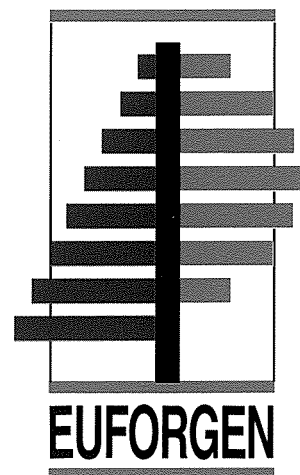


# ***Populus nigra* Network**

*Report of the second meeting  
10-12 September 1995  
Casale Monferrato, Italy*



**J. Turok, F. Lefèvre, L. Cagelli and S. de Vries**  
*compilers*



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The European Forest Genetic Resources Programme (EUFORGEN) is a collaborative programme among European countries aimed at ensuring the effective conservation and the sustainable utilization of forest genetic resources in Europe. It was established to implement Resolution 2 of the Strasbourg Ministerial Conference on the Protection of Forests in Europe. EUFORGEN is financed by participating countries and is coordinated by IPGRI, in collaboration with the Forestry Department of FAO. It facilitates the dissemination of information and various collaborative initiatives. The Programme operates through networks in which forest geneticists and other forestry specialists work together to analyze needs, exchange experiences and develop conservation objectives and methods for selected species. The networks also contribute to the development of appropriate conservation strategies for the ecosystems to which these species belong. Network members and other scientists and forest managers from participating countries carry out an agreed workplan with their own resources as inputs in kind to the Programme. EUFORGEN is overseen by a Steering Committee composed of National Coordinators nominated by the participating countries.

Citation:

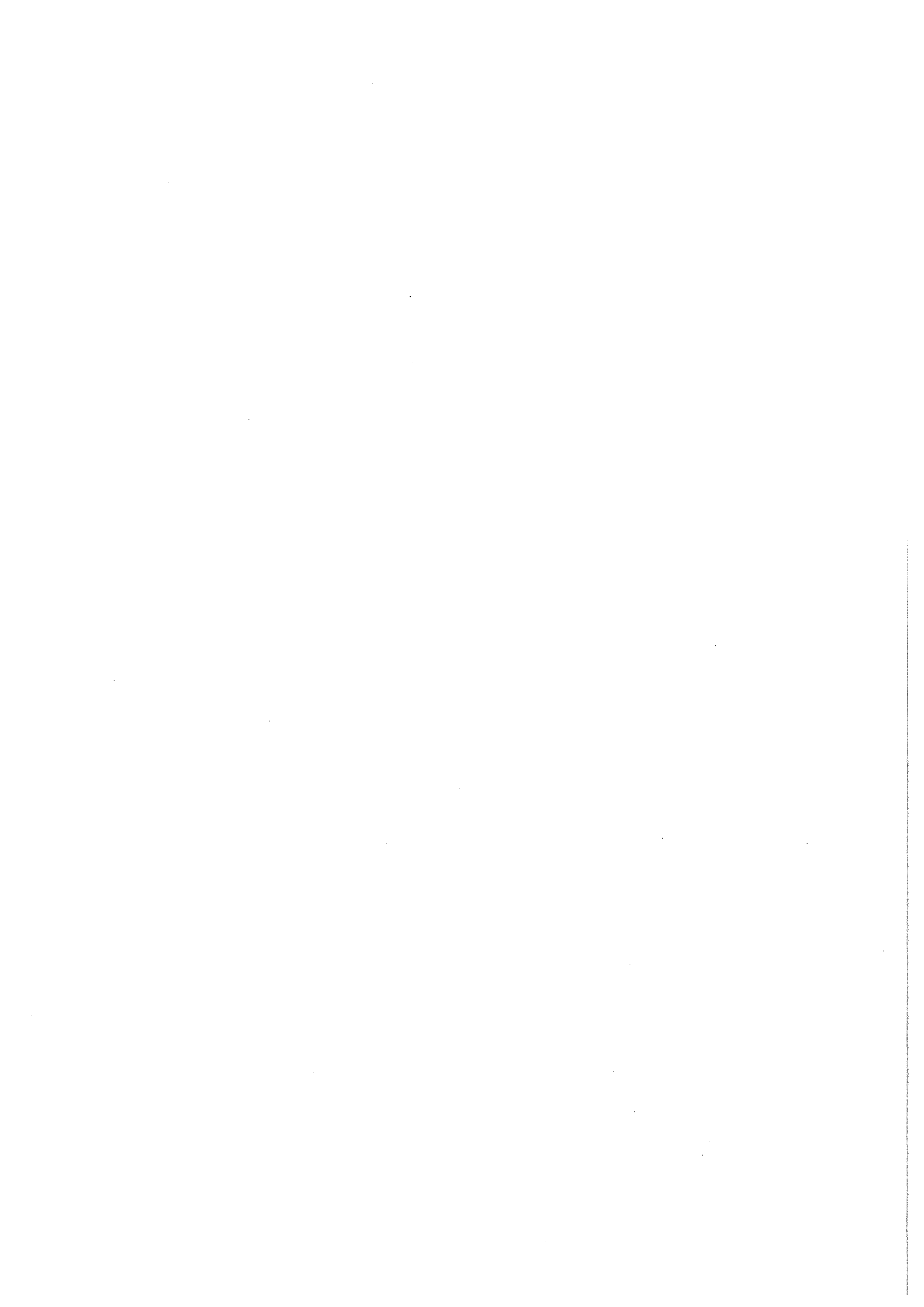
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## Introduction

