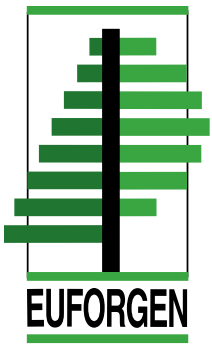


# Conifers Network

## Summary of the seventh meeting

Sopron, Hungary, 10-12 June 2008



European Forest Genetic Resources Programme (EUFORGEN)



## Summary of the meeting

### **Opening of the meeting**

Cs. Mátyás welcomed the participants to Sopron and gave a short introduction to the city and the region. He then introduced F. Lakatos, Dean of the Faculty of Forestry (University of West Hungary) who delivered the welcome address of the meeting. F. Lakatos highlighted the fact that the first meeting of the EUFORGEN Steering Committee was held in Sopron in 1995 and that the Programme has since made good progress in promoting regional collaboration on forest genetic resources (FGR). He also stressed the importance of FGR in the face of climate change.

B. Fady, Chair of the Network thanked Cs. Mátyás and E. Rasztovits for the meeting arrangements and welcomed the participants to the meeting. On behalf of the EUFORGEN Secretariat, J. Koskela welcomed the participants and presented the tentative agenda of the meeting which was then adopted. L. Yrjänä, P. Alizoti, D. Danusevicius and S. A'Hara were nominated as rapporteurs for the meeting.

### **EUFORGEN update**

J. Koskela presented a summary of recent EUFORGEN and other relevant activities or events. He started with an update on the EUFGIS project (Development of a European Information System on Forest Genetic Resources) which started its activities on 1 April 2007 for a period of 42 months (lasting until 30 September 2010). EUFGIS is co-funded by the European Commission under Council Regulation No 870/2004 on genetic resources in agriculture and it is coordinated by Bioversity International. The project aims at developing pan-European minimum requirements and data standards for dynamic gene conservation units of forest trees before creating a web-based, permanent information system on these units in Europe. It will also provide some training on FGR documentation for national focal points, who will then compile relevant national data for the information system. A total of 34 countries have nominated their focal points so far.

EUFGIS organized a workshop on FGR documentation in Birkerød, Denmark on 23-24 October 2007. It was attended by the national focal points, representatives of the EUFORGEN Network, FAO, Global Biodiversity Information Facility (GBIF) and the TREEBREEDEX project as well as the EUFGIS partners. The workshop made several recommendations for the development of pan-European minimum requirements for the gene conservation units and for creating the information system. Following the workshop, a small expert group held a one-day meeting in Denmark and initiated the harmonization of minimum requirements and data standards. The expert group met for the second time in Avignon, France on 8-9 April 2008 and discussed the first draft of the pan-European minimum requirements and data standards. L. Yrjänä and P. Alizoti represent the Conifers Network in the expert group. J. Koskela continued by informing the participants on the outcomes of the fifth EUFORGEN Steering Committee meeting, held in Novo mesto, Slovenia on 22-24 May 2007. The Steering Committee reviewed the progress made during the first half of Phase III and discussed on

the Network activities, the EUFGIS project and the impact of climate change on FGR conservation and forest management. The Steering Committee also discussed its inputs to the MCPFE process. Regarding the Network activities, the Steering Committee concluded that they are in line with the objectives of Phase III. It was also noted that the work plans of the Networks should not be too ambitious and that the Networks need to show tangible results at the end of Phase III. Furthermore, the Steering Committee pointed out that the coordination between the Networks should be increased as they are engaged in many similar efforts (e.g. the EUFGIS project and the development of common action plans (CAP)).

In conjunction with the Steering Committee meeting, an Inter-Network meeting was also organized in Novo mesto on 25 May 2007. The meeting, participated by Chairs and Vice-Chairs of the Networks, discussed the recommendations of the Steering Committee, development of the common action plans and inputs of the Networks to the EUFGIS project. It was agreed that the species-Network should publish the plans as separate publications, targeted to forest managers. The Forest Management Network could develop later an overview for policy-makers and forest managers. The meeting also concluded that the EUFGIS project is a useful platform to strengthen collaboration between the Networks and to facilitate the finalization of the common action plans. Regarding climate change, it was agreed that all Networks should discuss how to address the issue in their future work; the Forest Management Network should focus on the management implications of climate change and the species-Networks on the consequences of climate change for gene conservation of forest trees in Europe. Another Inter-Network meeting took place in Birkerød, Denmark on 22 October 2007 during which Chairs and Vice-Chairs updated themselves on the progress made after the first meeting.

J. Koskela then briefed the participants on the outcomes of the fifth Ministerial Conference on the Protection of Forests in Europe (MCPFE), held in Warsaw, Poland on 5-7 November 2007. As part of the Warsaw Declaration, the ministers responsible for forests committed European countries to the maintenance of the biological diversity of forests, including their genetic resources, through sustainable forest management. The declaration also highlights the role of forests and their sustainable management in combating the negative effects of climate change. The conference made two declarations; Warsaw Resolution 1 on Forests, Wood and Energy, and Warsaw Resolution 2 on Forests and Water. The week of 20-24 October 2008 was also declared to be the Pan-European Forest Week 2008 (for further information visit [www.europeanforestweek.org](http://www.europeanforestweek.org)). During the Warsaw Conference, reports on the State of Europe's Forests 2007 and on the Implementation of MCPFE Commitments were released. The first report provides information on the implementation of sustainable forest management based on the pan-European criteria and indicators and the second one on national and pan-European activities to implement various MCPFE Resolutions between 2003 and 2007. EUFORGEN provided inputs to both reports which can be downloaded from the MCPFE Website ([www.mcpfe.org](http://www.mcpfe.org)).

In January 2008, the MCPFE Liaison Unit moved from Poland to Norway where it is now based at the Norwegian Forest and Landscape Institute in Ås, near Oslo. The new Liaison Unit organized its first expert level meeting in Oslo on 7-8 May 2008 and initiated discussion on actions to implement the commitments of the Warsaw Conference. The meeting also discussed a draft work programme and shared information on forest policy issues. The draft

work programme also includes actions to define the strategic direction of the MCPFE process to facilitate discussions on its future role.

Actions in the work programme mainly include those ones the Liaison Unit Oslo has a leading role. Many delegates from the participating countries and observer organizations expressed their interest to include additional actions into the work programme. The revised version of the work programme will probably include an annex for such actions. Actions for continuing implementation of the earlier Ministerial commitments were also largely missing from the draft work programme although the Warsaw Declaration also reinforced implementation of the earlier commitments.

