Quercus suber Network

Summary of the fifth meeting

Le Lavandou, France, 3-5 April 1998

European Forest Genetic Resources Programme (EUFORGEN)

EUFORGEN is
coordinated by
Bioversity International

Meeting on cork oak and related evergreen oaks

Le Lavandou, France, 3-5 April 1998

Introduction

Participants from 11 countries attended the meeting (see List of Participants). It was organized as a joint, fifth meeting of the EUFORGEN *Quercus suber* Network and the Concerted Action EU/FAIR 1-CT 95-0202 ("European network for the evaluation of genetic resources of cork oak for appropriate use in breeding and gene conservation strategies") with additional support of EU Microaction DGIB/A, B7 4100.

Besides participants from France, Germany, Italy, Morocco, Portugal, Spain and Sweden, who attended the previous joint meetings, representatives of a wider range of countries from the entire Mediterranean region were invited. Cyprus, Greece, Malta and Turkey participated and Bulgaria, Croatia and Tunisia sent apologies for not being able to attend. This broader participation reflected the previously agreed opening of the scope of the EUFORGEN *Quercus suber* Network to include related evergreen oaks.

The participants were welcomed by M. Bariteau. He expressed his satisfaction with hosting the meeting in Le Lavandou and introduced colleagues from INRA and the Office National des Forêts (ONF) who assisted in organizing the meeting locally.

M.C. Varela opened the meeting. She stressed the need for an integrated conservation and use of genetic resources in cork oak. More awareness is needed to promote cork products. Sustainable economic use is closely linked with, and often a prerequisite for, the better conservation of genetic resources. Activities need to be strengthened at various levels. M.C. Varela expressed her wish that this well-attended meeting be an important milestone in further developing the conservation and use of genetic diversity in cork oak and related oaks throughout the Mediterranean region.

J. Turok also welcomed the participants. He mentioned that exchange of experience and information on the genetic resources of Mediterranean oaks was the main motivation for organizing this joint meeting. He briefly explained the objectives, mandate and outputs of EUFORGEN. The role of the Networks is to facilitate practical gene conservation strategies at the national level. Various international projects which have been 'catalyzed' by the Networks help to implement the national strategies. The linkage between the Concerted Action and the *Quercus suber* Network is an excellent example of such cooperation and complementarity.

After having introduced themselves, the participants approved the agenda of the meeting (see Programme).

EU/FAIR Concerted Action on cork oak

Field trials

All partners reported on the situation of the field trials (see Reports of the previous meetings) and mentioned the activities they undertook during the past year. Almost all trials have either already been planted, or are currently being

established. Most countries reported severe difficulties with finding a suitable, sufficiently homogeneous and available land.

The advantages of nursery planting versus direct sowing in the trials were discussed. The approach chosen, i.e. planting material raised in a central nursery, was very time-consuming and labour-demanding but resulted in a comparably low mortality in the newly established trials. Colleagues responsible for raising the plants in the nursery in Portugal were commended for their work.

Certain problems occurred due to a delayed release of funds during the planting season. It was acknowledged that the labelling of individual plants, although time-consuming as well, was the right decision. Due to the delayed planting in some cases watering of the trials was necessary, which incurred additional costs.

The participants briefly discussed whether it would have been feasible to include more provenances, apply different experimental design, enhance the progeny trials and so on. It was stressed that the procedures and methods followed and the experience obtained when establishing the trials must be well documented. It will be essential not only for the further management of these trials but also useful for setting up future experiments. A handbook will be developed for this purpose as one of the outputs of the Concerted Action (see below).

Each country will send information about the establishment of the trials including a scheme (experimental design) and technical details (provenances, mother trees etc.) to J. Turok and M.C. Varela for compilation by **31 May 1998**. This valuable information will be included in the Report of the meeting and then widely distributed.

Planning of joint observations and statistical treatment of the experiment

Short-term and long-term evaluation needs to be distinguished. While financial support from the EU-funded Concerted Action will be provided for the first year evaluations, it was emphasized that funding needs to be secured in each country for the long-term observations and evaluation of the experiment.

The essential task during the first years is to observe adaptation in the trials. Survival in particular will be assessed during three subsequent years. It was mentioned that first measurements of plant height would be carried out in **May 1998**.