One year after their first meeting, members of the *Populus nigra* Network met for the second time from 10 to 12 September 1995 at Casale Monferrato, Italy. The second Network meeting was held immediately after the final meeting of the EU project "Inter-Disciplinary Research for Poplar Improvement" (AIR1-CT92-0349), and several participants attended both meetings.

The Network meeting was attended by 14 participants from 9 countries (see Participants). Altogether 7 countries nominated attending members to this meeting. The meeting was opened by Jozef Turok, the newly appointed EUFORGEN coordinator, who welcomed the participants on behalf of IPGRI. He thanked Stefano Bisoffi, the present Director of the hosting Istituto di Sperimentazione per la Pioppicoltura (ISP) for kindly offering and providing local organization of the meeting.

The ongoing activities of EUFORGEN were presented by Jozef Turok. He mentioned that 21 countries now participate in the Programme. It was reported that the *Picea abies* Network met for the first time in March 1995 and the *Quercus suber* Network has had two meetings. Both Networks achieved agreements on an advanced workplan and on different tasks to be carried out, including proposals of joint research programmes. The technical and biological aspects of the conservation of genetic resources require different solutions in different tree species, but a similar approach has been chosen by the Networks for many common problems. The 'noble hardwoods' Network is scheduled to have its meeting in March 1996. At this first meeting it will be decided which species are involved as a priority.

The Steering Committee, composed of national coordinators from all participating countries, planned a meeting for 19 to 21 November 1995. On that occasion, a workshop addressed the most important European forest genetic resources issues, making an input to the FAO Fourth International Technical Conference on Plant Genetic Resources. Jozef Turok announced the departure of Emile Frison as Director of IPGRI Regional Office for Europe. He has been appointed Director of the International Network for the Improvement of Banana and Plantain (INIBAP) in Montpellier, France.

Following the overview of EUFORGEN, Stefano Bisoffi welcomed all participants on behalf of the Istituto di Sperimentazione per la Pioppicoltura. He explained the present situation and plans for the Institute. He suggested that the opportunity should be taken at the meeting to establish close links with other collaborative activities on poplars such as the preceding EU project meeting. Stefano Bisoffi also informed participants on the outcome of the International Poplar Symposium of the International Union of Forestry Research Organizations (IUFRO) organized in Seattle, Washington, in August 1995. He expressed his wish to see a successful Network meeting.

Following this introduction, François Lefèvre, the chairman of the Network, welcomed everybody and began the technical part of the meeting through the adoption of the draft agenda (see Agenda).

## Synthesis of the national activities

The national activities on *Populus nigra* genetic conservation, as presented by Network members, were published in the Report of the first meeting. At this second Network meeting, participants from each country represented reported on progress achieved since the previous meeting. The presentations dealt with aspects of research and applied conservation, and new projects in development were introduced. Paul Tabbush gave a first presentation on the national activities in *Populus nigra* in the United Kingdom.

During 1994 and 1995, inventories of native *P. nigra* were initiated in Belgium, Hungary and Spain. New stool-beds were installed and the collection of material has been continuously carried out. This work was made possible through national funds. The situation is slightly different in Germany, the Netherlands and the UK where *P. nigra* occurs almost exclusively as isolated trees. In southern and central Europe (Croatia, France, Hungary, Italy and Spain), *P. nigra* stands may still be found, often as a result of the re-colonization of disturbed areas.

The research activities in France were concentrated on the study of genetic diversity and its structure within and among populations, the role of vegetative and sexual regeneration in the wild, and phylogeny within the genus *Populus*. In Italy, research aimed at the technology of seed and pollen conservation in *P. nigra* and *Populus* species in general. Guidelines on that subject, developed in Italy with contributions from other Network members, will be published in the report of the next meeting. Research activities were financed either at a national level (France) or through the collaborative EU project on poplars (AIR1-CT92-0349).

Two different aspects of genetic conservation were raised at the Network meeting: (1) re-establishment of riparian forests and (2) public awareness. Although these two aspects go beyond the particular scope of *P. nigra*, they are particularly important for that species.

