Conifers Network

Summary of the sixth meeting

Reykjavik, Iceland, 7- 9 September 2006

European Forest Genetic Resources Programme (EUFORGEN)

FUTURE HARVEST
<www.futureharvest.org>

IPGRI is a Future Harvest Centre supported by the Consultative Group on International Agricultural Research (CGIAR)

Summary of the meeting

Opening of the meeting

A. Sigurgeirsson welcomed the participants from 25 countries to Iceland and introduced J. Löftsson, Director of the Iceland Forestry Service who then delivered the opening address of the meeting. He highlighted the importance of introducing tree species and using imported forest genetic resources to Iceland as the country has very few native tree species of its own. Common juniper (*Juniperus communis*) is the only native conifer species in Iceland and about two thirds of the forest area (0.3% of the total land area) consists of native downy birch (*Betula pubescens*) forests. About one third of the forest area is planted forest of various species, mostly exotic conifers. Introduced tree species are of vital importance for Iceland, especially for afforestation and reforestation efforts under the diverse and harsh environmental conditions. There are numerous experimental plots scattered around the country to test and identify the most suitable tree species and to develop tree breeding efforts.

B. Fady, Chair of the Network thanked A. Sigurgeirsson for the meeting arrangements and welcomed the participants to the meeting. He also introduced M. Machavariani, P. Alizoti and S. de Vries as new Network representatives from Georgia, Greece and The Netherlands, respectively.

J. Koskela presented the tentative agenda of the meeting which was then adopted. P. Alizoti, J. Fennessy, T. Nikkanen and J. Frýdl were nominated as rapporteurs for the meeting. S. de Vries agreed to chair the morning session of the second day.

EUFORGEN update

J. Koskela welcomed the participants on behalf of the EUFORGEN Secretariat and provided an update on the implementation of IPGRI's new strategy, the MCPFE process (Ministerial Conference on the Protection of Forests in Europe) and various EUFORGEN activities.

IPGRI's new strategy builds on the Millennium Development Goals adopted by the United Nations back in 2000 and it reflects a broader focus on agricultural biodiversity, including forest biological diversity. The strategy emphasizes the use of biological diversity for alleviating poverty and improving livelihoods. It also addresses issues such as nutrition, health, shelter, water, environment and sustainability. The Institute has a new internal structure now and J. Koskela introduced the four new Programmes (Diversity for Livelihoods, Understanding and Managing Biodiversity, Commodities for Livelihoods and Global Partnership) as well as the new Research and Support Units (Policy, Capacity Development, Public Awareness and Information Management and Marketing). The EUFORGEN Programme continues as part of the activities of the Regional Office for Europe despite these changes.

J. Koskela highlighted the MCPFE meetings that have taken place after the previous meeting of the Conifers Network in Cyprus. The annual Expert Level Meeting in Warsaw on 5-6 September 2005, and the Round Table Meeting in Wroclaw on 24-25 April 2006 have already started discussions and preparations for the next Ministerial Conference. It has been considered that the theme of the Conference, to be held in Warsaw in late 2007 or early 2008, could be forests and water. Other important issues in the agenda of the Conference are likely

to be biomass and energy, adaptation of forest management and forests to climate change, and forest law enforcement and governance. The discussions will continue during this year's Expert Level Meeting in Warsaw on 9-10 October.

A total of 32 countries have officially signed the agreement to join EUFORGEN Phase III, including four new member countries (Georgia, Greece, Moldova and Romania). Some of the old member countries are still finalizing the official process and the EUFORGEN Secretariat is continuing discussions with several potential new member countries.

J. Koskela reminded the participants of the objectives of Phase III and highlighted the activities discussed under each objective during the previous Network meeting in Cyprus. He also explained the background and purpose of the 'common action plan' concept for the benefit of new participants. He further mentioned that the Technical Guidelines are now nearly finalized for European larch (*Larix decidua*) and Macedonian pine (*Pinus peuce*). The draft text for Bosnian pine (*Pinus heldreichii/P. leucodermis*) is ready for circulation and the Secretariat has also received a first draft for English yew (*Taxus baccata*). He also displayed the present versions of the distribution maps of the four conifer species. He then highlighted what activities the other EUFORGEN Networks have included into their work plans.