Assessment of physiological performance

October 1998: Mortality of cork oak plants is not easy to assess because even dry, seemingly dead seedlings may sprout after the first and even the second summer, following autumn rains. The methodology developed and used in France was accepted for the common evaluations whereby individual plants are classified as follows:

- Class 1: 90% of green leaves,
- Class 2: 10-90% of green leaves,
- Class 3: 10 % of green leaves.

The proposed classes were considered an adequate assessment of the physiological state of cork oak plants for the first two years after planting. Good comparability of data collected by the different teams in all participating countries is expected in this way.

April/May 1999: Classification using the same classes plus assessment of sprouting:

- Class 1: Original shoot alive,
- Class 2: Main shoot dead but plant exhibits sprouting:
  -from root,
  -from stem,
- Class 3: No sprouting.

October 1999, October 2000 and October 2001: Assessment of physiological performance plus sprouting.

Flushing

April/May 2002; October 2002: Flushing is also an important parameter. The existing scales for beech (*Fagus sylvatica*), European oaks (*Quercus robur*, *Q. petraea*, *Q. cerris*) were accepted as a basis to build up a common scale for all countries hosting the trials. The assessment of flushing shall begin by the fifth year of the experiment. Autumn flushing should also be recorded.

Replanting

Since the plants available for substitution (replanting) can only be maintained until autumn 1998, it was agreed to plant the substitute close to the (seemingly) dead plant, which should, however, not be removed. Elimination of one of the plants will then be decided upon individually by autumn 1999.

The replanting requires a common protocol defining:

- the relative position of the substitute plant in relation to the original plant (which can be given by a geographic cardinal point);
- the distance between the two plants;
- labelling of the new plant.

First pruning

First pruning of lateral branches will be carried out no earlier than after five years of the experiment. The exact timing and intensity will depend on the height of the trees, site conditions, provenance etc. The purpose of pruning is to support cork production. The evaluation of genetic parameters with regard to cork production is a major focus of this experiment. This will be carried out no earlier than after 20 years.

Databases

Portugal (T. Branco) reported on the status of the databases related to genetics and genetic resources of cork oak. Most progress has been made in the **bibliographic database**. Other databases are under preparation and include various types of data: institutions, field trials, meetings and projects dealing with various aspects related to the genetic resources of cork oak. The sofware used is Microsoft Access 7.0.

The participants made comments and suggestions which will be incorporated. It was suggested that, if further information is requested from the partners by the coordinator, then it should be circulated in a pre-formatted way, i.e. including data already available in the respective database. This will facilitate a better and more timely response. The participants will be kept informed about the development of the individual databases.

Handbook

A technical handbook will be produced. It will summarize the valuable experience obtained with the establishment and first evaluation of the trials, giving practical reference for the management of the trials as well as advice to those implementing similar projects in the future. The handbook will be focussed broadly, aiming at forest services, forest owners and research organizations. It will be written in English. The participants emphasized that translating and adapting the handbook to the conditions in each country should be encouraged under the responsibility of the national partners.

The partner countries will contribute chapters from the most relevant areas of their expertise/experience (see below). It was stressed that each chapter should be brief and concise. Portugal will have the overall responsibility for the compilation, printing and distribution of the handbook.

Title of the handbook: **International Network for the Evaluation of Genetic Resources of Cork Oak (*Quercus suber* L.)**

Outline:

1. Introduction - a brief synthesis of the current knowledge on the genetics of cork oak (natural evolution, threats, conservation, breeding, need for provenance research); the EU/FAIR Concerted Action project [20 pages]. Responsible: Italy.
2. Objectives [2 pages]. Responsible: Sweden.
3. Methodologies [5-7 pages]. Responsible: France.
4. Collecting of material [2 pages from each country]. Responsible: Spain. Map and table should be provided for Annex.
5. Nursery, raising of material; labelling [10 pages]. Responsible: Portugal.
6. Field trials - selection of the sites, experimental design, trials establishment [2 pages from each country]. Responsible: Morocco. Table and design scheme should be provided for Annex.
7. Perspectives -assessment of the trials; implications of the project for practical conservation and use of cork oak genetic resources. Responsible: Germany.
8. Annex (Responsible: Portugal).
   -List of databases resulting from the project (links or information on access to them);
   -Protocols (including passport data);
   -Maps, tables, schemes etc.;
   -List of Partners.