Concerning the re-establishment of riverside forests, future projects are planned in Belgium, the UK, Hungary and France. We must distinguish the objective of restoring a transient riparian ecosystem that has almost disappeared (UK, Belgium), and the afforestation of riverbanks (Hungary, France). In both cases, the local *P. nigra* genetic resources should play a predominant role. The 'conservationist' point of view in restoring riparian ecosystems assumes exclusively natural regeneration with material from local origin. This approach may, however, be difficult to apply for *P. nigra* and similar pioneer species with scattered distribution patterns. For the afforestation of riverbanks, the use of genetic material from plantations is mostly an acceptable solution. For example, in Hungary, 35 000 rooted plants from various indigenous clones of the species were produced for reforestation with a high density (2000-3000 plants/ha). Although the objectives are primarily dedicated to the conservation of ecosystem itself, or to the control of water regime, they can be combined with genetic conservation.

To inform the public about needs, objectives and strategies of forest genetic resources conservation, different media have already been used. In the Netherlands, the UK and France, newspapers, reports, leaflets, meetings, excursions, conferences and videos were mentioned. Such efforts are important for *P. nigra*, at least to show that poplars are an important part of the native flora.

## Workplan

### 1. Standardized descriptor list for *Populus nigra* stands

The subject was briefly introduced by Martin Hofmann. Several participants confirmed their need for a practical standardized descriptor list for stands. It was agreed to provide the existing information by Croatia, Hungary, Spain and the UK to M. Hofmann by **15 October 1995**. Jos Van Slycken will send his proposal for ecological data to be included in the list. J. Turok will provide the list of descriptors prepared by EUFORGEN *Picea abies* Network. **M. Hofmann will prepare and circulate the draft to all members before 1 January 1996 and receive comments before 1 February 1996.**

### 2. Identification sheet for *Populus nigra*

J. Van Slycken presented a set of illustrations prepared in Belgium<sup>1</sup>. They include most characteristic morphological traits for easy distinction of *Populus nigra* from Euramerican hybrids and the presumably introgressive forms in the field. The comprehensiveness of prepared identification sheets was discussed and minor improvements were made in the descriptors part by the participants. **After receiving the final text version, IPGRI will prepare a layout of the document and publish it along with the Report of the meeting.** The leaflet will be first published in English and French and further languages will be discussed at the next meeting.

### 3. Descriptor list for *Populus nigra* clones

Further to the workplan approved by the last Network meeting, J. Van Slycken had prepared and introduced a list of descriptors for *Populus nigra* clones. The descriptors were discussed and the **final version will be published in the Report of the meeting.** J. Turok will receive the final version from J. Van Slycken by **15 October 1995**.

### 4. Reference clones

The purpose of assembling reference clones is to compare country collections of *P. nigra*. A list of 15 well-known reference clones was developed at the meeting. F. Lefèvre will inform participants interested in receiving the clones about this initiative. If no answer has been received by **1 January 1996**, no material can be sent. From every clone, 15 cuttings will be sent to the countries which responded. **The basic material (reference clones) should be first sent to Geraardsbergen, Belgium, before 15 February 1996, from:** the Netherlands (Gelrica, Vereecken, Heidemij, Dorschkamp, Bloom, Marilandica and Robusta), France (Blanc de Poitou, Tardif de Champagne, Serotina and Fritzi Pauley), Italy (I 214, Italica, I 45/51) and Germany (Rochester)<sup>2</sup>.

### 5. European database

The proposal for passport data included in the Report of the first meeting was discussed. A modified list of descriptors and a list of country codes (International Standard Codes, ISO) will be sent by L. Cagelli to all countries requesting the information for inclusion in the database by **1 December 1995**. Network members

<sup>1</sup> The illustrations were produced and provided as contribution in kind to EUFORGEN by the Institute for Forestry and Game Management, Geraardsbergen, Belgium.

<sup>2</sup> See also page 15.



should send the corresponding information to L. Cagelli **before 1 April 1996** (in ASCII file format; the size of the fields to include in the database will be specified). The new version of PARADOX programme will be sent by J. Turok to L. Cagelli **before 15 October 1995**. Information about a programme for the conversion of geographic coordinates in latitude and longitude used by different countries will be sent by P. Tabbush to L. Cagelli **by 1 January 1996**.

#### **6. Synthesis of *in situ* conservation measures**

Participants agreed to provide information on the *in situ* conservation measures currently used in each country to Sven de Vries **by 1 February 1996**. Since national legislation aspects of *in situ* conservation are not mentioned in most country reports from the first Network meeting, it was recommended to particularly focus on these issues. A reminder letter will be circulated by J. Turok in **November 1995**.

#### **7. Guidelines for *ex situ* field collections**

S. de Vries presented and distributed brief 'Guidelines for maintenance and duplication of *ex situ* field collections'. Technical and administrative aspects of *ex situ* collections were discussed during the session. S. de Vries will incorporate the improvements made by participants and send the final version to J. Turok **by 1 November 1995**. **The paper will be published in the Report of the meeting.** Additional comments may be provided to S. de Vries **until 15 October 1995**.