He updated the Network on two proposals on forest genetic resources which were submitted in September 2005 to the European Commission under the first call for proposal of the Council regulation on genetic resources in agriculture (EC 870/2004). These were 'Establishment of a European information system on forest genetic resources (EUFGIS)' and 'Dynamic conservation and utilization of European elms (ELMPOPS)'. A third proposal was also being developed ('Dynamic conservation and use of native poplars in Europe (POPGIS)') but it was not submitted in 2005. In early June 2006, the EC announced that it had selected a total of six proposals, including EUFGIS. The end of June 2006 was also the deadline for the second call and two projects on FGR were submitted (ELMPOPS and POPGIS). Some efforts were also made to develop a proposal to establish 'Europe-wide programme for gene conservation of *Taxus baccata* (EUROTAXUS)' but it was not submitted to the second call.

Finally, J. Koskela informed the participants that Canadian Forests Genetic Resources Program (CONFORGEN) were recently launched during the 30th Biennial Meeting of the Canadian Tree Improvement Association, held in Charlottetown on 24-29 July 2006. CONFORGEN aims at increasing collaboration on FGR among different provinces of Canada.

Progress made in various countries

Central and Eastern Europe (Czech Republic, Georgia, Hungary, Poland, Slovakia and Slovenia)

The status of conifer species is extremely variable in the region. The legal background of gene conservation is similarly varied from practically non-regulated to relatively well-regulated. In many countries, gene conservation activities are hindered by shared responsibilities between the agriculture and environmental protection sector. An acceptable situation has been reached in the Czech Republic and Poland.

The consequences of climate change continue to threaten conifer genetic resources. For instance, in southern Poland, the bark beetle calamity threatens to wipe out valuable Norway

spruce (*Picea abies*) plantations. Health status of most conifers has declined in recent years in the region, with an exception of European silver fir (*Abies alba*) in Slovenia mainly due to silvicultural changes.

With regard to research, new DNA labs have been established in most countries (Poland has three now). Research is concentrating on genotyping, identification of provenances and reproductive material sources and detecting intra-specific genetic patterns. Progress has also been made in establishment of DNA banks in most countries.

The first phase of creating gene conservation areas has been completed in several countries (e.g. the Czech Republic, Hungary and Poland). Setting up central seed banks and clonal archives has also progressed. Interest on the conservation and inventory of English yew (*Taxus baccata*) has also grown in recent years. Due to the weak professional and public acceptance of conserving forest genetic resources, efforts have been made in Slovakia to train practical forest managers and to link "best practice" principles of forest management with gene conservation.

Mediterranean region (Bulgaria, Croatia, Cyprus, France, Italy, Greece, Serbia and Montenegro, Spain, Portugal, Turkey)

New nuclear microsatellites have been developed for *Abies alba*, *Cedrus* spp., *Juniperus* spp., *Taxus baccata* and *Pinus pinea*. Analysis of single nucleotide polymorphism (SNP) in putative candidate genes related to drought and wood quality of Mediterranean pine and cedar species (*Pinus pinaster*, *Pinus halepensis* and *Cedrus atlantica*) is in progress. First estimates of nucleotide diversity, genetic differentiation and linkage disequilibrium are available. Bulgaria reported the development of a research project focused on monitoring genetic resources of the Pirin Mountains.

Regarding *in situ* activities, new seed stands have been selected in various countries. In Greece, where the large part of forests is state-owned, the forest code is applied with the main principle of sustainable forest management, together with a new law concerning the protection of forest ecosystems. In Cyprus, a new forest law will be effective soon and forest management plans will be oriented towards biodiversity conservation and conservation of genetic resources. Spain adopted the national strategy for conservation of forest genetic resources that encourages merging of conservation activities and forest management. In France, *in situ* networks for *Picea abies, Pinus pinaster* and *P. sylvestris* are under development (sampling of gene conservation units). The French National Commission for the Conservation of Forest Genetic Resources (CRGF) meets every six months and monitors gene conservation activities in the country.

For *ex situ* conservation, clonal seed orchards have been established for Austrian black pine (*Pinus nigra*) and silver fir in Croatia, for Brutia pine (*Pinus brutia*) in Turkey, and for Maritime pine (*Pinus pinaster*) in Spain and Bulgaria. Genebanks in Bulgaria and Serbia and Montenegro have also been established. Spain has acquired new accession of seeds from many populations of conifer species in the country (e.g. *Pinus* spp., *Taxus baccata*). A DNA bank is being developed in Italy in connection with the EVOLTREE project. Spain proposed the creation of a European genebank network on forest genetic resources.

