

First meeting of the EUFORGEN Working Group on forest reproductive material

Maccarese (Rome), Italy, 28-30 March 2012

Summary of the meeting

Opening of the meeting

J. Koskela (EUFORGEN Coordinator) welcomed the participants to Bioversity and introduced the meeting. He also briefed the participants on the CGIAR reform process and the organizational changes at Bioversity. He concluded by stressing that these changes have no impact on the hosting arrangements of the EUFORGEN Secretariat or the EUFORGEN activities.

The meeting agenda was adopted without changes. All participants then introduced themselves. B. Fady and M. Konnert were elected as Co-Leaders of the Working Group, and J. Koskela and M. Bozzano were nominated as rapporteurs of the meeting. F. Ducci attended the first two days of the meeting via a video call and joined the other participants for the third day.

EUFORGEN update and expected outputs of the Working Group

J. Koskela briefly revisited the objectives of EUFORGEN Phase IV (2010-2014) and explained the new *modus operandi* which is based on small working groups and workshops. In September 2010, the EUFORGEN Steering Committee decided to establish three working groups for 2011-2012 focusing on 1) genetic conservation strategies, 2) genetic monitoring, and 3) forest reproductive material (FRM). The members of each working group (max. 10 experts) were selected from a pool of national experts nominated by the EUFORGEN National Coordinators. Other nominated experts for Objectives 1 (use of forest genetic resources) and 2 (conservation of forest genetic resources) will have an opportunity to contribute to the work of the different working groups by email and to attend the workshops. A total of 52 and 50 experts have been nominated to Objectives 1 and 2, respectively.

J. Koskela continued by presenting the tasks of the Working Group which is expected to:

- Review existing work from EUFORGEN Networks and relevant European projects
- Synthesize existing (national) guidelines
- Select (widely used) model species
- Identify critical factors related to climate change and future needs to transfer of FRM
- Summarize lessons from provenances trials for seed transfer
- Analyze if any relevant information should be added to the *accompany documents* as specified in the EC Directive and other relevant schemes covering the movement of FRM
- Compile a list of existing models and tools that can be used for future forest management planning and transfer of FRM
- List the issues related to the climate change context

- Prepare a draft report (including recommendations)

He further informed the participants about the work schedule. The second meeting of the Working Group will be held in summer 2012 and the draft report should be ready by October 2012. The results of the Working Group will be then presented to the EUFORGEN Steering Committee during its next meeting in France in November 2012. The Steering Committee is expected to make decisions on further actions based on the report.

J. Koskela also presented a tentative schedule of other EUFORGEN meetings in 2012. He also noted that a workshop on FRM will be organized in 2013 or 2014, subject to a Steering Committee decision.

He continued by informing that three new FGR projects have been approved recently by the European Commission (EC) under the Knowledge-Based Bio-Economy Programme (KBBE) of the seventh framework programme for research. These include PROCOGEN on conifer genomics, TREES4FUTURE on increasing the use of forest resources for wood products and services, including tree breeding, and FORGER on managing genetic resources of forest trees. The FORGER project will be implemented in collaboration with EUFORGEN. More information on these and other KBBE projects are available on the EC website (http://ec.europa.eu/research/bioeconomy/projects/index_en.htm). The FORGER project also includes activities on FRM that complement the tasks of the Working Group.

J. Koskela concluded by noting that the DG Agriculture and Rural Development of the EC is expected to make decisions on the continuation of the AGRI GEN RES Programme during 2012. This programme co-financed the EUFGIS project (Establishment of a European Information System on Forest Genetic Resources, 2007-2011). It is expected that a possible new AGRI GEN RES Programme would continue supporting work on forest genetic resources.

Overview of the past and ongoing work on forest reproductive material in Europe

EUFORGEN Networks

J. Koskela gave an overview of the earlier EUFORGEN work on FRM by presenting relevant discussions and results of the Forest Management Network and the Stand-forming Broadleaves Network, as well as the recommendations of the Bioversity-IUFRO workshop on climate change and forest management held in 2006.