#### **8. Review of *Populus nigra* literature**

Discussions confirmed the need for continuously updating the literature review. It was agreed that participants would send all relevant literature references, with specification of the language, to F. Lefèvre. He will compile and update the list before each meeting of the Network. A compilation of literature on *P. nigra* pathology will be prepared by U. Bosch and **sent to J. Turok by 1 December 1995**.

#### **9. EUFORGEN clone collection**

It was decided to establish a core collection of clones representing the whole *P. nigra* distribution area in Europe. ISP offered to host the collection in its stool-beds in Casale Monferrato. As a consensus between the representativeness of clones and easy maintenance of the EUFORGEN collection, it was proposed to include two clones from each of the national collections. The clones should be typical for the species' occurrence in countries and as different from each other as possible. Knowledge about their exact origin, as well as an adult tree for further reference, should be available. At least five cuttings per clone should be sent to Casale **before 15 February 1996**. A letter inviting institutes from all distribution areas to send their clones will be circulated by J. Turok **before 1 October 1995** and answers received **prior to 1 February 1996** will be taken into account.

#### **10. Public awareness**

Raising public awareness of the importance of genetic resources of *P. nigra* is an essential component of the species' safeguard, and will help solve problems and implement conservation activities in many countries. Sven de Vries presented a video made recently for education purposes in the Netherlands. **It was recommended that EUFORGEN further strengthen public awareness initiatives on forest genetic resources.**

### 11. Common research needs

The Network listed the **most important research needs for the development of overall conservation objectives and strategies:**

- genetic diversity (sampling, collections, management): structure, ecotypes, evaluation, population management, risk assessment;
- regeneration (*in situ* management): ecological conditions, biology of regeneration (flowering, germination, sex ratio), cladogenesis;
- taxonomy, introgression, identification of subspecies;
- *ex situ* conservation methods;
- socioeconomic aspects, cultural aspects.

The research topics were not prioritized. It was stressed that research is a keystone of gene conservation activities in EU member as well as non-member countries and that collaboration in this area would be beneficial for all. A project on research and conservation activities might be submitted to the EU for the next call in March 1996. S. de Vries offered to prepare a preliminary proposal.

### 12. *Populus nigra* Network

Participants recommended that a mailing list of addresses for the distribution of *Populus nigra* Network publications be developed. Network members will regularly send addresses to J. Turok for inclusion in the list and/or specify a number of copies to be sent directly to them.

It was recommended that reports be sent to the IUFRO Secretariat in Vienna. F. Lefèvre will contact Dr Bradshaw and ask for distribution of the Network publications in North America. J. Turok will contact the Secretariat of IPC/FAO in Rome in order to compile a list of contact persons in countries within the distribution area of *P. nigra*.

It was agreed to hold the third *Populus nigra* Network meeting jointly with the 20th Session of the International Poplar Commission in Budapest, Hungary, in September/October 1996.

## Programme

### Casale Monferrato, 10-12 September 1995

#### **Sunday, 10 September 1995**

- 08.30-10.00      Opening of the meeting  
                     Welcome address, report on EUFORGEN activities (J. Turok)  
                     Welcome address, introduction of the host institute (S. Bisoffi)  
                     Report on activities of the *Populus nigra* Network (F. Lefèvre)
- 10.00              Coffee break
- 10.15-12.30      New developments in the genetic conservation of *Populus nigra* in countries
- 12.30              Lunch
- 13.30-15.00      Standardized descriptor list for *Populus nigra* stands (M. Hofmann)  
                     Descriptor list for clones (J. Van Slycken)  
                     Identification sheet (J. Van Slycken)
- 15.00              Coffee break
- 15.15-17.30      Guidelines for maintenance and duplication of *ex situ* collections (S. de Vries)  
                     Synthesis of *in situ* conservation measures (S. de Vries)
- 19.00              Dinner, social evening

#### **Monday, 11 September 1995**

- 08.00-10.00      Discussion of the database set-up (L. Cagelli)
- 10.00              Coffee break
- 10.15-12.00      Update of Workplan for other tasks and agreement on new Network activities; bibliography update; mailing list of institutions; other miscellaneous
- 12.00              Lunch
- 13.00-15.30      Identification of common research needs; information on project proposals to be submitted to the EU; participation of partners
- 15.30              Coffee break
- 15.45-17.45      Field trip
- 19.30              Dinner

#### **Tuesday, 12 September 1995**

- 08.00-09.30      Final wrap-up session: approval and distribution of the Report
- 10.00              Departure of participants

## The status of black poplar conservation in Britain

**Paul Tabbush**

Forest Research Station, Alice Holt Lodge, Farnham, Surrey, United Kingdom

### Introduction

It is widely accepted that an Atlantic race of *Populus nigra* subsp. *betulifolia* (Pursh.) W. Wettst. is native in Britain (Stace 1991; White 1993), and this is distinct from *P. nigra* L. growing in continental Europe. However, subsp. *betulifolia* also occurs in continental Europe, and the British population may or may not be genetically distinct. Zsuffa (1974) gave the distribution of *P. nigra* to include Britain, but noted that "*P. nigra* var. *betulifolia*... has been described in western Europe, especially in France and Great Britain. A pistillate form of this variety, *P. lloydii* Henry, is cultivated in England". It is not clear whether *P. nigra* L. ever occurred naturally in Britain.