As public awareness activities, a book entitled "Can we conserve biodiversity?" and targeted for the general public, was published in France. The book stresses that both ecological and genetic considerations are needed for sound evolutionary conservation strategies.

The group also discussed the consideration that the Macaronesian conifer species growing in the Atlantic archipelagos of Canarias (Spain), Madeira and Azores (Portugal) should be included to the already long list of Mediterranean conifers of interest to the Network. The problem of forest fires in the Mediterranean region was also stressed and in particular how to handle stands after the fires and what are the effects on genetic resources. The need for conservation of genetic material of low-elevation Mediterranean pines was highlighted as frequent fires may result in permanent losses of valuable genetic material.

Northern Europe (Estonia, Finland, Iceland and Lithuania) and Western Europe (Austria, Germany, Ireland, Netherlands and United Kingdom)

The group comprised eight countries, some of whom have a wide variety of species. However, UK, Iceland, Ireland and The Netherlands have up to only three native conifer species and most of these countries rely heavily on north-west American exotic conifers. Legislation addressing FGR only exists in Estonia and Lithuania although it is hoped that a current review of the 1946 Forestry Act in Ireland will also include recognition of the conservation of forest genetic resources. Policy development is slow and often regional differences within individual countries where policy is devolved can arise (Germany, UK).

Tree breeding research in conifer species is continuing although funding support can be seen to be generally reducing. New research developing and using molecular markers was reported; this is mainly directed towards identification of origin of material within the natural range of species (mitochondrial DNA in Norway spruce in Austria and reference samples in Germany).
Implementation of the EC Directive of forest reproductive material in different member states was discussed. It is clear that there would be an advantage in a wider exchange of information on this among countries on a more formal basis than casual exchanges at meetings such as this. This would improve the way in which the control of resourcing and deploying FRM from genetic reserves is carried out.

Two countries reported efforts in translating EUFORGEN Technical Guidelines (Estonia and the Netherlands). The Netherlands has opened a new genebank which already includes material of *Juniperus* and is soon to be stocked with *Taxus*. Iceland is working within a network of other Nordic countries to establish a genebank and Finland is hoping for a major increase in accessions for their genebank following the exceptional flowering year in 2006.
Austria, Ireland (*Taxus*) and Finland (*Picea abies, Pinus sylvestris)* reported increases in the number of gene conservation units. A target area of 100 ha and ownership issues were making this task more difficult for Norway spruce in Finland. In Lithuania, this process is further advanced with a coordinator for forest species, based at a central genebank directing the state forest service on the management of gene reserves.

Warmer winters in Iceland are creating problems in the growth and survival of Siberian larch (*Larix sibirica*), Sitka spruce (*Picea sitchensis*) and lodgepole pine (*Pinus contorta*). Red needle blight is causing reduced growth rates in much of the Corsican pine (*Pinus* nigra) in the UK and alternative conifer species for use in the specific dry environment in which the species is planted are being considered. Around 50 seed origin (provenance) trials in 10-15 conifer species have also been identified for long-term retention in the UK. They can provide useful information on the performance of a range of origins at sites which may reflect conditions brought about by climate change. A bulletin on adaptive variation in Sitka spruce, based on almost 70 years of field provenance research in the country, has been completed.

Gene conservation units and common action plans for conifers

Development of minimum requirements for gene conservation units of conifers

B. Fady presented a draft of the minimum requirements for gene conservation units of conifers. The document is necessary for further development of the common action plans. In addition to defining the requirements for individual gene conservation units, it also includes requirements for networks of these units within the distribution range of species. The implications of climate change for gene conservation are also highlighted.

The draft was then discussed in detail and participants made comments on the text, especially regarding the minimum size of a unit. It was stressed that the minimum size should ensure long-term evolutionary potential of the target tree species of the unit. The selection of the units should not be based solely on phenotypic selection but also take into account adaptive traits including drought resistance and tolerance to biotic factors, such as insect and disease attacks for example. It was also proposed that the requirements should take into consideration other tree species occurring on the units. Furthermore, many participants pointed out that the minimum number of the units in a gene conservation network should be based on the ecological and genetic diversity of the species.