The Forest Management Network had conducted two surveys in 2006-2007, one on relevant policies and practices related to genetic conservation and forest management, and another one on tools and mechanisms to promote the use of high-quality FRM. The surveys found that many countries promote tree planting efforts through legal and policy instruments. However, several of these countries promote largely the use of local provenances and some countries have even banned the use of non-local provenances or introduced tree species. Most countries have recommendations and guidelines for selecting provenances. These are

often rather general but there are also more specific guidelines, such the Danish on-line advisory system (www.plantevalg.dk). Many countries also have specific provenance requirements as part of grant schemes supporting tree planting efforts.

J. Koskela noted that the “production part” (seed sources and seed supply) works rather well in general while the “information part” does not work that well. Researchers and professionals have a wealth of information which is not always easily accessible or available for tree planters and/or forest owners. The “use part” is the most critical part and lack of knowledge, market forces and trade mechanisms often work against the use of high-quality FRM.

Concerning inappropriate use of FRM, J. Koskela mentioned that the Forest Management Network first discussed extensively what makes FRM “appropriate”. The discussion emphasized that appropriate use of FMR matches species, provenances or clones with the given site conditions and pays attention to both genetic and physiological quality of FRM as well as other aspects (e.g. avoid using unknown or non-autochthonous material in the vicinity of genetic conservation units or seed stands/orchards). The Network found that it usually takes 5-10 years for problems to show up (e.g. frost damage, low vigour, susceptibility to pests, diseases, wind or snow, etc) but in some cases, problems surfaced after more than 30 years. Areas affected by inappropriate use of FRM can often be several thousands of hectares. In France, for example, red oak (*Quercus rubra*) was planted over 400,000 ha planted between 1970-2000 but only 27,000 ha was left in 2004. J. Koskela concluded that examples of inappropriate use of FRM were reported for all tree species and types of FRM. He also noted that it is always clear to what degree the planting results depend on geographic, ecological and genetic “distances” between FRM sources and planting sites.

He continued by presenting some findings of the Stand-forming Broadleaves Network on the design of provenance regions in different European countries. The zones are typically identified based on different criteria (e.g. major watersheds, geological fault lines, main roads and species distributions) plus the expert guess work. In most countries, there is no real genetic data to support the zonation of the country. Furthermore, some countries have very detailed zonation systems which are then applied to all tree species while other countries have species-specific zones. In conclusion, it is very difficult, if not impossible, to develop a pan-European provenance zoning based on the various national approaches.

Finally, he highlighted the outputs of the Bioversity-IUFRO workshop on climate change and forest management. The workshop concluded that climate change will bring along both opportunities and threats to forests, and that genetic diversity contributes to the resilience of forest ecosystems. The workshop participants also stressed that the use of genetic diversity provides flexibility for forest management and is a recommendable risk-reducing strategy. Furthermore, they also pointed out that pan-European strategies and guidelines are needed to promote appropriate use of forest reproductive material and to facilitate the adaptation process of forest trees. One of the specific workshop recommendations states that policy makers in Europe should endorse the development of pan-European, science-based guidelines for the transfer of FRM to facilitate adaptation of forest trees to climate change.

TreeBreedex and Trees4Future projects

F. Ducci gave a brief presentation on TreeBreedex and Trees4Future projects. The TreeBreedex project ended in 2010 and it was funded by the EC as a coordination action under the 6th framework programme for research. The project was coordinated by INRA-Orleans (France) and it brought together a total of 28 institutes in 19 countries. The project created a virtual tree breeding centre, delineated adaptive environment and breeding zones at European level, improved long-term management of forest tree genetic resources (i.e. breeding populations), and developed breeding strategies, methodologies and tools. More information on the project is available on its website (<http://treebreedex.eu/>).

As a follow-up to the TreeBreedex project, a new project, called Trees4Future (Designing Trees for the Future), was launched in January 2012. It is an Integrative European Research Infrastructure project that aims to integrate, develop and improve major forest genetics and forestry research infrastructures. It will provide the wider European forestry research community with easy and comprehensive access to currently scattered sources of information (including genetic databanks, forest modelling tools and wood technology labs) and expertise. Trees4Future is coordinated by INRA-Orleans and the European Forest Institute (EFI), and the consortium consists of a total of 28 partners. The project is supported by the EC under the 7th framework programme for research. More information is available on the Trees4Future website (<http://www.trees4future.eu/>).