The status of black poplar in Britain was assessed by the Biological Society of the British Isles (BSBI) in a survey over the period 1973-78 (Milne-Redhead 1990). This survey found that the tree very rarely reproduces sexually in Britain, and that the present population results largely from the planting of cuttings, often resulting in local clones of a single sex. A distribution map was presented, showing that the tree was planted mainly in the floodplains of southern England and eastern Wales, where it was assumed to have been native.

Black poplar no longer occurs in natural floodplain forests, as these have all but totally disappeared as a result of conversion to agriculture. The remaining trees which are of interest are very large trees, probably more than 150 years old, and therefore unlikely to have been genetically polluted by pollen of the imported hybrid poplars.

The endangered status of the British black poplar has only recently been recognized (White 1993). A Black Poplar Group has been set up, and this has produced a draft conservation plan, written and collated by Jonathan Spencer of English Nature (Spencer 1994). The plan estimates that there may be between 2000 and 3000 mature trees in Britain, of which only about 150 females are known. *Populus nigra* is widely dispersed across the country but is rarely concentrated in any numbers (Fig. 1).

In recent investigations using DNA analysis by scientists at the Forestry Commission's Northern Research Station (Forrest and Cottrell, pers. comm.), 21 accessions were studied using the RAPD technique of DNA analysis, and among these only 8 were distinct. If this pattern were continued this would give a genetic base of less than 1000 individuals. There was no close relationship between geographical location and genotype, indicating that the clones may have originated as planting stock which was widely distributed. It would be interesting to compare the British accessions genetically with samples collected in continental Europe.

There is a disproportionate occurrence of male trees, possibly because females were not favoured for planting because the seed-fluff can be troublesome. However, one mature natural stand of *P. trichocarpa* in Washington was said to contain seven males to every female, the females being less drought tolerant, and confined to areas closer to the river. Of the five female British clones analysed, four were found to be genetically indistinguishable, many of these trees may be identical clones, and the clones are not necessarily clustered geographically. Thus the number of genetically distinct individuals may be much smaller than this estimate.