Regarding the strategic direction of the MCPFE process, the meeting agreed that the Liaison Unit Oslo should assign a small group of external expert to assess progress made in the implementation of the commitments made by the five Ministerial Conferences. The review will be finalized by the end of 2009. Simultaneously with the external review, it was agreed to establish a working group to explore the potential added value of a legally binding agreement on forests in the pan-European region. The working group should also provide its findings by the end of 2009.

Finally, J. Koskela briefed the participants on the FAO work on FGR. The 14<sup>th</sup> Session of the FAO Panel of Experts on FGR was held in Rome between 31 January and 2 February 2007. The Panel recommended FAO to take stronger action to support the work on forest genetic resources and to increase its knowledge base on the current status of forest genetic resources by developing a State of World's FGR report with linkages to the Forest Resources Assessment. The Panel recommendations were further discussed at the 11th Session of Commission on Genetic Resources for Food and Agriculture on 11-15 June 2007. The Commission decided to include the development of State of World's FGR into its Multi-Year Programme of Work. The Commission also recommended that the FAO Forestry Department and the Regional Forestry Commissions should be fully involved in preparing this report, in collaboration with relevant regional and global programmes. FAO is currently developing a proposal for the structure and content of the SOW FGR report. It will be further discussed at 15th Session of the FAO Panel of Experts, to be held in November or December 2008. The proposal will be also discussed by the FAO Committee on Forestry in March 2009. In September 2009, the next Session of the Commission on Genetic Resources for Food and Agriculture should then endorse the plan for developing the SOW FGR report and provide funding for it. The global report is expected to be published by 2013.

### **Establishment of a European Information System on Forest Genetic Resources**

J. Koskela presented an update on the activities of the EUFGIS project. He first summarized the results of a survey on documentation of *in situ* gene conservation of forest trees in Europe. The survey feedback was provided by the national focal points in September 2007 before the EUFGIS workshop in Denmark. The purpose of the survey was to obtain information on *in situ* gene conservation efforts, how countries have organized their documentation of these efforts, what kind of IT tools are used for this purpose and what kind

of national information systems exist at the moment. The full survey results are available at the EUFORGEN Website ([www.euforgen.org](http://www.euforgen.org)).

He then informed the participants on the work of the EUFGIS expert group which is developing pan-European minimum requirements for dynamic gene conservation units of forest trees and related data standards for these units. The EUFGIS workshop made several recommendations for the expert group. One of them was that the information system should only include gene conservation units which already have a designated status as gene conservation areas or stands, recognized by appropriate national authorities or agencies. However, it is not necessary that the units have a legal status. An administrative status or other similar arrangement is enough with clearly defined management requirements for the units (e.g. a basic management plan and management goals). The workshop also agreed that seed stands can be accounted as gene conservation units but only if they meet the minimum requirements.

The expert group started its work by reviewing the workshop outputs, the minimum requirements for conifers, scattered broadleaves and stand-forming broadleaves, developed earlier by the EUFORGEN Networks, as well as other existing data standards (e.g. descriptors for inventories of black poplar stands and basic inventory requirements for noble hardwoods). The first draft of the pan-European minimum requirements was developed based those requirements which are common to all species-specific requirements.

The draft minimum requirements indicate that each unit should have one or more tree species recognised as *target species* for gene conservation efforts. The units should be predominantly located in autochthonous tree populations but additional *ex situ* units can also be included if they represent well-adapted forests. Units of introduced tree species can be included if they are established for conserving well-identified and differentiated characteristics from their original source populations. Regarding the minimum population size, a unit should have either 500 reproducing trees (widely occurring and stand-forming conifers and broadleaves), 50 reproducing trees (scattered conifers and broadleaves), 50 seed bearing trees (dioecious tree species with sexual dimorphism) or 20-50 reproducing trees (rare or endangered tree species in specific situations only). The expert group is still continuing its discussion on these requirements for the minimum population size. The draft document also gives guidelines for the management and monitoring of the units.

The data on the units will be collected at two different levels; general data on the units and more detailed data on each target tree species within a unit. In addition to the identification data of the units in each country, the data standards include geographical coordinates of the unit, minimum and maximum elevation within the unit, surface area, ownership, type and function of the unit and predominant silvicultural system. For each unit, climatic variables will be obtained based on the geographical coordinates using common sources and extrapolating methods. Additional fields will be available for remarks (e.g. specific soil and other characteristics) and a list of non-target tree species growing within the unit.

The data standards on each target tree species include Latin name, the origin of the material, the total number of reproducing trees per unit, remarks on sex ratio (in case of dioecious species), age class distribution, the level of natural regeneration and distribution of the

reproducing trees in the unit. Furthermore, the data standards include additional information on the stand(s) and a field to indicate why the unit was established (e.g. conserving the genetic diversity of the target species, specific adaptive traits or remaining individuals of rare/endangered species).

Several participants asked what criteria were used for deciding on the specific minimum numbers of trees in a gene conservation unit and how buffer zones are taking into considerations. It was agreed that the criteria (e.g. the numbers below which genetic drift may be significant, and the numbers which are within the limits of minimum viable population sizes) as well as their theoretical basis should be described in the minimum requirements. Regarding buffer zones, it was noted that poor quality and degraded stands around a gene conservation units should be documented. It was also suggested to strengthen the legal status of gene conservation to be in line with other nature protection efforts by discussing how to include gene conservation into management plans of nature conservation areas. In Norway, for example, fruitful discussions are ongoing to allocate certain plots within the nature protected areas for gene conservation purposes with special rules for their management.

J. Koskela informed that the next version on the pan-European minimum requirements and data standards will be circulated for comments to all EUFORGEN Networks during the summer. Subsequently, the EUFGIS expert group will discuss the feedback of the Networks during its final meeting in Slovenia in early October 2008.

## **New research and other efforts on the CAP species**

### *Genetic structure of *Taxus baccata* in the western Mediterranean*

G. Vendramin presented results of a recent study on *Taxus baccata* populations in the western Mediterranean Basin, carried out in collaboration with Italian, Spanish and Slovakia research teams. As part of the study, seven polymorphic nSSR were developed for *T. baccata* and an additional polymorphic SSR was obtained by testing eight primer pairs developed for *T. sumatrana*. The sampling covered the entire distribution range of *T. baccata* in the western Mediterranean Basin (Iberian Peninsula, North Africa, Balearic Islands, Corsica and Sardinia). A total of 1,008 individuals from 93 populations were sampled, including some populations in the western part of Central Europe.