It was also mentioned that the gene conservation units should include a buffer zone and that poor or unsuitable genetic material should be removed from the buffer zone as it could contribute to the regeneration of the trees within the core area. However, several other participants stressed that it is difficult to establish buffer zones due to environmental, topographical and other constrains such as private ownership of land.

B. Fady insisted on the fact that minimum requirements should make sense in terms of conservation of the evolutionary potential of conifer species. The requirements may need modifications for local management of some species and conservation units. He took note of the proposed changes and will develop a revised draft **by 30 October 2006**. G.G. Vendramin, M. Aranxta Prada and P. Alizoti agreed to contribute to the finalization of the minimum requirements. It was also suggested to ask inputs from A. Pfeifer and T. Skrøppa who were unable to participate in the meeting. The revised draft will be then circulated for comments to all Network members who should provide their feedback to B. Fady **by 31 December 2006**.

Introduction to the EUFGIS project

J. Koskela provided the participants with an introduction to the EUFGIS project, which was approved by the EC in the first call for proposals under the Council Regulation No 870/2004 on genetic resources in agriculture. The EUFORGEN Secretariat, following the request from the EUFORGEN Steering Committee, developed the project proposal in collaboration with partners in six countries (Austria, Denmark, France, Slovakia, Slovenia and the UK). The project aims at developing minimum requirements for dynamic gene conservation units of forest trees and common information standards at pan-European level, and creating a web-based, permanent information system on national inventories on forest genetic resources in Europe.

The role of the EUFORGEN Networks is to provide technical inputs and contribute to the harmonization of minimum requirements for gene conservation units of different trees species and development of information standards for these units. Once established, the

proposed information system will benefit all Networks in their further efforts to develop the common action plans and assess the status of gene conservation efforts for various tree species in Europe.

All EUFORGEN member countries will be invited to participate in the project, which is expected to start in early 2007. The EUFORGEN National Coordinators will be asked to nominate a national focal point for the project. The focal points will receive training on FGR documentation and inventories as part of the project to compile national data for the information system. However, the project does not have resources to support actual field inventories in different countries as part of its activities. During the first year of the project, a European workshop on FGR documentation will be organized to discuss the present situation and to initiate the harmonization of the minimum requirements for gene conservation units across the EUFORGEN Networks.

List of priority conifer species and common action plans

The meeting reviewed the list of priority conifer species that was updated and discussed during the previous meeting in Cyprus in 2005. The ranking of the species is based on conservation priority at national level as indicated by the Network members (1=high priority, 2=medium priority, 3=low priority, 4=no priority). The information is missing from some countries and it was agreed that the Secretariat should circulate the list after the meeting so that all countries can provide the missing information or update their previous ranking, if needed.

The meeting then discussed the development of the common action plans and agreed to continue working with three groups of so called CAP species, i.e. 1) stand-forming/widespread species, 2) scattered/widespread and 3) rare/threatened). However, it was felt that it would be appropriate to add a fourth group on exotic conifers following the discussions that were initiated during the fourth Network meeting in the UK in 2003. The participants also discussed the CAP species and it was decided that the groups should focus on the following species:

- Group 1: stand-forming/widespread species (*Picea abies, Pinus halepensis/brutia,*)
- Group 2: scattered/widespread (*Taxus baccata*)
- Group 3: rare/threatened (*P. nigra* ecotypes, Mediterranean *Abies* spp.)
- Group 4: exotic conifers (*Picea sitchensis*, *Pseudotsuga menziesii*)

The following persons agreed to contribute to the work of the different CAP groups. It was also noted that several Network members who were unable to participate in the meeting could make important contributions (i.e. T. Skrøppa, A. Pfeifer, P. Mertens) and it was proposed that they should be included in the groups.