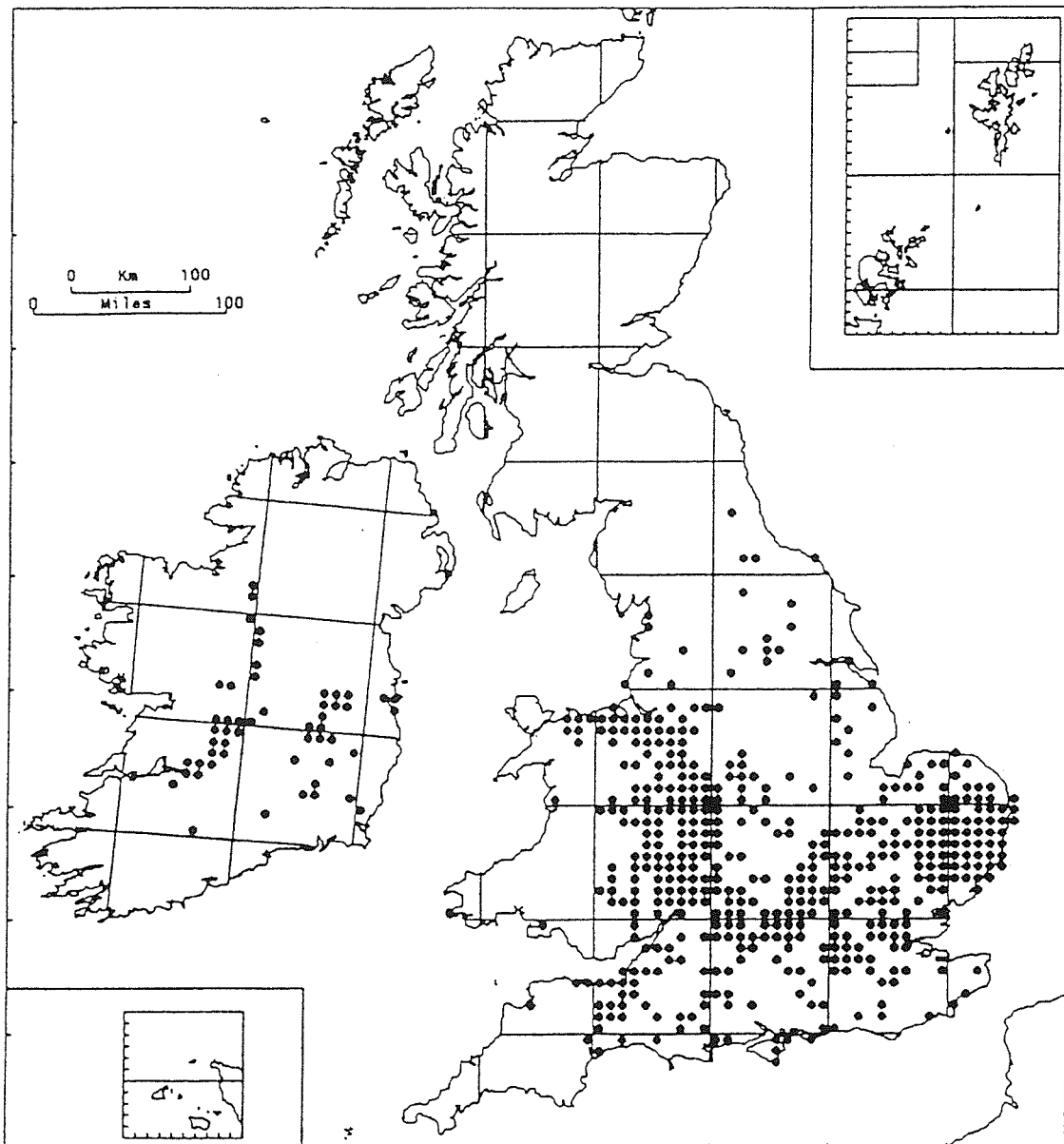


Fig. 1. The distribution of *Populus nigra* in Britain (after Spencer 1994)

### Conservation

The conservation of black poplar in Britain is regarded as a priority for two main reasons:

- a) As Britain's most endangered native timber tree species, it should be conserved according to the principles agreed internationally at the Earth Summit in Rio de Janeiro in June 1992 (Local Agenda 21).
- b) Black poplar is resistant to bacterial canker (*Xanthomonas populi*) and may possess other genetic traits which make it available as a genetic base for breeding commercially useful hybrids.

## Strategy

### **Genetic diversity**

The first priority in Britain is to determine the distribution and genetic diversity of the remaining mature trees. A 'hunt' for these trees has been pursued by the Tree Council through the national newspaper The Daily Telegraph over the last two years, with records being collated by the BSBI and the Forestry Commission. This information needs to be verified and recorded carefully so that a comprehensive register of the remaining authenticated trees can be assembled. Some 75 of the trees have been propagated, and a sample of these has been studied using DNA analysis.

### **In situ conservation**

No natural floodplain woodlands exist in Britain, and the trees which represent the genetic reserve of British black poplar are to be found isolated in hedgerows and on river banks. They are generally overmature and subject to wind damage and decay. In some instances, these trees will be preserved under a Tree Preservation Order issued by a Local Authority, because they have particular aesthetic or historical value. However, from a biological perspective, the priority must be to conserve the existing genetic diversity and this is best achieved, in the long term, through propagation and *ex situ* conservation.

### **Ex situ conservation**

In the absence of clear information about the genetic make-up of the population, the strategy so far has been to collect authentic material from the mature trees and propagate it to produce rooted saplings of known origin. So far, 75 individuals have been propagated in this way, and the saplings have been planted out on three widely separated sites, at wide spacing, so that eventually it will be possible to use them for breeding. As soon as sufficient material is available, these clones will be incorporated into the stool-bed collection which forms part of the National Populetum at Alice Holt.

### **Future work**

The Action Plan (Spencer 1994) makes detailed recommendations for the new conservation measures that are needed. There is much interest on the part of Local Authorities and private individuals in re-establishing black poplar in the landscape (in England and Wales). It is considered important to ensure that nurseries are offering authentic native material, and measures have been considered to encourage this process. Ideally, grant aid would be provided to ensure that a number of nurseries are able to provide authentic planting material. This would require that the source material would be inspected by the Forestry Authority and authenticated as a condition of the grant aid.

More work is also required on the genetic variation, with emphasis on the following questions:

1. How many trees should be regarded as a minimum number to be conserved to retain 90% of the genetic variation into the next generation?
2. How can local organizations readily distinguish trees of different genotypes from individuals of the same clone, using techniques available to local individuals, schools or colleges (such as gel electrophoresis, biometrics studies, etc.)?

3. What limitations are imposed by the limited number of females available?
4. What is the genetic relationship between British and continental varieties of the species, and what is the importance of the British population in the context of the overall strategy for the conservation of black poplar in Europe?

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## Guidelines for maintenance and duplication of *ex situ* field collections of *Populus nigra*

**Sven M.G. de Vries**

Institute for Forestry and Nature Research IBN/DLO de Dorschkamp, Wageningen, The Netherlands

Conservation of genetic resources of *Populus nigra* through *ex situ* field collections usually takes place at three different levels:

- networks of trial plantations (A)
- genebanks as stool-beds (B)
- genebanks as adult tree plots (C).