The results indicate that populations from northern (Cantabrian Range, Central Europe and Pyrenees) and eastern (Corsica and Sardinia) regions have higher genetic diversity and allelic richness than those from south-eastern Iberian Peninsular and North Africa. The results also showed that there is a strong differentiation between populations within certain areas. No significant phylogeographic structure of the populations was found. However, from the phylogeographic point of view, there seems to be a relationship between Central European (Switzerland) and Sardinian populations of *T. baccata*. Furthermore, the Iberian populations from Balearic Islands were also related to the populations in Corsica and Sardinia while the Moroccan populations were not related to any other populations in the Mediterranean islands.

### *Practical approach to selection of in situ units for Taxus baccata in Spain*

A. Prada made a presentation on the selection of *in situ* units for *Taxus baccata* in Spain. She first provided an overview of the species' distribution in Spain, its natural regeneration and management, the genetic diversity among different populations as well as their ownership status. The two main distribution areas of the species in Spain, i.e. the Atlantic and the Mediterranean regions, have different ecological characteristics owing to variation in annual rainfall (1200 and 400 mm, respectively).

In the Atlantic region, the populations are genetically rather homogenous and they occur throughout the region. Regarding the selection of the gene conservation units, there is no problems in finding populations meeting the minimum number of adult trees nor occurring in state-owned forests. However, the situation in the Mediterranean region is somewhat different and it is difficult to find populations large enough as defined by the minimum requirements. Forest fires are also creating a considerable threat to the long-term survival of the *T. baccata* populations. Therefore, some of the units in the Mediterranean region may not meet the minimum number of reproducing trees. She also noted that the number of reproductive individuals is not necessary a good proxy of the effective population size.

She concluded that a management plan should be compulsory for the conservation units of the species to ensure survival of the seedlings under fire threat, grazing and competition by other species. She stressed that studies on traits related with adaptation are needed to assess the effectiveness of a network of gene conservation units across the ecological range of the species. She also suggested that creating new, more diverse *ex situ* populations should be considered seriously, in particular in the Mediterranean region. *Ex situ* conservation of seed lots can also be considered as a medium to long-term conservation measure. After her presentations, the participants discussed the application of the minimum requirements, developed by the Network for gene conservation units of conifers, in selecting *in situ* units for *T. baccata* in practice. It was noted that the requirements provide possibilities but they also have some limitations, depending on how strictly the minimum number of reproducing trees should be followed, for example.

Following the two presentations, the implications of the findings and experiences to gene conservation efforts were discussed. It was highlighted that the nature of the DNA markers is important when interpreting the results and that the absence of a consistent phylogeographic structure may be caused by demographic factors. Regarding the gene conservation units, it was stressed that they should not be just dots on maps but real efforts and properly managed on ground. It is useful to have the minimum requirements but it was recognized that the level of management for gene conservation purposes often varies between good and no efforts at all. The pan-European gene reserve status may help to raise the interest of local forest managers and make them implement appropriate management of the reserves.

## Development of common action plans for conifers

The four working groups met separately and discussed the selection of the proposed gene conservation units from different countries. They also assessed the quality of the proposed units and discussed the overall progress of the work. Following this, the groups provided their updates which were then discussed in plenary.

### *Stand-forming/wide-spread conifers (Picea abies, Pinus halepensis/brutia)*

T. Skrøppa and D. Danusevicius reported on the group's discussion on proposals for the two target species. Some countries also proposed gene conservation units for additional species.

In Austria, four units for *P. abies* were proposed representing genetic variation along different altitude (average size of one reserve is 100 ha). In Bulgaria, two stands of *P. abies* (genetic reserve and seed stand) were proposed (ca. 250 ha each) representing the southern range of the species' distribution and different environments.

Estonia proposed four *P. abies* genetic reserves, ranging between 160 and 300 ha. The reserves were selected to represent different environments in Estonia. In Finland, four national gene reserves of *P. abies* were selected representing southern, central and marginal northern range of the species' distribution in the country.

Greece proposed four autochthonous stands for each of the following species; *Abies cephalonica*, *Pinus brutia*, *Pinus halepensis* and *Pinus nigra*. The selection was based on good performance of the material in provenance trials and sampling of one marginal population. No units were proposed for *T. baccata* but there will be an inquiry to find units for this species as well.

Hungary proposed two *P. abies* stands; one in the eastern part (about 14 ha) and another in the western part of the country (about 14 ha) (both are located at the elevation of 750 m). The stands are non-local land races (origin unknown), about 100 years old, and show good adaptedness and growth.

Italy reported that three units for each of the following species will be selected in consultation with the forest management authority and researchers: *Abies alba*, *Picea abies*, *Pinus nigra*, *Pinus halepensis* and *Taxus baccata*. The selection will also be guided by adaptive genetic variation and genetic variation revealed by the DNA marker studies.

Lithuania proposed three reserves for *P. abies* representing different environments; the very southern limit of the "Russian" refuge, sea-side highland and the north-eastern part of the country (frost hardy populations).

In Norway, about 30 possible gene reserves of *P. abies* have been identified within protected areas. Only the most representative ones will be selected after inspection; four for the European network and 10 at national level. Agreements on their management will be made with the nature protection agency.

Poland proposed the following gene reserves: seven units for *P. abies*, each one about 20 ha (three from the mountains in the southern part of the country, including the Istebna provenance; two units from the north-eastern part of the country to capture the southern edge of the “Russian refugium” and two from the central part (representatives of the northern limits of the “southern refugium”). Poland also proposed additional units for the following species: *Pinus sylvestris* (seven gene reserves), *Abies alba* (four gene reserves), *Larix decidua* (two gene reserves).

Romania proposed three stands (genetic reserves) for *P. abies* and Slovakia proposed two gene reserves for the species (about 600-700 ha each) representing different adaptive environments in the country. Management of the Slovakian reserves is based on the principles of close-to-nature forest management.

Slovenia proposed three stands of *P. abies* with the total area of 270 ha, two stands of *Abies alba* (129 ha), two stands of *Pinus nigra* (10 ha) and two stands of *Taxus baccata* (52 ha). The main criteria used in the selection were that the units should be located in natural forests, meet both the national criteria and the minimum requirements of the Network, and that there is natural regeneration.

