

# GenTree/Stakeholders' consultation

University of Avignon, 30/1/2020

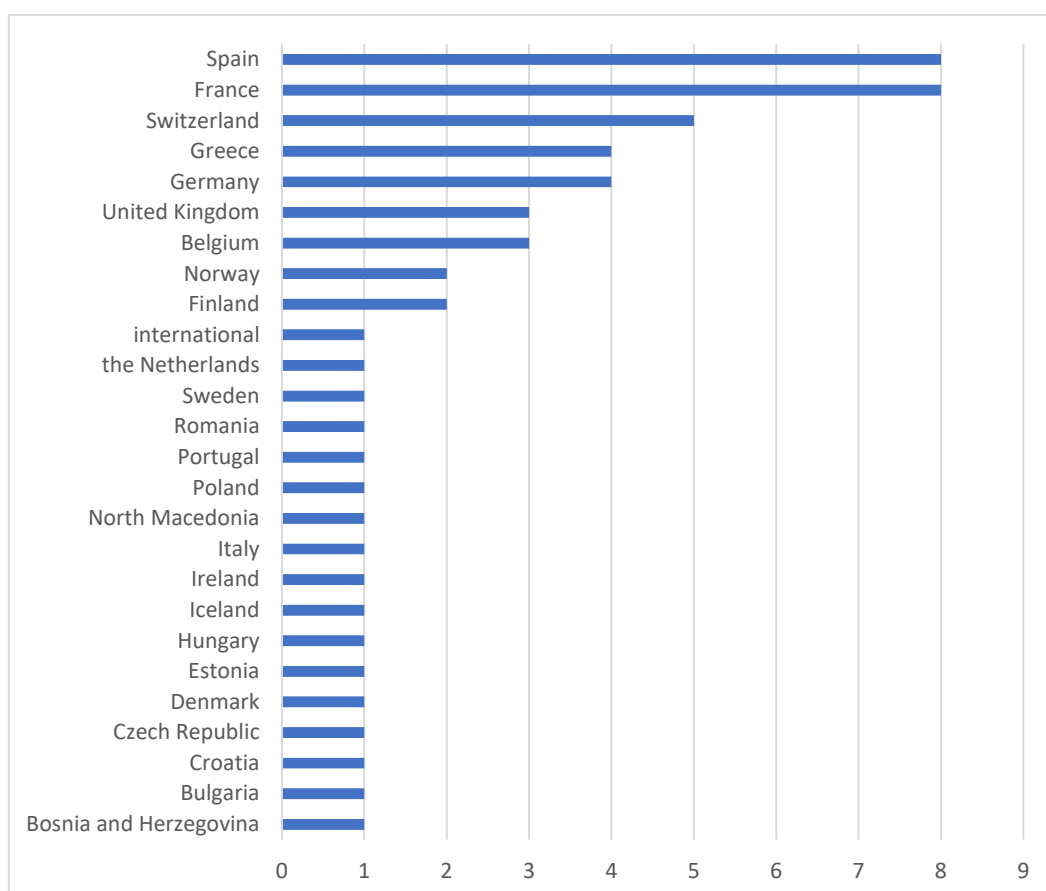


## Introduction

The GenTree project and EUFORGEN programme organized a consultation on 30 January 2020, at the University of Avignon (France), with Stakeholders from a broad range of European countries. The aim was to take stock of the scientific findings on conservation and sustainable management of forest genetic resources (FGR), presented during the conference 'Genetics to the rescue: managing forests sustainably in a changing world', organized prior to the consultation (on 28-29 January 2020) and to identify research questions that remained open. About 60 participants attended the event, representing 25 European countries.

The consultation focused on the identification of critical issues not yet addressed by research, on the formulation of a list of research priorities for future collaborative work in the area of forest genetic resources conservation and sustainable use, and on the preparation of a portfolio of research ideas to be presented to different funding bodies and implementing agencies. The following figures provide an overview of the diversity of the Stakeholders who attended the event.

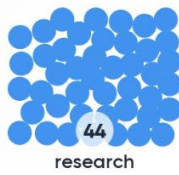
## What is the country of the organization you are affiliated to?