LinkTree project

B. Fady presented the LinkTree project (Linking genetic variability with ecological responses to environmental changes: forest trees as model systems) which supported by the BiodivERsA network of research funding agencies. The project is coordinated by the Spanish Institute for Agriculture and Food Research and Technology (CIFOR-INIA) and it involves a total of seven partners. The project has three objectives:

- To identify genes of ecological importance related to forest trees responses to climate change, targeting traits such as drought, fire and cold tolerance;
- To study the effects of natural selection on allelic polymorphism at candidate genes, quantitative genetic parameters for adaptive traits (obtained from progeny testing) and phenotypes (measured in the field) in model forest systems and how standing genetic variation in a forest may confront rapid environmental change; and
- To evaluate the putative impact of environmental change on trees and forests at the stand level.

More information on LinkTree is available from the project website (<http://www.igv.fi.cnr.it/linktree/?home/1>).

FORGER project

J. Koskela presented the FORGER project which is coordinated by Alterra (Netherlands) and which started in March 2012 for a period of four years. The project includes nine partners, including Bioversity. The project has five objectives, i.e. 1) to improve inventories on forest genetic resources in Europe by linking existing databases, 2) to assess the current distribution of genetic diversity and how forest genetic resources are conserved in selected tree species at pan-European level, 3) to assess both the future distribution of genetic diversity of selected tree species at pan-European level under climate change and the adaptation options by forest management, 4) to develop a common protocol for measuring and monitoring genetic diversity of tree populations at pan-European level, and 5) to improve guidelines and recommendations for transfer of forest reproductive material and management of forest genetic resources in gene conservation units and production forests.

One of the FORGER Work Packages, lead by BFW (Austria), focuses on the use and management of forest genetic resources. Firstly, the project will analyze of historic and current forest management and FRM transfer based on national records. This task is lead by BFW and it includes case studies on transfer of FRM in selected tree species (*Fagus sylvatica*, *Quercus petraea*, *Q. robur*, *Pinus pinaster*, *Pinus sylvestris*, *Picea abies*). A workshop is also planned for representatives of official FRM bodies and EUFORGEN experts.

As a second task under this Work Package, the project will try to optimize seed harvest strategies for sustainable use of FGR (lead by vTI, Germany). The Eco-Gene simulation model will be used for designing optimal seed harvesting strategies to maintain genetic diversity in seed collected from approved seed stands of the selected species. The third task focuses on assessing reaction norms to environmental changes based on field trials (lead by NymE (Hungary) and INRA (France)) and the fourth one predicting the impacts of climate change and forest management on FGR (lead by Alterra).

J. Koskela also informed that as part of the FORGER dissemination activities, an expert consultation is planned with the EUFORGEN Working Group on FRM. The purpose of this expert consultation is to create synergies between the project and EUFORGEN.

National guidelines for the use and transfer of FRM

The Working Group members exchanged information on the existing provenance zones and guidelines in their countries. In Luxemburg, there are two provenance zones but the guidelines only make recommendations on the use of species and not provenances. Estonia has four provenance regions for Scots pine and two for Norway spruce while the UK has four main regions for all tree species (excluding Scots pine). France also has a species-specific provenance regions and grant schemes support the use of certain types of FRM. In Poland where around 80% of forests is state-owned, the same provenance zonation is applied to all tree species. Slovakia has species-specific zones for seven main tree species and a common zonation for other species. Furthermore, it was noted that source identified material cannot be used in Slovakia without a special permit. In Germany, the provenance zoning is not species-specific and an online system is being developed to guide forest owners in selecting

suitable material. A system for controlling the origin of FRM is in place and guidelines have been developed for the management of seed stands. In Italy, there are about 40 provenance regions which applied for all tree species.