In Sweden, three gene conservation stands of *P. abies* were selected to represent the clinal variation across different environments at the latitudes of 58°, 62° and 66° N. These are all autochthons 25-year-old stands regenerated naturally in 1985. No stands were selected in southern Sweden where most of the stands originate from non-local seed sources.

No units for *P. abies* were proposed by France (a network of the units is under development) nor Portugal and the Netherlands (the species does not occur naturally in these countries). Germany, the Czech Republic and Switzerland informed that they will propose units for *P. abies* after they have carried out inventories. Spain and Turkey reported the same for *Pinus halepensis*. No data or feedback was received from Croatia and Denmark. No units for *P. halepensis* were either proposed by France as there is no gene conservation network created yet for the species.

### ***Scattered/widespread conifers (Taxus baccata)***

S. de Vries provided an update on the discussions of the second group on *T. baccata* which is a native tree in 30 countries. Only three countries proposed the units; Netherlands and Romania both proposed one unit and Slovakia two units. Several other countries (Hungary, Italy, Norway, Spain and Switzerland) reported that they have potential units which could be proposed later. Finland, France and Portugal reported that they do not have gene conservation units for the species. In addition, he informed that the Netherlands proposed one unit for *Juniperus communis* and Portugal did the same for *J. phoenicea* subsp. *turbinata*.

He then urged all countries to provide feedback and send data on the proposed units, including those ones which have already made their proposals. He stressed that it is also important to inform the group if a country does not any units to propose. Finally he noted

that active management of the *T. baccata* units is necessary as the species suffers from grazing and competition by other tree species.

*Rare/threatened conifers (Pinus nigra ecotypes, Mediterranean Abies spp.)*

B. Fady reported the discussions of the third group on rare and threatened conifers. The group also decided to include *Abies alba* in the list of *Abies* species. Four countries have made proposals and provide data so far. Austria proposed three units for *A. alba* and three for *Pinus nigra*. France suggested six units for *A. alba* and informed that a gene conservation network is under construction for *P. nigra*. Romania proposed three units for *P. nigra*. Turkey proposed one unit for *P. nigra*, one for *A. bornmuelleriana* and one for *A. cilica*. B. fady noted that some proposed units were much smaller than the recommended size so their selection needs a specific justification.

He also mentioned that it should be indicated in the data collection table why stands were selected as gene conservation units (e.g. typical stand, marginal stand, population selected for a specific trait in a common garden experiment like drought resistance). It was further discussed a protocol for providing the average age of a stand for uneven-aged stands is needed. The group also discussed genetic pollution and recommended that the surrounding area of a proposed unit should be surveyed. He concluded by saying that some countries need an official agreement for their proposals before they can be submitted and thus these countries are not able to propose quickly gene conservation units.

*Exotic conifers (Picea sitchensis, Pseudotsuga menziesii)*

A. Sigurgeirsson gave an update from the fourth group which is focusing on exotic conifers. No country has yet proposed gene conservation units for these species. He also reported that the group discussed the concept of 'land race' and why it is important to conserve the genetic resources of these species in Europe. He urged Network members in countries using the two species in forestry to provide their inputs to the group as soon as possible.

The updates of the four groups were followed by a general discussion on the CAP work. Firstly, the number of units each country can propose was clarified. It was decided that each country can propose a maximum of five units per species, depending on the species' distribution and the pattern of its genetic variation. It was also suggested that the chapter on the management of gene conservation units in the minimum requirements should be revised regarding "management based on phenotypic quality".

### *Preparation of distribution maps for Abies spp., Picea sitchensis and Pseudotsuga menziesii*

J. Koskela informed the participants that there is a need to develop distributions maps for these species. For other species included in the common action plans, the maps have already been developed while preparing the Technical Guidelines for them.

The development of the maps for the two exotic conifers was then discussed in length. It was stressed that the maps will be developed only for the purpose of displaying the distribution of the species in Europe without any indication where the species could or should be planted. Some participants were concerned that developing distribution maps for these species would give an impression that the Network is promoting their use in Europe. Others questioned whether the Network should at all promote the conservation of their genetic resources (landraces).

It was decided that a clear definition of a land-race should be formulated. This will also facilitate collection of data on the existing gene conservation units of these species in Europe and selection of the units for the pan-European network.

Regarding the maps, it was decided to develop the distribution map for all Mediterranean *Abies* spp. No distribution maps will be developed for the exotic species and only the selected gene conservation units of their landraces will be shown in a map as part of the CAP publication.

### **Development of Technical Guidelines for conifers**

J. Koskela updated the participants on the development of Technical Guidelines for conifers. *Pinus leucodermis/heldreichii* and *Larix decidua* are ready for layout finalization and they will be send to the printer soon. *Pinus peuce* and *Taxus baccata* will be also finalized soon. The Secretariat will contact the authors and send them the final versions. He also highlighted the efforts made by several countries in translating the Technical Guidelines into their national languages (e.g. Dutch, Italian and Spanish). During the second day of the meeting, the participants agreed to develop Technical Guidelines for additional species (see the updated work plan below for further details).

### **Progress made in various countries**

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

Many countries in the region reported efforts to strengthen legislative background of FGR conservation. New legislation has been approved in Romania and a revised Forestry Act is in preparation in Hungary. In Slovakia, a revision of regulations on forest reproductive material and gene conservation is under way. Poland completed similar revision recently.

Regarding progress in forest policy, gene conservation units have been included in the National Forest Strategy in Romania in 2008. Slovenia reported that the same took place in 2007 and issues dealing with gene conservation have been incorporated into the forest management planning guidelines. In Slovenia, gene conservation units have been identified in wilderness areas.

Funding for FGR conservation activities has been reduced significantly in some countries. In Hungary, selection and management of gene reserves, as well as the activities of the Forest Genetic Resources Conservation Working Group, have come to a complete halt as a result of a re-organization process in the Ministry of Agriculture. Similar conditions were reported by the Czech Republic. In Slovenia, support for genetically proper forest regeneration is insufficient.