Deadlines for the production of the Handbook:

- **30 November 1998**: each country sends information to the responsible person (chapter coordinator) in the respective country.
- **February 1999**: intermediary meeting of all chapter coordinators (to be held in Morocco).
- **15 March 1999**: Chapter coordinators distribute draft chapters to all partners.
- **30 April 1999:** Partners provide feedback to the chapter coordinators.
- **16-19 June 1999**: Discussion and agreement on the chapters during the meeting in Portugal (see Conclusions); comments incorporated by chapter coordinators.
- **October 1999**: Final draft produced.
- **Januay 2000**: Publication printed and distributed (also electronic version uploaded on the Internet).

Other issues

The future of the network of the experimental field trials was discussed. Every effort will be made by the participants to ensure that the trials be maintained properly in their countries and that the experiment be evaluated in a timely and coordinated manner in the future. The participants also discussed possibilities for funding of the common research on the trials. The Concerted Action could only fund the initial phase of the trials and will be finished at the end of next year. Without secured funding, the trials and all the genetic research undertaken so far may be at risk of not being adequately continued in the future.

It was suggested that private companies (such as nurseries) be more strongly involved and that their interest in funding this research be assessed. Research on the adaptation of cork oak under different conditions is essential for developing regulations on the transfer and use of forest reproductive material. Cork oak has not yet been included into the EU or OECD legislation.

If a follow-up research project will be developed, then it should stress the need for an integrated approach (conservation and use aspects), and should encompass broader issues of biodiversity and genetic resources of all Mediterranean oaks. Taking into account the particular need of involving North African countries, it will be further discussed at the consultative meeting in Morocco (to be held in February 1999).

It was strongly felt that the EUFORGEN Network should again play a facilitating role in preparing the future of the cork oak field experiment.

Genetic resources of evergreen oaks in the Mediterranean region

The status and activities in each country

Each country introduced the status of genetic resources of evergreen oaks and the activities towards their conservation and use. As agreed during the previous two meetings (in Sassari, Sardinia, Italy, June 1996 and Almoraima, Spain, February 1997), *Quercus ilex* (holm oak), *Q. coccifera* and *Q. alnifolia* should also be concerned when dealing with the genetic diversity and genetic resources of *Q. suber*. They represent a complex of closely related evergreen oaks with natural hybridization occurring between them (*Q. suber–Q. ilex* and *Q. ilex–Q. coccifera*). The Mediterranean region is very important for evergreen oaks because of the rich genetic diversity it represents.

Evergreen oaks outside of the distribution area of cork oak (i.e. eastern and central parts of the Mediterranean) grow in most situations as scattered, non-commercial species. Their conservation is usually linked with their habitat because of the ecological functions they fulfil. Specific gene conservation programmes do not exist in most countries but the species and their populations are protected within the system of nature protected areas and the practice of forest management. They are currently not threatened as species but natural regeneration is for various reasons very difficult and thus the maintenance of genetic diversity is threatened locally (within species). Afforestation is usually carried out with material of local origin.

In countries where cork oak occurs and is used intensively, the status and activities are very different for the other related evergreen oaks. These usually do not occupy larger continuous areas and are not used to any significant extent. Hybridization between cork oak and holm oak is subject to research in some countries. Also the potential and the implications of an extended economic use of

holm oak are being investigated. The participants recognized that the objectives and approach to genetic conservation and management of cork oak could not be applied in full to all evergreen oaks.

In general, very little information is available even on the distribution of these species, not to mention genetic knowledge. Taxonomic classification of the evergreen oaks and their hybrids is not unambiguous. R. Lumaret presented a comprehensive overview of research on the genetics of evergreen oaks based on isoenzyme and chloroplast DNA molecular markers. It was suggested that introgression occurs locally among the species. Their possible origin is another subject of her studies. The genetic diversity observed at genetic markers is high for all the species. She suggested that the slightly lower levels of variation in cork oak could be a result of the intensive human impact. Some participants, however, objected to such conclusion arguing that the genetic markers used do not provide a suitable and representative sample.

National reports on the genetic resources of evergreen oaks will be published as part of the Report of the meeting. The participants will send their reports for compilation to J. Turok **no later than 31 May 1998.** Each report should have no more than 10 single-spaced pages including tables and figures, and should be sent both printed and electronically (preferably by E-mail). It was agreed that the national reports should follow a common structure with Introduction mentioning **the species and their occurrence**; and then include information on: relevant **ecosystems and forest associations**; **economic importance**; **health status** and **threats**; ***in situ*/*ex situ* conservation measures**; **breeding and afforestation**; **research**; **organizations involved**; **needs and perspectives of gene conservation** in the country; **bibliographic references**. Countries unable to attend the meeting will be contacted by J. Turok and asked to contribute brief national reports as well.