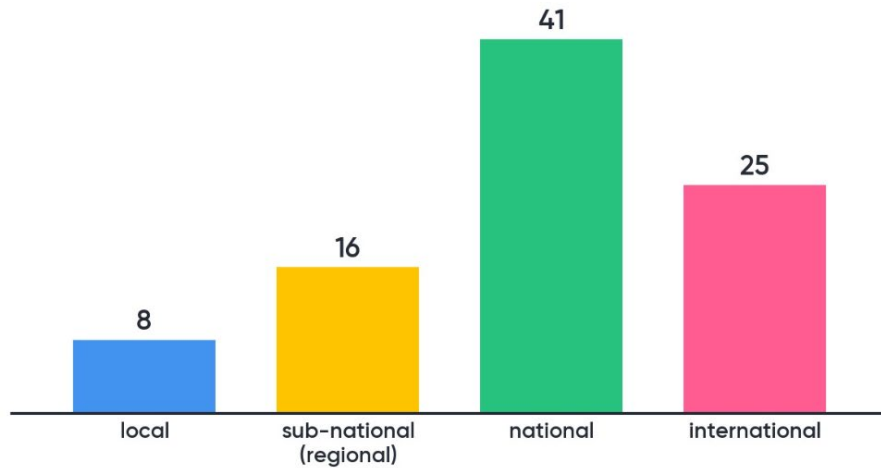
## What kind of institution you work for



## What is your type of experience?



## At what scale/level does your organization operate ?



## Constraints in sustainable forest management in your country



## What are the challenges in forest genetic resources management in Europe?

Participants were asked to express their views on what were the most critical challenges in managing forest genetic resources, based on their experience. The list below presents the result of a free listing exercise (FGR = forest genetic resources).

- How to adequately transfer forest reproductive material?
- How to manage the interaction between FGR and the ecosystem they are part of?
- How to address the conflict between conservation and management of FGR?
- How to increase provision of goods from forests without undermining their biodiversity?
- How to adapt forest management to changing site suitability?
- Which species should be used for afforestation?
- Climate change is faster than adaptation – how to manage this?
- How to ensure policies properly address issues related to a changing environment
- How to prioritize actions?
- How to increase awareness on what diversity we have in forest ecosystems?
- How to communicate with society about genetic diversity?
- Lack of national strategies on FGR
- In the face of uncertainty, how to set up a strategy to manage risks?
- How to increase forest ecosystem resilience at local scale?
- How to build on ex situ conservation of FGR as an insurance?
- How to fight pathogens?
- How to broaden use of FGR?
- How to deal with extreme climate events affecting forest ecosystems?
- How to explain that conservation is different from doing nothing?
- How to deal with invasive species
- What kind of characterization of FGR is needed?
- Does use of FGR equals plantations only?
- How to deal with assisted migration: if a species is moved outside its range, is it invasive?
- How to integrate FGR into regular forest management?
- How much diversity do we need to have healthy and resilient forest ecosystems?
- How to link climate policies with biodiversity conservation?
- How to manage FGR as part of the Green Deal? (more than just carbon stocks)
- How to monitor forest management actions and make use of this information?
- How can new technologies help set priorities and identify populations at risk?
- How to manage marginal tree populations?
- How can FGR conservation be part of forests strategies?
- How can FGR offer options for restoration?
- How to define the proper moment to take action based on FGR?
- How to deal with many forest species?

## What are, to your opinion, the NEW – OPEN – EMERGING research (action) needs in forest genetic resources management in Europe?

The research ideas proposed by the participants were progressively posted on a digital board and then clustered to form groups of ideas closely interlinked (see figure below).

The research topics proposed were also given a color code, based on the type of action proposed.