- Group 1: T. Skrøppa, P. Alizoti, G.G. Vendramin, A. Christou (new representative of Cyprus after X. Hadjikyriaou's retirement)., G. Bozic, D. Danusevicius, A. Alexandrov
- Group 2: S. González-Martínez, S. de Vries, R. Bruchánik, M. C. Varela
- Group 3: B. Fady, G.G. Vendramin, M. Aranxta Prada, V. Isajev, H. Semerci, A. Sigurgeirsson, M. Mengl, P. Alizoti
- Group 4: A. Sigurgeirsson, S. A'Hara, A. Pfeifer, , V. Isajev, P. Mertens, new representative from Germany (to be nominated before A. König retires)

The task of the CAP groups is to collect information on what is done in terms of gene conservation in each country where the above-mentioned species are found. Each Network member should send this information to all members of the relevant CAP groups by email. Each Network member should also propose a few gene conservation units (2-3, as a first step) in their country, based on the minimum requirements, to be included in the pan-European network of the gene conservation units for the CAP species. The Secretariat will provide all members with a data collection sheet where the data on the proposed units can be filled and sent to the CAP groups. The groups should then assess that the proposed gene conservation units meet the minimum requirements and the Secretariat will help to develop maps of the units at pan-European level. Following this, the CAP groups should review the status of gene conservation efforts and develop the common action plans to further strengthen the gene conservation efforts at pan-European level. The deadlines for these activities are indicated below.

Meetings, projects and other initiatives

EVOLTREE II proposal

G.G. Vendramin presented the current state of the EVOLTREE project (EVOLution of TREEs as drivers of terrestrial biodiversity) which is funded by the EC under the 6th framework programme for research in 2005. EVOLTREE is a consortium of 25 partner institutes from 15 European countries and it is coordinated by A. Kremer (INRA, France).

The main aim of the project is to support integration of work on forest genomics in Europe by developing common research infrastructures and exchanging human resources. The project also includes jointly executed research activities and dissemination of research results and other relevant information. EVOLTREE associates four major disciplines – genomics, genetics, ecology and evolution – for understanding, monitoring and predicting genetic diversity, ecosystems structures, dynamics and processes. The functional role of trees as drivers of biodiversity is deciphered by investigating their adaptive diversity, their structuring role on diversity of associated species and their own evolutionary rate in response to biotic and abiotic environmental changes. The research activities will focus on selected model (*Pinus*, *Populus*, *Prunus* and *Quercus*) and target genera of broadleaves (*Acer, Alnus*, *Betula*, *Castanea, Carpinus*, *Corylus*, *Crataegus*, *Fagus*, *Fraxinus*, *Prunus*, *Salix*, *Sorbus*, *Tilia*, *Ulmus*) and conifers (*Abies, Picea*, *Larix*). In addition to trees, the scope of the project includes other species associated with forest trees (defoliating insects and mycorrhiza).

EVOLTREE started officially on 1 April 2006 and the kick-off meeting was organized in Bordeaux, France on 26-28 April 2006. Project activities to analyse the organisation of the mitochondrial and nuclear genome in the model species are in progress. The project has also selected seven intensive study sites; Valais (Switzerland, alpine altitudinal gradient), Ventoux (France, Mediterranean altitudinal gradient), Solling (Germany, temperate forest), Puszcza Świętokrzyska (Poland, untouched forest), Punkaharju (Finland, boreal forest), Loire (France, riparian forest) and Landes (France, intensively managed forest). The first EVOLTREE Symposium and Workshop on Community Structure and Dynamics will be organized in Marburg, Germany on 11-13 October 2006. A communication strategy is also under development to disseminate the results of the project to the scientific community, policy makers and general public.

TREEBREEDEX

A. König presented an update to the TREEBREEDEX project, which is also funded by the EC. The project is coordinated by L. Pâques at INRA Orleans (France) and it brings together a total of 27 participating institutes. It builds on the earlier achievements by European forest tree breeders and their collections of trees and vast networks of experiments.

The project activities will focus on 1) creating a virtual tree breeding centre, 2) assessing the geographical structure of the genetic variation of European tree species (delineation of adaptive environment and breeding zones at European level), 3) securing the long-term management of forest tree genetic resources (breeding populations), 4) improving breeding strategies, methodologies and tools, and 5) optimizing mass production and deployment of improved varieties in forests.

Development of a project proposal on Taxus baccata

J. Koskela informed the Network that L. Paule initiated the development of a project proposal on English yew in May 2006 for the second call of the Council Regulation EC 870/2004. L. Paule contacted selected persons working with yew in Europe and asked their interest to contribute to the proposal development. Several persons expressed their interest and comments but there was not enough time to develop a full proposal for the call. However, the process indicated that there is increasing interest among different countries to work with yew. G. Vendramin reported that a Spanish Ph.D. student, working in his group in Florence, managed to develop molecular markers for yew recently.