Technical Guidelines on gene conservation and management of cork oak

It was agreed at the previous Network meeting that concise technical guidelines be developed for forest officers and national agencies responsible for the conservation and management of cork oak genetic resources. The guidelines will complement the approach taken in the handbook which is being developed within the Concerted Action (see above). They will be produced as a separate publication and will consist of four chapters (each chapter will have a maximum of 5 pages; together no more than 20 pages).

The following outline was agreed upon:

Summary

1. Cork oak distribution and ecosystems. Responsible: B. Schirone/ L. Gil.
2. Underlying population genetic concepts. Responsible: G. Eriksson.
3. Current genetic knowledge on cork oak. Responsible: R. Lumaret/ G. von Wuehlish.
4. Long-term gene conservation strategy. Responsible: G. Eriksson, M.C. Varela, J. Turok.

All draft contributions should be submitted to J. Turok **before 1 April 1999**. He will compile and circulate the draft guidelines to all participants one month before the next meeting.

Future scope of the Network

Following the previous discussion about the genetic resources of evergreen oaks, it was recognized that (1) more knowledge should be obtained through research on these species and (2) minimum standards (technical recommendations) for their gene conservation in the long term should be developed. It was recognized that both tasks could be accomplished only in a collaborative way and with the contribution of all concerned Mediterranean countries.

All participants then expressed their position on the scope of the Network. The discussion clearly indicated that the need for common activities in the Network is greater for **all Mediterranean oaks (evergreen and deciduous)**. The main arguments for all Mediterranean oaks to be included under the scope of the Network are: occurrence in the same ecosystems; similarity of threats, problems and constraints of gene conservation; natural hybridization between species; shared institutional responsibilities and others. It was mentioned that regeneration of stands is the most urgent, common task related to the conservation of their genetic diversity. Broadening the scope of the *Q. suber* Network to all Mediterranean oaks would enable that the **Social Broadleaves Network** concentrates its efforts on **temperate species**. This will be proposed to the forthcoming EUFORGEN Steering Committee meeting of National Coordinators (to be held in November 1998, in Vienna, Austria).

It was suggested that **needs and priorities for gene conservation of Mediterranean oaks** be assessed throughout the region. The assessment will include a combination of threats and economic importance of species, current or potential. A table was developed for this survey which will be circulated to all Mediterranean countries by J. Turok **before 1 May 1998**. M. Bariteau will provide addresses of contact persons in countries not participating in the Network meeting. Replies will be sent back to J. Turok **by 1 October 1998**. The results of the survey will then be communicated to all participants by J. Turok **before 1 December 1998**. They should be used in every country for stimulating further activities on the genetic resources of Mediterranean oaks, according to the national conditions and needs.

Excursion

During a half-day excursion on 3 April 1998, the participants visited cork oak stands in the Maures forest area, Domaine du Ruscas. Forest officers managing the area introduced its history and problems which are related to forest fires. It was noted that grazing and active management of the stands, carried out with certain intensity in the past, contributed to preventing large forest fires. The risk of fires increased after such activities had been abandoned. Cork oak stands, which now dominate the area, originally formed the understorey of widespread *Pinus halepensis* forests. These pine stands almost disappeared during recent decades following large-scale damage by insects. The participants also visited one of the two French field trials of cork oak which is situated in the Domaine du Ruscas. This trial, a joint effort between INRA and ONF, has just been established. Activities of INRA on genetic resources in the region were briefly presented to the participants at the forest research station in Bormes-les-Mimosas.

Conclusions

The main outcomes of the meeting were summarized by M.C. Varela. A draft plan of activities was presented. It was discussed, modified and endorsed by the participants.

It was proposed that the next meeting be held from **16 to 19 June 1999** and Portugal offered to host the meeting. The modalities of how the meeting of the partners of the Concerted Action be combined with the next EUFORGEN Network meeting will be discussed between the coordinators and announced in due time.

M.C. Varela thanked the local organizers for arranging this pleasant meeting in Le Lavandou.

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