Lessons from provenance trials for seed transfer

M. Konnert presented new provenance recommendations for Douglas-fir and silver fir in Germany. The natural distribution range of Douglas-fir in North America is one of the largest ranges of tree species and different provenances show large variation in a number of characteristics and traits as well as in genetic composition. The first provenance trials of Douglas-fir was established in 1910 in Germany and establishment of trials continued until the 1970s when the IUFRO provenance trials were established across Europe. Between 1971 and 1976, new provenance trials for Douglas-fir were also established in Bavaria.

These trials have showed that the coastal provenances grow better in Germany than the interior ones. Generally the height growth of Douglas-fir in Germany also correlates negatively with the elevation of the provenance origin in North America. Most fast growing provenances originate from the Washington State in the USA (below 600 m above sea level). Provenances from northern Oregon State also grow well on German sites with a mild climate.

She then presented the newly recommended Douglas-fir provenances for Bavaria based on the results of the IUFRO provenance trials at the age of 25 years. Furthermore, she also briefly explained how different provenances perform across Europe based on the overall results of the IUFRO trials. Douglas-fir provenances from low elevations in the Washington State can be recommended for oceanic Europe and provenances from middle elevation zone of the Cascades in northern Washington to Central and Eastern Europe. In southern and Mediterranean Europe, the provenances used should originate from low elevation locations in northern Oregon or southern Washington States.

In case of silver fir, the provenances from the Carpathians have shown high growth rate and high survival in the Bavarian provenance trials while provenances from western and southern Europe grow slower and have higher mortality. Based on these results, she then showed a map of recommended silver fir provenances in different parts of Germany.

Traceability and certification of forest reproductive material (M. Konnert)

M. Konnert briefed the other participants on issues related to traceability and certification of FRM. She started by clarifying the terminology used and then explained the reasons for a FRM certification system (to make sure that the material meets agreed requirements, and to create confidence between producers and consumers). She then noted that FRM certification is essentially one form of product certification (i.e. attestation of a certain property for a given product). She continued by explaining that traceability means a possibility to check the identity of a definite product (e.g. a lot of FRM) along different processing steps. In a product certification system, the attested feature has to be traceable in any processing stage and at

any moment. She noted that the list of topics related to FRM traceability and certification is a long one, including species identification, verification of the origin of seed and seedlings, identification of regions of origin, identification of clones (including clonal mixtures), identification of introgression (e.g. natural vs cultivated material), and verifying the number of harvested trees. She then presented the German system in detail and explained how it operates.

M. Konnert concluded that the use of genetic laboratory tests has significantly improved the quality of the control checks in Germany. Reference samples collected during seed harvest from each seed lot are generally mandatory, except for small, distinctly delineated harvest units, which have been or can be assessed genetically without high financial costs. She noted that certification schemes are necessary because they help to enforce agreed rules, and that a European certification scheme for FRM would be necessary since FRM is traded across national borders.

The Working Members discussed extensively issues related to the certification of FRM. It was noted that climate change is likely to increase the need for tracing the origin of the material as forest owners will become more keen to check the origin of FRM they have bought. Furthermore, it was discussed that FRM certification also helps to create awareness on the fact that changing a provenance is usually a better option than changing to another species in a given site if climate change starts creating problems. It was agreed that the report of the Working Group should include a specific chapter on the certification of FRM.

EC Directive on forest reproductive material

The Working Group members exchanged views on the existing Council Directive 1999/105/EC on the marketing of FRM and its planned harmonization with other Directives dealing with seeds and propagating material of agricultural crops. The Working group also took note on the new Commission Recommendations (2012/90/EU) on guidelines for the presentation of the information for the identification of lots of FRM and the information to be provided on the supplier's label or document (released in February 2012).

F. Volter informed other Working Group members that the EC has decided to review the legislation on the marketing of seeds and plant propagating material as part of its better regulation initiative, and that it is planning to create a common Seed Law, merging the current 12 different Directives, including the one on FRM. He further explained that the Standing Forestry Committee (SFC) had prepared a draft Opinion on this issue in early 2012. The document strongly opposes the EC's plans to harmonize Council Directive 1999/105/EC with 11 agricultural Directives and urges the EC to keep the FRM Directive as a separate one, based on several valid reasons and arguments. However, the SFC could not finalize and release the Opinion document due to pressure from the EC. Subsequently, the EC will go ahead with its plans to create a common Seed Law by merging all 12 current Directives.