The purpose of networks of trial populations (level A) is not gene conservation as such, but prevalingly the selection and evaluation of clones on growth performance, health, form and other phenological and morphological characters. However, trial plantations could very well act as safe duplications for gene conservation purposes. They should therefore be involved in the national administrative networks of gene conservation programmes. Involvement of as many clones as possible in the trials should be emphasized, including the less favourable clones in relation to traits that are mainly concerned with wood production.

For an optimal use of the preserved material, it is absolutely necessary to maintain genebanks at both levels of stool-beds and adult trees (B and C). In order to have both female flowers and pollen available for seed production purposes, adult trees are elemental. A quick and complete way of producing many individuals of a certain clone can only be achieved through cuttings. Cuttings in their turn can only be produced in an optimal way through stools.

### **A. Networks of trial plantations**

Guidelines for maintenance of trial plantations can not be given as such; the amount of individuals per clone, spacing, replications and other characteristics are subject to the type of trial that is under evaluation. The only condition for insertion of trial plantations in the *ex situ* field collections is that administration, maps, localization of clone numbers etc. are well recorded (see Genebanks as adult tree plots).

### **B. Genebanks as stool-beds**

For the layout of this type of genebank it is necessary to select a site that is considered a good growing site for *P. nigra* species (soil type and structure, water availability). Four plants per clone are considered to be sufficient unless relatively high numbers of cuttings are to be produced in the near future. The number of stools should be kept at four; every year when the stools are cut, the amount should be evaluated and new cuttings placed on empty spots.

Spacing between the stools should be about 50 cm, preferably planted in lines (rows of four). Between the rows of four one empty space should be respected. Spacing between rows should be about 100 cm.

Stools are to be cut annually for regular production of cuttings of good quality. The height of cuttings should be considered as an important factor. Mechanical cutting usually takes place at the ground level, but maintenance is easier when



cuttings are at a level of about 1 meter above the ground. In order to produce good quality cuttings (minimum size of 1 cm), the stools could be pruned to leave only one or two shoots per stool.

The soil should preferably be kept clean from competing vegetation like grasses. Protection against insects should be considered. Protection against woodborers is necessary. Application of fertilizers is only needed when shoot production is decreasing with age.

Every 6-12 years the stool-bed area should be renewed. This is subject to local judgement, but the quality of the stool-beds decreases with the years. One should be aware of unwanted plants (from root suckers or lost cuttings). These should be checked upon every year and removed immediately.

The clone numbers should be well indicated with permanent labels or tags on the site, and precise maps should be produced, indicating rows of plants, planting distance, sequence of clones and location of labels or tags.

### **C. Genebanks as adult tree plots**

For the layout of this type of genebank it is necessary to select a site that is considered a good growing site for the species (soil type and structure, water availability). Initially six plants per clone should be planted at a spacing distance of 4 to 6 m. After some years half of the trees should be removed in order to keep three trees at wide spacing (8 to 12 m). The ramets can also be directly planted at this distance. Beating up of lost ramets can only take place in the first 4 years (as light competition limits the possibilities later on). Trees should be planted in rows.

The soil should be kept clean from competing vegetation like grasses. Application of fertilizers is not necessary when the site is appropriate for *P. nigra*. Renewal of the total area should be decided when trees are losing numbers. As a special type of genebank with adult trees, line plantations could be considered in order to save land and therefore costs. Shape of adult trees can be better judged in this way. The trees can generally reach higher age than trees in stands.

Clone numbers should be well indicated with permanent labels or tags on the site, and precise maps should be produced, indicating rows of plants, planting distance, sequence of clones and location of labels or tags.

## Plant descriptors for *Populus nigra*

**Jos Van Slycken**

Institute for Forestry and Game Management, Ministry of the Flemish Community,  
Geraardsbergen, Belgium

### Adult trees

For some plant descriptors, it is recommended to use a well-known reference clone, e.g. *P. nigra* cv. Italica, *P. euramericana* cv. Robusta and *P. euramericana* cv. I 214.

#### 1.1. Sex

- 1 male
- 2 female
- 3 monoecious
- 4 hermaphrodite flowers

#### 1.2. Growth habit

(it is recommended to attach a picture or photograph of the adult tree)

- 1 fastigate
- 2 very narrow
- 3 narrow
- 4 slightly spreading
- 5 spreading
- 6 very spreading

#### 1.3. Stem form

- 1 very straight
- 2 straight
- 3 slightly curved
- 4 curved
- 5 very curved or forked
- 6 other, specify

#### 1.4. Flushing date

Date when flushing occurs (in the format WWMMYY)  
weeks before (-) or after (+) the reference clone

#### 1.5. Epicormic shoots

- 1 absent
- 5 present
- 9 frequent

#### 1.6. Burls

- 1 absent
- 5 present
- 9 frequent

#### 1.7. Buttresses

- 1 absent
- 9 present

**1.8. Flowering****1.8.1. Peak male bloom date**

When maximum pollen shedding occurs (in the format WWMMYY)  
weeks before (-) or after (+) the reference clone