Implementation of FGR conservation has also made progress in the region. In Romania, a complete revision of the national register was carried out 2006-2008, including collection of GPS data. In Slovakia, three new units were selected for conifers (two for *Taxus*, and one for *Abies*). In Hungary and Poland, the first phase of gene reserve selection was completed. In Poland, a new initiative to establish two vast clonal archives (150 ha each) has started. A seed bank was established by the Slovenian Forest Service in 2005. Research supporting gene conservation has also taken place. Molecular markers are being used for identification and selection of gene conservation units (isozymes in the Czech Republic and DNA markers in Poland). In Slovenia, an EU-funded project (Life+) is supporting monitoring of genetic diversity.

Calamities and catastrophes are menacing gene conservation units of Norway spruce throughout the region. Serious damages and problems were reported by Hungary, Slovakia, the Czech Republic, Poland and even Slovenia. A revision of the conservation units will be necessary in some cases to assess whether the units still serve their purpose.

#### *Mediterranean region (Bulgaria, Croatia, France, Greece, Italy, Portugal, Spain and Turkey)*

Studies on molecular and adaptive variation of *Taxus baccata* have been carried out in a collaborative project among Spain, Italy and France. Italy also reported further improvement of the genetic maps of all coniferous species by inclusion of markers that have a likelihood of not being neutral and thus increasing the map density. In Turkey, a project on genetic diversity of *Abies bornmuelleriana* and *Fagus orientalis* has been carried out. An extensive study on *Cupressus sempervirens* based on molecular markers has also been conducted by Italy. Analysis of mitochondrial DNA of *Abies alba* and molecular analysis of *Pinus nigra* genetic material collected from old provenance tests were reported by Croatia. In France, a mapping project has been launched for species with scattered distribution using material from databases of botanical gardens, museums and laboratories.

In Spain, adaptive variation of *Pinus halepensis* and *P. pinaster* has been studied based on nursery tests and field trials. Turkey has launched a project aiming at identifying cold and drought resistant *Pinus nigra* populations. *Abies alba* provenance tests were evaluated in Croatia while evaluation of *Cedrus* spp. and *Picea abies* provenance trials was reported by

Bulgaria. Flowering synchronization of *Pinus nigra* was studied in Greece. In France, a project regarding dieback and vulnerability of *Abies alba* due to drought is under way, with cross pollinations among parental trees and selection of resistant genetic material. Furthermore, a project on the neutral gene diversity and the adaptive genetic variation of *Abies alba*, *Picea abies*, *Pinus halepensis* and *P. pinaster* and oak species has been carried out in France using material growing in provenance trials,.

In Bulgaria, the *in situ* conservation area increased from 63 000 to 73 000 ha for coniferous species, including *Picea abies*, *Pinus sylvestris*, *P. nigra*, *P. peuce* and *P. heldreichii*. The total area of seed stands for conifers is estimated to be about 21 000 ha in Bulgaria. In Spain, the plan for conservation of genetic resources has already been approved and a network of institutions is expected to define the scientific criteria and indicators for gene conservation areas in the near future. The selected model species, which will be studied in depth, include all those species for which the EUFORGEN Networks are developing CAPs and by the end of September candidate gene conservation units will be proposed to different working groups. New efforts for gene conservation of *Abies nordmanianna* and *Pinus nigra* are under way in Turkey. Identification of gene conservation units for all targeted conifers is also under way in Greece, Italy and Portugal. The French National Commission for the Conservation of Forest Genetic Resources (CRGF) decides about the conservation networks for new target species and it also monitors the existing gene conservation networks. In this framework, the networks for *Picea abies*, *Pinus pinaster* and *P. sylvestris* are in preparation while a new network has already been created for *P. nigra* subsp. *salzmannii*.

Most of the countries also reported *ex situ* conservation activities. Italy reported an increase in DNA samples and seed bank collections after including more populations and species like *Taxus baccata*. Croatia reported the establishment of a new *Pinus nigra* provenance test while a new *Pinus peuce* seed orchard was established in Greece.

The group also discussed the predicted effects of climate change which, in combination with the intensified human pressure in the region, are expected to threaten the Mediterranean forest trees with higher frequency of extreme weather events, forest fires, and spread of pathogens and diseases. It was concluded that the evaluation of the adaptive potential and the conservation of forest trees and their isolated populations in the Mediterranean region is of vital importance.

#### *Northern Europe (Estonia, Finland, Iceland, Lithuania, Norway, Sweden)*

As of January 2008, the collaboration among the Nordic countries on plant, farm animal and forest genetic resources continues through a new Nordic Genetic Resource Center (NordGen) which was established by merging the Nordic Gene Bank (NGB), Nordic Gene Bank Farm Animals (NGH) and Nordic Council for Forest Reproductive Material (NSFP). NordGen operates under the Nordic Council of Ministers; NordGen–Plants is located in Alnarp, Sweden while NordGen–Farm Animals and Forest operates from Ås, Norway. The Nordic FGR Network within NordGen–Forest has initiated a study on legal status of FGR in Nordic countries (related to access and benefit sharing issues). More information is available at [www.nordgen.org](http://www.nordgen.org).

In Norway, a new breeding strategy for Norway spruce is under development based on genotyping of parents, similar to the “breeding without crossing” concept (genetic variation in wood quality is being analysed, followed by construction of a trait index on genetic relationships). A new mtDNA and micro-fossil study showed that there was an early gene flow of Norway spruce across the Baltic Sea to southern Sweden during the postglacial colonization. Another DNA marker study by Norwegian researchers showed that there is a decrease in genetic diversity among Norway spruce populations when moving from south to north. Norway also reported a growing interest in seeds produced by seed orchards following the presentation of progeny trials’ results in leaflets and their promotion during extension activities.

Iceland will organize a meeting for the Nordic forestry ministers in August 2008. The meeting will discuss forests and climate change, and is followed by a conference of NordGen–Forest.

Estonia has started a new breeding programme for Scots pine and Norway spruce. It is also carrying out an inventory of gene reserves for the purpose of selecting gene conservation units for a pan-European network of such units. Estonia is also planning to revise its Forest Act to better define ‘gene reserve’, ‘gene conservation’ and other related terms. It was also reported that the Estonian state forest management centre will be re-structured soon.

In summer 2008, a project will be launched by the Swedish Forest Agency to identify those protected areas in which gene conservation can be included into their management plans and from which seeds can be collected (e.g. areas part of Nature 2000). Seed collection will be started in all forest stands classified as ‘source identified’ category because selected seed collection stands have provided little gain based on a recent study. The geographical coordinates of all seed collection stands will be recorded in Sweden.