Gene conservation and climate change

IPGRI-IUFRO workshop on forest genetic diversity and climate change

IPGRI and the International Union of Forest Research Organizations (IUFRO) organized a workshop in Paris on 15-16 March 2006 to discuss the role of forest genetic diversity in improving the adaptability of forests to climate change. The workshop was hosted by the French Ministry of Agriculture and Fishery and attended by nearly 80 participants from 25 countries. J. Koskela informed the meeting on the outputs of this workshop which was also part of the MCPFE Work Programme to implement Vienna Resolution 5 (Climate change and sustainable forest management in Europe).

The workshop recognized that the impacts of climate change on forests will vary in different parts of Europe, bringing with it both threats and opportunities. Forest genetic diversity has an important role in maintaining the resilience of forest ecosystems to the threats (new pests and diseases) and in taking advantage of the opportunities (e.g. longer growing seasons in northern Europe). Genetic diversity and its appropriate use provide flexibility with respect to forest management and help to reduce risks.
The workshop recommended that management of forest genetic diversity should be better linked with national forest programmes. These programmes are already in place in most countries to facilitate continuous dialogue on forest-related issues between various stakeholders within and outside the forest sector. The workshop further recommended that forest management practices that maintain evolutionary processes of forest trees and support natural regeneration of forests should be promoted, especially in areas where long-term natural regeneration is self-sustainable despite the impact of climate change.

The discussions also stressed that the adaptation of forest trees to climate change can be accelerated through tree breeding and transfer of potentially suitable reproductive material. Subsequently, the workshop recommended that the MCPFE process should endorse the development of pan-European guidelines for the transfer of forest reproductive material in Europe on the basis of scientific knowledge. The workshop also concluded that the impacts of climate change need to be analyzed in a holistic manner. The European forest research community was urged to carry out more interdisciplinary studies (e.g. tree physiology, forest genetics, pests and diseases, forest management and economics, and modelling) on the impacts of climate change on forests with the support of the policy makers. The full summary report of the workshop is available at the EUFORGEN Web site (www.euforgen.org.).

Implications of climate change to gene conservation of forest trees

B. Fady delivered a presentation on the implications of climate change to gene conservation of forest trees. He pointed out that climate change is now becoming a reality as average temperature have been rising worldwide for the last 150 years. Climate models also predict that this increase in temperature will continue (up to several degrees) for several centuries. The same models also suggest that rainfall patterns will experience major changes and extreme weather events, such as heat waves and storms, are likely to occur more frequently. These changes in climatic conditions will have an effect on trees, but to what extent is really not entirely predictable as climate change scenarios are still imperfect at the local scale and much is still to be learnt on tree and forest ecosystems response to such changes.

B. Fady summarized that plants can use three mechanisms to face any ecological change: 1) acclimatization (because of phenotypic plasticity, survival, growth and reproduction is possible locally even though the environment is changing), 2) adaptation (because of selection, there is a modification in the genetic make-up of progeny that renders local survival, growth and reproduction possible), and 3) long distance dispersal (seeds can germinate in friendlier environments). The evidences show that trees can use all three mechanisms, with greater or less success depending on the species and the ecological and geographical context. He pointed out that extinctions of forest trees have happened in Europe in the past because of previous climate changes, the most recent ones during the Quaternary period.

He further stressed that climate change considerations need to be taken into account in the management of gene conservation networks, both at the national and pan-European level. Public awareness on the effects of climate change needs to be increased. More integrated research (both biology and social sciences) is also needed to understand and predict the effects of climate change on forests ecosystems.
Issues such as the choice of priority species, the role of marginal areas, the importance of habitat (and not just genotype) conservation, the diversification of forest management systems, the need for long term monitoring, the need to evacuate populations (artificial long distance dispersal) and the need to enhance gene flow for adaptation (hybridization) should be addressed too. The minimum requirements for gene conservation units and establishment of gene conservation networks should also include climate change considerations.