- Research & Innovation actions
- Innovation actions
- Coordination & support actions



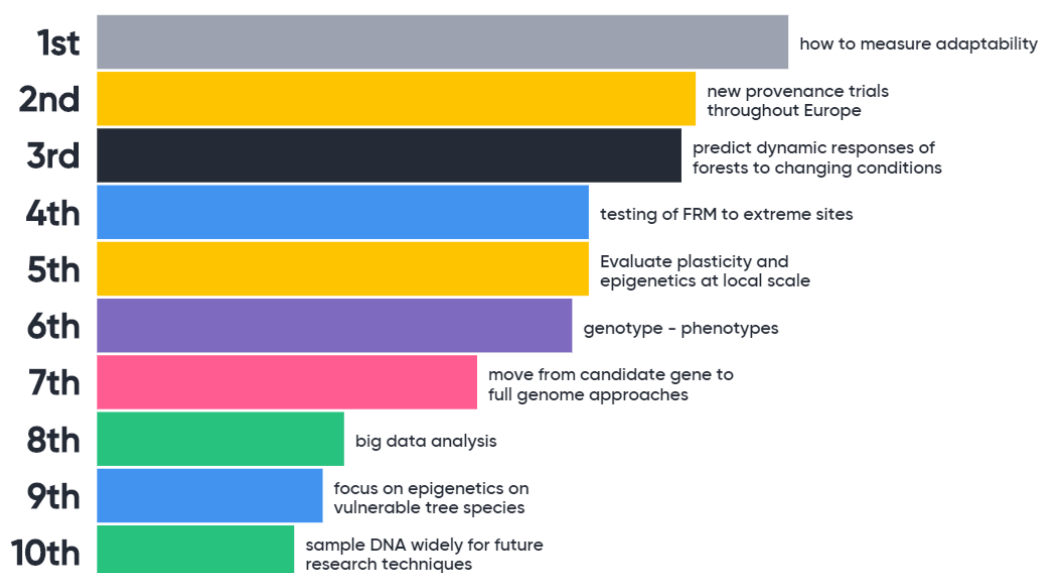


## Main research ideas

The ideas listed in the following pages (pp 7-9) are transcripts of the themes elaborated by the participants, placed on the digital board. Those ideas highlighted in green were further elaborated into short texts with a more detailed description of the activities proposed (18 research topics). The titles in yellow refer to the seven identified overarching themes that define the main clusters of research ideas (FRM = forest reproductive material).

### Adaptation

The research theme 'Adaptation' contained several research sub-themes. They were prioritized and a short description was elaborated for the first three research sub-themes (see ranking in the image below).



How to measure adaptability rather than adaptation to inform conservation and management

New provenance trials throughout Europe

Predict dynamic responses of forests to changing conditions (modelling approaches, multidisciplinary approaches)

Testing of FRM to extreme sites resembling expected climatic conditions (better knowing of genetic diversity of trees - provenance trials/international - in real environmental conditions).

Sample DNA widely for a few selected tree species for future research techniques (sample adult and young trees, keep sample for future analyses with modern tools)

Move from candidate gene to full genome approaches in looking at adaptation and the reproductive capacity

Linkages between genotype and phenotype for deployment under climate change

Focus on epigenetics on vulnerable tree species (there is a lot of unexplained variation)

Evaluate plasticity and epigenetics at local scale (plasticity and epigenetics for adaptive population response)

### **Transfer**

Mechanisms to evaluate success and failure of advice on the deployment of FGR

- Monitor (success, failures, vulnerabilities) more precisely and on long term deployment of FRM
- Mechanism to enable continuous monitoring of success / failure of deployment of FGR to get feedback on research-based advice - e.g. use of EU plant passport?
- Improving indicators on FGR management
- Use of new technologies to assess mortality, plasticity, regeneration success of FRM to environmental stress episodes in the long term

Document movement and use of FRM (develop a tool to monitor in the long term the movement of FRM, from production to use, at the European level)

The right tree for the right site and the right reason (assess trade-offs; what new seed sources are required to meet tree planting needs - what spp/provenance)

Evaluate the effect of hybridization between gene pool following assisted migration (evaluate the ecological risks of assisted migration)

### **Risk management**

Provide guidelines on how to manage risks at local level

Speed up research on resistance to emerging/exotic pathogens (breeding for pest and diseases in non-common species. Transfer of existing knowledge)

How to avoid overreacting-

- The research challenge of evaluating tipping points: 1) establish new common gardens at core and niche edges and 2) genome wide assessments of the link between gene diversity and environment, gene diversity and phenotype
- Evaluate when and where we are reaching tipping points in genetics, important also for management