Lithuania reported that a new plan is being discussed for conserving individual trees in old parks and other phenotypically interesting trees in natural forests.

In Finland, a new gene conservation unit for Norway spruce was established in Lapland, at the northern limits of the distribution area of the species. A new clonal archive of *Juniperus communis* (ca. 160 clones, 1400 ramets) was established on two duplicated sites. It was also reported that the Punkaharju unit of METLA may be closed soon and that this is likely to have negative effects on the gene conservation programme of forest trees in the country.

#### *Western Europe (Austria, Germany, Netherlands and United Kingdom)*

In 2007, the Netherlands issued a national list of autochthonous stands of most tree species allowing the certification of material in harvesting, growing and trading through the FRM category of “source identified”. A symposium on the relation between the national list and climate change was also organized on the occasion of the issuing of this list.

Germany reported big changes in the last few years. Norway spruce is being hit increasingly by bark beetle and is being replaced by other species, such as Douglas-fir. Douglas-fir seed is marketed for a high price since seed from the USA cannot be imported in the category “source identified”. Using exotic tree species is not an issue in Germany but reforestation subsidies are only granted for using local seed sources of broadleaves like oak and beech. Surplus land is being utilised for producing woody biomass for fuel (poplars and willows). Research on agroforestry systems has been initiated and this is promoting collaboration between agriculture and forestry sectors to grow short-rotation trees and crops side by side. On the political front in Germany, gene conservation is falling out of favour. The gene bank at Northrhine-Westfalia has been closed down after 20 years of operations and a “don’t collect anymore” message is coming from the politicians.

Austria reported establishment of gene conservation units for *Taxus baccata* and a provenance trial of Douglas-fir (the latter in collaboration with Germany). A recent molecular study on *T. baccata*, investigating chloroplast genetic variation, detected no cpDNA polymorphisms in the Austrian populations of the species. Efforts are also underway in Austria to identify adaptive markers for drought resistance, the timing of bud burst and resistance against *Heterobasidion* in Norway spruce. Testing of forest reproductive material with such adaptive markers can be used for enhancing the performance of future Norway spruce stands. Creation of a mitochondrial map of Norway spruce in Austria is also underway to study its postglacial migration history and anthropogenic influences on the populations. The preliminary results suggest that the populations in the Alps are dominated by one haplotype while the eastern and southern populations contain more variation.

As an update on the marker-aided selection project with Sitka spruce, the UK reported collaboration with a Canadian group called ARBOREA which allowed access to their microarray resources. This enabled the painless discovery of over 150 SNPs in wood formation related genes in Sitka spruce. It was also reported that a new European project called NOVELTREE will be soon start its activities. It is a collaborative project which aims to mobilise and integrate European scientific research and resources on forest tree genetics to i) develop genomic tools for plant breeding, efficient gene isolation, and optimized exploitation of genetic resources and ii) demonstrate novel/improved methods to breed trees with improved quality and quantity parameters.

## **Seminar on the use of forest reproductive material and FGR conservation**

### *Use of FGR in forestry in Hungary*

I. Bach started the seminar by presenting the history and recent developments in using and certifying FRM in Hungarian forestry. He highlighted the need to ensure visible and invisible quality of FRM, traceability of the marketed FRM as well as legal background and institutional arrangements for the certification work. In 1958, Hungary developed the National Seed Collecting Regulation and in 1989, the country joined the OECD Scheme on FRM. In 2003, Hungary adopted new national legislation to implement the requirements of the European Commission on the trade of FRM (105/1999/EC).

He then explained the details of the FRM regulations, provenance regions in Hungary, types of basic materials and various FRM categories. The regulations ensure that FRM shall meet with the requirements of different categories (source-identified, selected, qualified or tested) and that FRM is harvested or collected from approved basic material, which is registered in the national list. He also stressed that field inspection are an important component of the certification process. There are some 900 nurseries for forest trees currently registered in Hungary and they produced 307 million seedlings in 2007. After his presentation, it was noted that the FRM schemes can only ensure traceability of the material, not how and where it will be finally used.

### *FGR conservation in Hungary*

L. Nagy provided an overview to FGR conservation efforts in Hungary. A forestry committee was set up in 2000 as part of the National Plant Gene Bank Council to coordinate the FGR conservation activities, develop the management of national gene reserves and allocate state funding for the work. The committee has developed a national strategy for FGR conservation as well as a list of target species and guidelines for gene conservation of rare and endangered tree species. Furthermore, it has established the national *in situ* gene conservation network for oaks and beech. The committee has also been active in carrying out background studies and contributing to position papers on legislation and funding for FGR conservation.

He then highlighted some of the problems for FGR conservation in Hungary. In case of *in situ* conservation, he noted that the country's legislation on gene reserves is still incomplete and inconsistent. This has led to some conflicts with nature protection agencies, i.e. management interventions to favour selected trees species, for example, are not allowed. Forest owners (often state-own companies but managed for profit like any other business) are often reluctant to accept limitations for management in the name of FGR conservation. L. Nagy mentioned that this was the main reason why no gene conservation unit has been established in Hungary since 2004. There is also lack of long-term funding for FGR conservation efforts.

Regarding *ex situ* conservation, he informed that the existing collections originates from previous breeding and research work. A total of 8800 genotypes and 1500 families or provenances were listed on the national registry in 2004. However, state funding was suspended in 2004 and this has made the maintenance of the collections difficult. Some funds for the work are obtained through occasional research projects but they do not provide a sustainable solution. An even bigger problem for the overall FGR conservation is that the mandate of the forestry committee as part of the National Plant Gene Bank Council has expired. Therefore, the present activities lack coordination at national level.

At the end of his presentation, he noted that there have also been conflicts between the Ministry of Environment and the Ministry of Agriculture regarding the legislation on protected areas. There is an attempt to distinguish the gene conservation units of forest trees from other protected areas so that they could be actively managed for FGR conservation purposes. It has also been proposed that some protected areas should be declared as

‘protective areas’ and this would also make it possible to manage them for gene conservation purposes. Some participants commented that they have good experiences from the collaboration between nature conservation agencies and authorities implementing FGR conservation in their own countries (e.g. identifying gene conservation units within protected areas). They recommended that it is worthwhile to try to increase this collaboration in Hungary too.

