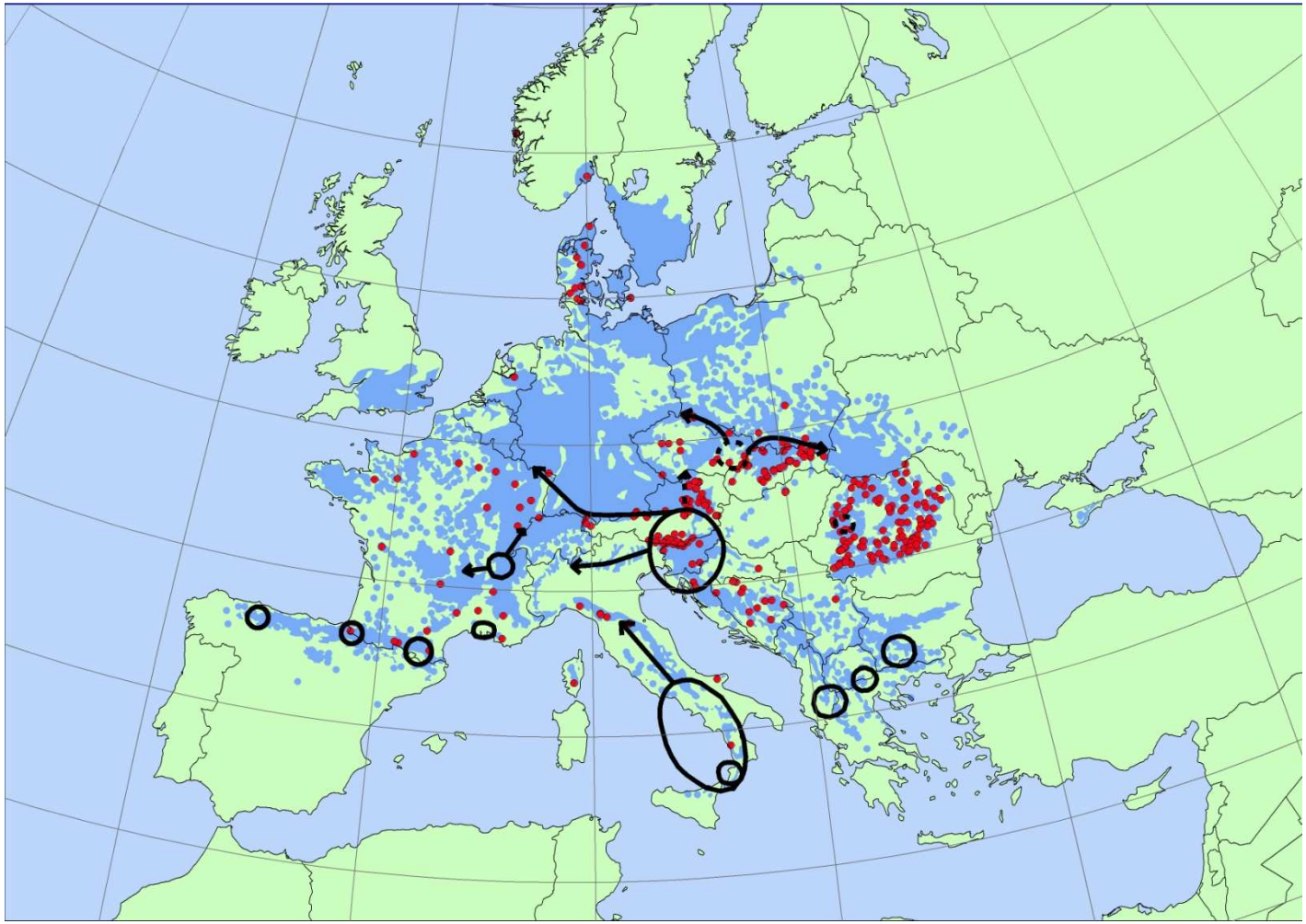
Magri et al. 2006 New Phytologist 171: 199-221

Beech genetic diversity (isozymes)



Magri et al. 2006 New Phytologist 171: 199-221

Units vs refugia areas (Magri et al. 2006)



FGR assessment and monitoring

Development of genetic and genomic resources in Europe offers new opportunities for assessment and monitoring efforts

- Discovery of genes with adaptive significance
- Diversity of genes

EVOLTREE Network of Excellence

- Databases on genetic diversity of forest trees (11)
- Repository Centre for DNA samples (340,0000)

Beech genetic resources

- 965 populations
- 18 genetic markers

www.evoltree.eu

Future EUFORGEN work

Assessment and monitoring

- Maintenance and further development of the EUFGIS Portal (2011-2014)
- WG to assess gene conservation status of forest trees in Europe and develop of pan-European gene conservation strategies (2011-2012)
- WG to develop genetic monitoring methods for gene conservation units of forest trees (2011-2012)

Conservation and sustainable use of FGR

- WG on use and transfer of forest reproductive material in the context of climate change (2011-2012)

Further information

http://portal.eufgis.org

www.eufgis.org

www.euforgen.org

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