The Working Group expressed its concerns on this development. In particular, it was questioned whether the common Seed Law effort means that the existing Directive on FRM will be also re-written during the harmonization process. Many participants noted that this is

likely to increase administrative work and require additional investments at the national level. In the worse case, it may even destroy the current national systems on FRM built over the years.

The Working Group concluded that it will continue following the development of the common Seed Law. Furthermore, it was agreed that the content of the chapter on the EC Directive on FRM needs to reflect the recent developments and potential impacts of the planned common Seed Law. The EC is expected to release a first draft of the new Seed law by June or July 2012 and the Working Group will discuss it again during the second meeting.

Existing models and tools that can be used for future forest management planning and transfer of FRM

The Working Group discussed various models and tools that have been developed for the use and transfer of FRM. It was concluded that the following ones should be described in the report:

- The Danish online tool
- The British Columbia guidelines for using provenances and the principles behind this system
- The German guidelines
- Climate envelope models incorporating plasticity (e.g. Benito Garzón et al. 2011. *Global Ecology and Biogeography*, 20(5): 766–778)

Selection of model tree species for the WG report

The purpose of selecting model tree species is to demonstrate the needs and problems related to the use and transfer of FRM. The model species will be particularly useful for developing the chapter on lessons from experiments and practice. The Working Group members discussed several species that would be suitable for this purpose and then selected the following model species:

- *Abies alba*
- *Fagus sylvatica*
- *Pinus sylvestris*
- *Pseudotsuga menziesii*

Development of the Working Group report

The meeting participants continued by developing the title and the outline of its report (see Annex 1). Lead contributors of each chapter were also identified. It was further agreed that all member of the Working Group will be authors of the report, and that inputs from the email contributors will be acknowledged. The report will be presented by one of the Co-Leaders (B. Fady and M. Konnert) to the EUFORGEN Steering Committee in November 2012 for further discussion and action. Once the Steering Committee has discussed and approved the report, the authors will develop a manuscript based on the report for publication in a scientific journal.

It was planned that the draft text for each chapter should be sent to the Co-Leaders and to the Secretariat **by 18 May 2012**. The full draft will be circulated to the email contributors by **4 June 2012**. The Working Group will then continue developing the report during its second meeting.

It was also agreed that the draft report will be shared with the FORGER project partners in order to influence the work of the project. It was clarified that the ownership and authorship of the report will remain with the Working Group and EUFORGEN.

Wrap-up session

The Working Group members agreed to continue working by email and prepare the first draft of the report for further discussion at the second meeting. M. Konnert kindly offered to host the next meeting of the Working Group in Freising, Germany. The first week of July 2012 was tentatively identified as a suitable period for the meeting. The exact dates will be confirmed later. The Working Group members considered the length of the first meeting ideal and recommended that the next meeting should have the same length.

Closure of the meeting

M. Konnert and B. Fady thanked all participants for their inputs to the discussions and the Secretariat for organizing the meeting. With no other business, they then closed the meeting.

Annex 1. Outline of the Working Group report and lead authors for different chapters.

Working Title: Use and transfer of forest reproductive material in the context of climate change

M. Konnert and B. Fady coordinate the writing process

Preface (J. Koskela)

Introduction (F. Volter, F. Ducci, B. Fady, M. Konnert, **J. Koskela**)

- Use

- Transfer, one option of use

- Data on “import/export” of FRM

- Earlier work of EUFORGEN and relevant European projects

Legal frameworks (F. Volter, M. Konnert)

- EC Directive

- National laws

- Recent developments (traceability and certification of FRM, review of EC 105/1999)

Existing guidelines and recommendations (M. Konnert, F. Volter, F. Ducci)

- National ones (e.g. Danish online tool or “paper” guidelines)

- Also from Forest Europe (e.g. S2)

- Silva Mediterranea

Climate change and the use of FRM (B. Fady, D. Gömöry)