### *Plasticity and its implications for using forest reproductive material*

Cs. Mátyás first discussed the purpose of FGR conservation and the use of forest reproductive material, and what are their differences and similarities. FGR conservation emphasizes long-term aspects, such as adaptation and evolution, while the time horizon in the case of FRM is considerable shorter (one or a few generations only). FRM is commonly transferred to new environmental conditions and subsequently importance of plasticity and provenance or seed zoning was recognized years ago in forestry. Forest genetics often considers plasticity from the point of view how much environmental change can be tolerated without genetic change, whereas the FRM approach is focusing on yield optimization and what are the limits for plasticity.

He continued by addressing the definitions of both plasticity and autochthony. In a broad sense, he defined plasticity of trees as their ability to maintain relative fitness across a range of environments without any genetic change. He noted that the definition of autochthony seem to be different among ecologists and geneticists. The ecologists often consider autochthony in historical sense, i.e. that a given species has been occurring continuously in an ecoregion since the last major climatic shift (about 800 BC). On the other hand, the geneticists understand autochthony so that a species has regenerated naturally over a sufficient number of generations to be considered as adapted to ‘local’ conditions, i.e. they have a selectionist approach.

Cs. Mátyás pointed out that silviculturists often assume that adaptation of natural stands has reached an optimal level. He questioned this assumption and noted the well-known fact that the local provenance is not always the best one on a given site. He also raised questions, such as how much of the adaptive variation is attributable to local selective forces and how large is the local population? He also stressed the difficulty of measuring genetic adaptation. At molecular level, markers are useful for studying migration routes and gene flow but not selection. Responses of genotypes or provenances to a given environmental conditions (phenotypic plasticity) can be observed directly by measuring quantitative traits in clonal or provenance trials. He mentioned that some genotypes or populations remarkably stable in their performance across different sites. As an example, he showed some results from a test of *Populus euramericana* clones in which one clone, Agathe-F, showed stable performance over a number of sites.

Based on data on the international provenance trials of *Picea abies* and *Pinus sylvestris*, he then showed how phenotypic plasticity can be observed by building response curves of phenotypic traits to average temperature change (as a result of transfer). He concluded that there are differences in phenotypic plasticity between tree populations and that phenotypic

plasticity has a significant role in adaptability. He called for establishment of new international provenance trials to provide more information on plasticity of tree populations. Finally, he urged that we should not throw away any genetic material or trials as they are valuable assets for future research efforts. He also stressed that the gene conservation units can serve as reference stands beyond gene conservation purposes.

After his presentation, the participants discussed how the trade and uncontrolled movement of forest reproductive material across countries may impact the conservation of forest genetic resources. It was pointed out that FRM certificates are sometimes falsified (e.g. large quantity of seed have been sampled from few trees only) and that the use of non-adapted FRM may create threats to gene conservation efforts as well as loss of adaptability of the existing forests. It was also noted that in non-stressful environments the choice of genetic material can be more liberal but in the case of marginal environments, the adaptive potential of the material should be taken into account as a critical factor.

It was considered necessary that the knowledge gained so far by testing or by practical experience should be incorporated into the characterization of FRM and the properties of the genetic material traded should be provided with more details, if they are known (e.g. early or late flushing provenance, photoperiod and temperature in relation to flushing and growth, and plasticity if the material tested in many sites). The importance of provenance trials was again highlighted many times during the discussion. Many results so far are based on the old IUFRO experiments but such international trials are not available for all species and especially for the tree species growing mainly in southern Europe. It was stressed that those species or southern populations of widely-occurring tree species might be of high interest for the rest of Europe in the face of climate change. Therefore, actions should be taken to include them into any new provenance trials.

### **Updating the work plan of the Network**

The participants discussed the activities to be finalized before the end of Phase III. Under Objective 1 (gene conservation and forest management), it was agreed to prepare a review paper on genetic consequences of seed harvesting in conifers. The paper should provide recommendations on how to collect seeds from gene conservation units or seed stands while maintaining genetic diversity. It should also discuss the roles of gene flow, mating system and spatial genetic structure, as well as provide recommendations on the number of sampled trees and the distance among them. The paper will be published as a chapter of the EUFORGEN publication on forest management and forest genetic resources with contributions from all EUFORGEN Networks.

B. Fady agreed to lead this activity and M.C. Varela, C. Mátyás, L. Ackzell, D. Danusevicius and G. Vendramin expressed their willingness to contribute to the paper as well. The working group will develop an outline of the chapter by **30 October 2008** and a first draft by **28 February 2009**. The draft will be then circulated for comments to the Network and the chapter will be finalised by **30 April 2009**.

Under Objective 2 (gene conservation methods), the participants agreed to continue collection of data on proposed gene conservation units. For this purpose, it was agreed that the Network will use the data collection file developed by the Scattered Broadleaves Network. The Secretariat will circulate the file to all Network members after the meeting.

Based on the minimum requirements for conifer gene conservation units, each Network member should then propose 1-5 units of the target conifer species in their country. The information on the proposed units should be sent to the EUFORGEN Secretariat by **30 September 2008**. The Secretariat will then compile the data on the proposed units and send the data to each CAP work for quality evaluation of the proposed units before they are included into the pan-European network of the gene conservation units. The CAP group should finalize the selection of the units by **30 November 2008**. Based on the feedback from the CAP groups, the Secretariat will then send a letter to Network members and inform them about the selection of the proposed units. The Secretariat will develop an outline of the CAP publication by **30 July 2008** and each CAP group should then develop a draft chapter on their target species by **28 February 2009**. The work of the CAP groups will be led by T. Skrøppa (Group 1), S. de Vries (Group 2), B. Fady (Group 3) and A. Sigurgeirsson (Group 4). The draft publication on CAPs will be circulated for comments and the Network members should provide their comments by **30 April 2009**.

It was then agreed that distribution maps will be developed for Mediterranean *Abies* spp. and *Pinus mugo*. All relevant Network members should send information on the distribution of the species to the Secretariat by 30 September 2008. The maps will be circulated for comments and then finalized by **31 December 2008**.

The participants also discussed the development of Technical Guidelines for conifers. The publications for *Larix decidua*, *Pinus leucodermis*, *Pinus peuce* and *Taxus baccata* will be finalized by **30 September 2008**. The Secretariat will be in contact with the authors during this process. It was agreed that additional Technical Guidelines will be developed for *Pinus mugo* (A. Alexandrov, G. von Wuehlisch and G. Vendramin) and Mediterranean *Abies* species (P. Alizoti, B. Fady, A. Prada and G. Vendramin). The two working groups should send their draft text to the Secretariat by **30 November 2008**.