Forests and forestry in Iceland

A. Sigurgeirsson provided an overview to forests in Iceland. He highlighted that Iceland is the least forested country in Europe as forests cover only 0.3% of the total land area. The native broadleaf tree species include downy birch, rowan (*Sorbus aucuparia*) and aspen

(*Populus tremula*) while common juniper is the only native conifer. Human settlement started in Iceland 1,100 years ago and at that time forests covered perhaps 30 % of the total land area. The medieval sagas describe the land being forested *"from the feet of the mountains to the seashore"*. He listed several factors that contributed to the decrease of forests in Iceland after human settlement. Clearing of forests for pasture and hay fields took place especially during the 9th and 10th century and the use of firewood and charcoal was a common practice until the 20th century. Overgrazing by domestic animals (sheep and goats in particular) prevented any natural regeneration of forests until the present times. Volcanic eruptions with extensive ash fall and catastrophic ice melt and related floods further destroyed forests. He also suggested that the overall low biodiversity in Iceland may be a predisposing factor. Iceland has low species diversity due to geographic isolation; it only has 470 vascular plant species while other regions in similar latitudes have much more species (Alaska has more than 1,400 vascular species and northern Norway more than 700 species).

Afforestation started in Iceland in 1899 with the first experiments and in 1907, a law on forestry and soil erosion was introduced. During the period between 1913 and 1935, the efforts focused on the management of native woodlands. The Regional Afforestation Projects Act from 1999 has a target of increasing the forest cover in the lowlands (below 400m in altitude) to 5% of the total land area within 40 years (by 2040). The most widely planted tree species between 2000-2005 were Siberian larch (33.7%), birch (26.4 %), lodgepole pine (14.9 %) and Sitka spruce (14.9 %).

Climate change and conservation of forest genetic resources: Icelandic perspectives

A. Sigurgeirsson continued with another presentation on the impacts of climate change to forest genetic resources in Iceland. He mentioned that the climate in Iceland has experienced warmer temperatures in the past as *Sequoia*, *Sequoiadendron*, *Metasequoia* and many other tree genera are commonly found in the fossil records from late Tertiary period in the country. Currently, the cool growing season is the main factor restricting tree growth in Iceland. A. Sigurgeirsson also presented predictions suggesting that the temperature in Reykjavik will warm by 0.7°C by 2035 as compared to mean temperatures during 1964-2003. Subsequently, the lowlands of Iceland could climatically move into the temperate forest zone and the highlands to tundra or taiga in the future. He also presented a scenario suggesting that silver birch (*Betula pendula*) could occur widely in Iceland by 2050.

Regarding conifers, A. Sigurgeirsson pointed out that different species are likely to react differently to climatic changes. As an example, he mentioned Siberian larch which suffered frost damage in spring 2003 due to exeptional weather conditions. Record high temperatures in April 2003 (e.g. 21.4°C at Hallormsstaður) were followed by sudden cooling at the end of the month. European larch has turned out to be less prone to frost damages than Siberian larch. He also showed that a local seed source of Siberian larch from Guttormslundur has probably developed into a land race as it suffered least frost damages of all Siberian larch provenances. Frost damages have been increasing in Iceland during the last decade and planting of Siberian larch has stopped in southern Iceland. He further mentioned that white spruce (*Picea glauca*) and Engelmann spruce (*P. engelmannii*) are less adapted to increasing winter temperatures in Iceland while the adaptation of Sitka spruce will improve.

He concluded that, although global warming is a severe threat to biodiversity at global level, forests and forestry in Iceland are likely to benefit from it. Most of the existing tree species will survive and prosper under warmer climate but the use of tree species will change as well as breeding goals.

Updating the work plan of the Network

B. Fady provided a short introduction to the work plan of the Network and then various activities included in it were discussed in detail. Under Objective 1 (gene conservation and forest management), it was agreed to prepare a discussion paper on genetic consequences of silvicultural practices in conifers. A. König agreed to lead this activity and C. Mátyás, J. Frydl and D. Danusevicius expressed their willingness to contribute to the paper as well. It was also proposed to ask L. Ackzell to provide his inputs for this. The task force will collect relevant literature **by 31 Jan 2007** and develop a draft **by 31 March 2007**. The draft will be then circulated for comments to the Network and the paper will be finalised **by 30 June 2007**.

Under Objective 2 (gene conservation methods), the development of the common action plans was decided to carry out as agreed during the session on minimum requirements for gene conservation units (see above). Based on the minimum requirements, each Network member should also propose a few gene conservation units (2-3, as a first step) of the target conifer species in their country **by 31 January 2007**. The information on the proposed units should be send to all members of each CAP groups by email (with a copy to the Secretariat) using the data collection sheet. The Network members can already start identifying the potential units during autumn 2006, simultaneously with the finalization of the draft minimum requirements.