### **Communication/education**

Active communication and education on FGR use and conservation

Connect FGR knowledge with managers and final users

- Progressively translate in "simple words" for the forest manager results and conclusion of important research programs (genomics namely)



- Improve recommendation to practitioners of environmental limits on deployment of phenotypes

Social studies on public awareness

### **Monitoring**

Genetic monitoring over space and time

- We need to analyze genetic diversity on a large scale and follow over time
- Implement genetic monitoring into forest surveys

Integrate in monitoring more traits

- Include biotic and abiotic traits to disentangle complexity
- Test the effect of species-mixed stands on tree reproduction and natural generation

### **Implementation and valorization**

Economic evaluation of the use of FGR, including positive externalities (include climate change considerations)

Link conservation of FGR and use

Adaptive management

### **Research to policy**

Linking international and national policies to research

## Ideas archived

The ideas below were screened and then archived as they were similar or overlapping with those already posted on the digital board:

- Evaluate performances of hybridization between gene pools following assisted migration
- Genetic adaptation *in situ*
- Communication! Important to inform more about FGR, use and conservation, research needs and results. Dialogue with politicians and managers.
- New pan-European networks of provenance trials (common garden experiments)
- Adaptability of species to extreme climatic events
- Integration of FGR conservation infrastructure with supply chains
- Improve transfer knowledge to practitioners of environmental limits on deployment of phenotypes
- Define operational measures and indicators of adaptive capacity, rather than of adaptation to current situation

## Additional, free-listed ideas

Not all ideas proposed could be screened due to lack of time. The ideas below were not picked up because they received less votes than others in the ranking exercise. Still, some of the ideas below partly reflect topics covered in the main research ideas proposed, although the wording may be slightly different.

- Understanding the integrated phenotype (trade-offs) before applying selection in breeding and conservation programs
- Better understanding of FRMs availability across Europe and how FRMs match to needs for planting. Link to right tree, right place /assisted migration advice
- Implementation of the results from the scientific research on FGR in practice
- Develop predictive ecology of the response of forest to global change: Integrate ecophysiology, community ecology, evolutionary ecology
- Better understanding of the relationships between genotype control of phenotypes for deployment under climate change
- Linking genotype (and epigenome) to phenotype
- Improve characterization of local environmental to better understand GxE interaction which is a major part of phenotype
- Ecosystem service evaluation of FGR value
- Integrate research findings into existing tools and guidance for foresters and landowners
- We need to know what kind of forest products that are needed in future - new products, new usage, etc..
- Participative research to deal with a larger number of forest species
- How to enhance genetic diversity at local level with simple and economic actions
- Integrate the communication of research already from start in all types of research activities
- Need to pay attention to new ways of forest protection against new dramatical damages caused by bark beetles (and others) regarding current environment changes.
- Join a risk assessment to each FGR recommended action

- Analyze or check the current species which could disappear because of the climate change and establish ex-situ conservation programmes.
- Identify most appropriate indexes to quantify plasticity/stability based on observation of adaptive traits
- Coordinate all existing tools for prediction
- Economic evaluation of social demands for improving action plans
- More training activities sharing new findings about current environmental changes ensured by forest scientists for forest practice
- Take into account mitigation in adaptation and migration (FMR importation, use, technological quality, etc.)
- Modeling the future
- Identify resources of interest threatened to protect urgently
- Monitoring of consequences of decisions made on FGR use - linked to forest inventory data /management plans / certification systems
- Study the economic importance of FGR conservation in order to integrate it in SFM
- Genetically well described seed sources
- Precise knowledge on climate change impacts on FGR to regularly update risk management strategies
- Assessment on the extent of buffer/adaptation/mitigation capacity of FGR-related actions
- To archive a European risky and ambitious strategy on FGR as a tool to collect all the points.
- Evaluate international and national policy efficiency for FGR
- Tests of climatic stress in nurseries
- Temporal and spatial genetic and epigenetic monitoring
- Managing the complexity of environment (including social) in Europe
- Test the efficiency of new approaches in FGR evaluation and management
- Reduce genetic pollution
- Better integration of overall forest biodiversity (genetic diversity included) in productive forestry.