Under Objective 3 (information dissemination), the Network members are encouraged to send short news on relevant national efforts (1-2 pages of text with a photograph) to the Secretariat. The news will be then published at the EUFORGEN Website.

## **Meetings, projects and other initiatives**

### *EVOLTREE*

G. Vendramin made a presentation on the recent activities of EVOLTREE which is a Network of Excellence with 25 partner institutes from 15 European countries. It is coordinated by A. Kremer (INRA, France) and funded by the EC under the 6<sup>th</sup> framework programme for research. EVOLTREE has established a repository centre of genomic resources at the Austrian Research Centers GmbH in Seibersdorf, Austria. The repository

centre is a centralized and automated storage unit for genomic resources to guarantee safe and long-term storage of the material, such as genomic DNA extracts, EST libraries (expressed sequence tags, i.e. short strands of DNA that can act as identifier of a gene) and BAC libraries (e.g. artificial chromosomes) of trees and species associated to trees. Seven intensive study sites (i.e. large-scale ecosystem plots) have also been established across Europe to carry out long-term research efforts on the evolution of biodiversity at different hierarchical levels (from genes to ecosystems).

He also briefed the participants on the dissemination activities of EVOLTREE (e.g. Web site, publications and newsletter). EVOLTREE has also established a stakeholder group to enhance dialogue between them and EVOLTREE scientists. The first meeting of the stakeholder group was held in Nice-Mandelieu, France on 7-8 February 2008 in conjunction with the second annual meeting of EVOLTREE. The meeting discussed the benefits of integration in forest genomic research in Europe, verification of the origin of timber and forest reproductive material based on molecular markers, adaptation of forest trees to climate change, and the use of genomic approaches in forestry for bioenergy production. Further information on EVOLTREE is available at: <http://www.evoltree.eu/>

### *TREEBREEDEX*

S. de Vries presented an update to the activities of the TREEBREEDEX project which is a Co-ordination Action funded by the EC 6th framework programme for research. The project was launched on 1 June 2006 for a period of four years with 28 partners from 19 countries. TREEBREEDEX is coordinated by Luc Pâques at INRA-Orléans in France. The main aim of the project is to create a Virtual Tree Breeding Centre which will act as a scientific, technical and training platform for forest tree breeders and geneticists. The project objectives, tasks and deliverables are clustered into six activities, each one of them coordinated by two consortium members. For each activity, S. de Vries presented an overview of the objectives and the achievements so far, as well as the future work plan. Further information is available at the TREEBREEDEX Website at: <http://treebreedex.mediasfrance.org>

### **Future activities of the Network**

On 11 June 2008, the meeting included a brief brain-storming session to exchange ideas and views on the future activities of the Conifers Network. These discussions were continued on 12 June 2008 while the meeting participants were visiting the Sárvár Experimental Station. The following chapters provide a summary of these discussions.

It was recognized that the future activities of the Conifers Network depends on the future of EUFORGEN as a whole, to be decided by the Steering Committee. Many participants noted that the Warsaw Declaration of the MCPFE process highlighted forest genetic diversity and reinforced the continuous implementation of the earlier ministerial commitments, including those ones dealing with FGR. EUFORGEN was still considered as a useful platform for sharing responsibilities, setting priorities and disseminating information at pan-European level. However, countries should also evaluate the progress made in FGR conservation and

what benefits EUFORGEN has brought for them. Establishment and strengthening of national programmes on FGR was mentioned as one of the concrete results of EUFORGEN. It was also noted that new efforts, such as the development of the State of World's FGR report by FAO, call for the continuing regional cooperation and that European countries have committed themselves for this work at the FAO Commission on Genetic Resources for Food and Agriculture.

Many participants also made remarks that the CAP work is not yet finalized and that the current efforts focus on a limited number of tree species only. It was suggested that all priority tree species should be addressed in the future. Furthermore, it was stressed that once the ongoing CAP efforts have been finalized, actions for FGR conservation still need to be promoted at national and regional level.

Climate change was considered bringing both challenges and opportunities for the conservation and use of FGR in the near future. There is a need to advocate that many tree species and marginal populations will face threats (drought, fires, diseases and pests), especially in the southern Europe. On the other hand, the use of FGR can also help mitigating the negative impacts of climate change on forests but this is not recognized well enough. For example, the latest IPCC report on forests and climate change does not put any emphasis on genetic aspects.

It is likely that FRM needs to be actively moved to facilitate the adaptation of forest trees to climate change as spontaneous migration of tree species may be impossible in the highly managed and fragmented landscapes especially in central Europe. In some countries, it may even be necessary to replace traditionally used tree species in forestry with new tree species. Some participants stressed that more attention should also be given to *ex situ* conservation as climate change is increasingly threatening trees species and marginal populations. It was further proposed that FGR conservation could be facilitated by exchanging more genetic material between countries.

All this make it even more important that conservation and use of forest genetic resources is better integrated into sustainable forest management. Genetic diversity is also a key component in maintaining and enhancing biodiversity at species and ecosystem levels. It was noted that the importance of genetic diversity is being increasingly recognized by the nature conservation community. This is encouraging development as it is likely to increase active efforts made for FGR conservation. The role of information management and dissemination was also stressed as important areas in which EUFORGEN should continue its efforts.

During the discussion, the participants also made several suggestions on how EUFORGEN could carry out its work in the future. Regarding the network structure, it was suggested that the networks could be organized by species, thematic issues, methods or even sub-regions. However, it was pointed out that there are already several ongoing sub-regional efforts on FGR and that it is often more useful to learn experiences and problems from other parts of Europe instead of your neighbouring countries.

**Wrap-up session**

B. Fady informed that an opinion paper titled as “Why the conservation of forest genetic resources has not worked”, by Thomas Geburek and H. Konrad, was recently published in *Conservation Biology*. He recommended the Network members should read it and think about the ideas and comments presented in it.

He then thanked the participants for their inputs and concluded the meeting by summarizing the main points of the earlier discussions on the impacts of climate change and on the future work.

With no other business, B. Fady closed the meeting.

Seventh meeting of the EUFORGEN Conifers Network  
Sopron, Hungary, 10-12 June 2008

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