- Natural processes

- Critical factors (e.g. frost/drought resistant, etc)

- Challenges

Lessons from experiments and practice (D. Gömöry, T. Maaten, S. A'Hara, F. Ducci, J. Kowalczyk, **B. Fady**)

- Provenance trials/Common gardens (D. Gömöry),

- Molecular markers (S. A'Hara)

- Practical experiences (B. Fady)

- Research needs (e.g. provenance trials, molecular markers)

(focus on model species; beech, Scots pine, silver fir, Douglas-fir)

Existing models and tools for use and transfer of FRM (**M. Konnert**, M. Bozzano, B. Fady, J. Koskela)

- British Columbia/Oregon/Washington seed zones (M. Konnert, M. Bozzano)

- Climate envelopes + plasticity (INIA) (B. Fady)

Conclusions and recommendations (all)

- The need for FRM verification increases under climate change -> molecular tools

Supplier documents (additional information, as in the EC recommendations (Feb 2012))

Transfer (break the idea “local is the best”) and “mix”

Ensure genetic diversity in FRM (adaptability)

Disseminate information & knowledge on adaptive potential within species (transfer provenances instead of species, develop breeding programmes differently)

Revision of seed zones needed (c.f. climate change)

References

Annexes

List of relevant European projects

Annex 2. Agenda of the meeting.

Tue 27 March		
	Arrival to Fiumicino Airport and train to the hotel	Hotel Express by Holiday Inn (via Assisi 53)
	Dinner on your own	
Wed 28 March		
09:00	Opening of the meeting <ul style="list-style-type: none"> Welcome to Bioversity and introduction to the meeting (J. Koskela) Adoption of the agenda Selection of WG Leader and nomination of rapporteurs 	Bioversity International Scylla meeting room (Stretto building)
09:15	EUFORGEN update and expected outputs of the WG (J. Koskela) <ul style="list-style-type: none"> Discussion 	
09:45	Overview of the past and ongoing work on FRM in Europe <ul style="list-style-type: none"> EUFORGEN Networks (J. Koskela) 	
10:30	Coffee/tea break	Stretto coffee room
11:00	<ul style="list-style-type: none"> TREEBREEDX/TREES4FUTURE (F. Ducci) LinkTree (B. Fady) FORGER (J. Koskela) Other relevant projects or studies 	
12:30	Lunch	
14:00	National guidelines for the use and transfer of FRM <ul style="list-style-type: none"> Discussion 	
14:45	Identification of critical factors related to climate change and future needs to transfer FRM <ul style="list-style-type: none"> Discussion 	
15:30	Coffee/tea break	Stretto coffee room
16:00-17:30	Lessons from provenances trials for seed transfer <ul style="list-style-type: none"> New provenance recommendation for Douglas-fir and silver fir in Germany (M. Konnert) Discussion 	
20:00	Social dinner	Ristorante Spirito DiVino Via dei Genovesi 31, Roma (Trastevere)

Thu 29 March		
09:00	Traceability and certification of forest reproductive material (M. Konnert) • Discussion	Bioversity International Scylla meeting room (Stretto building)
09:45	EC Directive on FRM • Information that should be added to the <i>accompany documents</i> as specified in the EC Directive • Discussion	
10:30	Coffee/tea break	Stretto coffee room
11:00	Existing models and tools that can be used for future forest management planning and transfer of FRM • Discussion	
12:30	Lunch	
14:00	Selection of model tree species for the WG report • Discussion	
15:30	Coffee/tea break	Stretto coffee room
16:00-17:30	Report of the Working Group • Development of the table of contents • Discussion	

Fri 30 March		
09:00	Report of the Working Group (continued) • Compilation of existing information, data, publications etc. • Discussion	Bioversity International Scylla meeting room (Stretto building)
10:30	Coffee/tea break	Stretto coffee room
11:00	Next steps before the second WG meeting • Tasks and deadlines	
12:15	Wrap-up session • Any other business • Date and place of the next meeting	
12:30	Lunch	Stretto coffee room
13:00-	Transport to Fiumicino Airport, as needed	

Annex 3. List of participants

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