## Agenda

9.00 – 12.00

- 1) Welcome by organizers and presentation of the agenda
- 2) Short exercise to get an overview of the audience (with support of a digital tool)
- 3) Introductory presentations on the Green Deal by Pierre Schellekens from the European Commission, to set the scene
- 4) General brainstorming with free listing of research themes (with support of a digital tools)
- 5) Grouping of similar themes under higher level titles (with support of a digital tools)

12:00 -14:00 - Lunch break

- 6) Ranking of the research themes identified based on their priority for the participants (with support of a digital tools); the ranking leads to identify the research themes to work on in groups.
- 7) A total of six working groups are formed to elaborate short texts on the research themes identified as priority, inclusive of a 1) short description of the research theme, 2) justification of why it is important and a 3) description of its innovative aspects. About 30 minutes are given to work on a research theme. Every 30 minutes, six new groups get formed to work a new topic. Three turns take place, producing short descriptions of 18 research themes in total.

17:00 – end

## List of participants

### **EUFORGEN nominated representatives**

Alain	Servais	Belgium
Bart	De Cuyper	Belgium
Dalibor	Ballian	Bosnia and Herzegovina
Mariya	Belovarska	Bulgaria
Mladen	Ivankovic	Croatia
Josef	Frýdl	Czech Republic
Ditte Christina	Olrik	Denmark
Tiit	Maaten	Estonia
Mari	Rusanen	Finland
Aurore	Desgroux	France
Lina	Vigneron	France
Niels	Müller	Germany
László	Nagy	Hungary
Aðalsteinn	Sigurgeirsson	Iceland
Colin	Kelleher	Ireland
Giovanbattista	de Dato	Italy
Darius	Kavaliauskas	Lithuania
Joukje	Buiteveld	Netherlands
Vlatko	Andonovski	North Macedonia
Kjersti B.	Fjellstad	Norway
Monika	Litkowiec	Poland
Felipe	Pérez	Spain
Andreas	Rudow	Switzerland

### **Observer countries**

Isabel	Carrasquinho	Portugal
Ecaterina Nicoleta	Apostol	Romania

### **GenTree project partners /partnering institutions**

Randolf	Schirmer	ASP (Germany)
Egbert	Beuker	Luke (Finland)
Bruno	Fady	INRAE (France)
François	Lefèvre	INRAE (France)
Véronique	Jorge	INRAE (France)
Catherine	Bastien	INRAE (France)
Cathleen	Petit	INRAE (France)
Paraskevi	Alizoti	AUTH (Greece)
Filippos	Aravanopoulos	AUTH (Greece)
Anna-Maria	Farsakoglou	AUTH (Greece)
Evangelos	Barbas	AUTH (Greece)
Ricardo	Alía	INIA (Spain)
Mirko	Liesebach	THÜNEN (Germany)
Tor	Myking	NIBIO (Norway)
Eduardo	Notivol	INIA (Spain)
Johan	Westin	Skogforsk (Sweden)

Christian	Rellstab	WSL (Switzerland)
Elisabet	Martínez Sancho	WSL (Switzerland)
Lenka	Slámová	WSL (Switzerland)
Stephen	Cavers	UKCEH (United Kingdom)
Marcus	Lindner	EFI (international)
Aida	Solé Medina	INIA (Spain)
<b>Observers</b>		
An	Vanden Broeck	INBO (Belgium)
Natalia	Puente Bautista	Forestal Catalana SA (Spain)
Cruz	Anegón	Ministry of Agriculture (Spain)
Laura	Prieto	Ministry of Agriculture (Spain)
Clare	Trivedi	Royal Botanic Gardens, Kew (United Kingdom)
Duncan	Ray	Forest Research (United Kingdom)
Christophe	Orazio	Institut Européen de la Forêt Cultivée/IEFC (France)
Hernan	Serrano Leon	(France / Spain)
Pierre	Alfter	Federal Office for the Environment/FOEN (Switzerland)
<b>Organizers</b>		
Barbara	Vinceti	Bioversity (international)
Michele	Bozzano	EFI (international)
Ewa	Hermanowicz	EFI (international)