The CAP groups will then assess that the proposed gene conservation units meet the minimum requirements and finalize the list of units to be included in the network of gene conservation units **by 31 March 2007**. The Secretariat will prepare the maps of the units and species distribution for the CAP groups. Following this, the CAP groups should review the status of gene conservation efforts and develop draft common action plans **by 30 June 2007**. The Network members can later propose additional gene conservation units, as needed. The draft common action plans will be circulated to all Network members for their comments.

The participants also discussed the development of Technical Guidelines for conifers. Nearly final text is available for European larch (*Larix decidua*) and it will be finalised by the Secretariat in collaboration with J. Matras **by 31 October 2006**. The Secretariat will circulate the text for Bosnian pine (*Pinus leucodermis*) soon after the meeting. A. Alexandrov suggested that A. Delkov could contribute substantially to the draft text. It was agreed that A. Delkov could be added as an author for this publication in case he substantially contributes to it. The Network members should provide their comments to the authors (G. Vendramin, S. Fineschi, B. Fady, A. Delkov) **by 31 October 2006** (with a copy to the Secretariat). The Secretariat will also follow up the finalization of the text for Macedonian pine (*Pinus peuce*) with A. Alexandrov and V. Andonovski **by 31 October 2006**. V. Isajev also agreed to contribute to the finalization of the draft text. A first draft is also available for English yew (*Taxus baccata*) and final text should be made available **by 30 November 2006**. The Secretariat will follow up this with L. Paule.

J. Koskela provided an update to the development of a template for translating the Technical Guidelines into national languages. Translated Technical Guidelines should follow the original layout and maintain the original authors. If needed, the translators can develop a two-page annex to be attached the translated Technical Guidelines. This annex should present the information adapted to the national conditions in a given country. The national publishing organization should obtain new ISBN numbers for both the translated Technical Guidelines and the annex, and print them with their own resources (as decided by the EUFORGEN Steering Committee). The Secretariat will finalise the template (InDesign file) in due course and it can be requested from M. Bozzano.

The content and recommendations of the Technical Guidelines can also be made available in national languages in the form of a review paper, for example, but the EUFORGEN logo should not be used in this case.

Under Objective 3 (information dissemination), it was agreed that short news on relevant national efforts should be developed for the EUFORGEN Website. All Network members can send the news (1-2 pages of text with a photograph) to the Secretariat as needed.

The conifers poster was also decided to be updated for the IUFRO Conference in Antalya, Turkey (see below). The Secretariat will circulate the old poster and all Network members can provide their ideas **by 30 September 2006**.

Any other business

M. Aranxta Prada informed that a conference on 'Population Genetics and Genomics of Forest Trees: from Gene Finction to Evolutionary Dynamics and Conservation' will be organised in Madrid, Spain on 1-6 October 2006. The conference is organised by the IUFRO Working Groups on Population, ecological and conservation genetics (2.04.01) and Genomics (2.04.10) together with COST Action E28 (Genosilva: European Forest Genomics Network).

P. Alizoti informed the participants about the IUFRO Division 2 Joint Conference on "Low Input Breeding and Genetic Conservation of Forest Tree Species" organised in Antalya, Turkey on 9-13 October 2006.

Date and place of next meeting

Following the Steering Committee decision, the species-oriented Networks can organize three meetings during Phase III. The Conifers Network can organize one more meeting during Phase III after the meeting in Iceland. The timing of the next meeting was discussed and the participants agreed to organize it in spring 2008.

Hungary and Georgia offered to host the next meeting of the Network. B. Fady thanked C. Mátyás and M. Machavariani for their offer on behalf of the Network. After discussion, it was agreed that the Secretariat can decide the place of the next meeting after analyzing the meeting costs of the proposed venues and consulting both C. Mátyás and M. Machavariani. The theme of the meeting will focus on the use of forest reproductive material.

B. Fady thanked A. Sigurgeirsson and other local organizers for the meeting arrangements and closed the meeting.

Sixth meeting of the EUFORGEN Conifers Network
Reykjavik, Iceland, 7-9 September 2006

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