**1.8.2. Number of stamens (average of 20 male flowers)**

- 1 15 and less
- 2 from 16 to 25
- 3 from 26 to 35
- 4 36 and more

**1.8.3. Peak female bloom date**

Date of maximum pistillate flower receptivity (in the format WWMMYY)  
weeks before (-) or after (+) the reference clone

**1.8.4. Length of ripe female catkins (average of 20)**

- 1 7 cm and less
- 2 from 8 to 10 cm
- 3 from 11 to 15 cm
- 4 16 cm and more

**1.9. Phototropic sensitivity**

- 3 slight
- 5 medium
- 7 strong

**2. Nursery plants**

- Average of at least 2 years of data
- The plants should be grown under conditions ensuring normal growth and should generally be conducted at one place
- The minimum number of plants per clone is 10; for safety reasons 15 cuttings should be planted
- Cuttings should be taken from 1-year-old main shoots of stools or 2-year-old plants, and should have a diameter of at least 1 cm and a length of 20 cm
- All measurements should be recorded from typical organs and based on two measurements from each of five different plants
- All characteristics on the stem should be recorded before lignification; the color of the stem should be recorded in the summer of the first year
- Unless otherwise indicated, all characteristics of branching should be recorded in the second growing season before lignification in the upper third of the first shoot produced after planting
- All characteristics of the leaf bud should be observed in the central third of the stem after the end of the first growing season
- Unless otherwise indicated, all characteristics of the leaf of the young plant should be observed in the first growing season on the leaves of the second quarter from the top of plants which have not been cut back.

**Reference clones**

*P. euramericana* cv. Gelrica, *P. nigra* cv. Vereecken, *P. euramericana* cv. Blanc de Poitou, *P. euramericana* cv. I 214, *P. euramericana* cv. Heidemij, *P. euramericana* cv. Tardif de Champagne, *P. euramericana* cv. Dorschkamp, *P. nigra* cv. Italica, *P. trichocarpa* cv. Bloom, *P. euramericana* cv. Robusta, *P. euramericana* cv. I 45/51, *P. maximowiczii* x *nigra* cv. Rochester, *P. euramericana* cv. Marilandica, *P. euramericana* cv. Serotina, *P. trichocarpa* cv. Fritzi Pauley (altogether 15 clones).<sup>3</sup>

**2.1. Stem: shape**

- 1 straight
- 2 slightly curved
- 3 curved
- 4 very curved
- 5 sinuous

**2.2. Stem: cross-section at 3/4 of height (at the centre of an internode)**

- 1 circular
- 2 slightly angular
- 3 angular
- 4 winged

**2.3. Stem: felt at 3/4 of height**

- 1 absent
- 9 present

**2.4. Lenticels: shape**

- 1 round
- 2 elliptic
- 3 short linear
- 4 long linear

**2.5. Lenticels: distribution**

- 1 regular
- 2 in regular distributed clusters
- 3 in clusters just under leaf base
- 4 irregular

**2.6. Twigs: total number of twigs longer than 5 cm (in autumn of the first year)**

- |   |                    |                                 |
|---|--------------------|---------------------------------|
| 1 | absent or very few | ref. Gelrica                    |
| 3 | few                | ref. Vereecken, Blanc de Poitou |
| 5 | medium             | ref. I 214, Heidemij            |
| 7 | many               | ref. T. de Champagne            |
| 9 | very many          |                                 |

<sup>3</sup> *P. nigra* specific reference values are until now not available for some descriptors; therefore references of other poplar clones should be used. Reference values are not yet available for the descriptors 2.16, 2.17, 2.27 and 2.32; in a first stage, measured values should be reported.

**2.7. Branch: angle between first 5 cm of branch and stem** (in the second growing season before lignification in the upper third of the first shoot produced after planting)

- 1 very acute
- 2 acute
- 3 weakly acute to right angle
- 4 obtuse

**2.8. Branch attitude**

- 1 curved up
- 2 straight
- 3 curved down

**2.9. Leaf bud: length** (at the end of the first growing season in the central third of the stem)

- 1 very short
- 3 short
- 5 medium
- 7 long
- 9 very long

**2.10. Leaf bud: shape** (at the end of the first growing season in the central third of the stem)

- 1 narrow ovate
- 2 ovate
- 3 broad ovate

**2.11. Leaf bud: shape of the tip** (at the end of the first growing season in the central third of the stem)

- 1 obtuse
- 2 acute
- 3 narrow acute
- 4 acuminate

**2.12. Leaf bud: position in relation to the stem** (at the end of the first growing season in the central third of the stem)

- 1 applied
- 2 adpressed with divergent tip
- 3 divergent

**2.13. Leaf blade: color of the upper side during bud burst** (stage 4 or 5 of bud burst; in the spring of the second year)<sup>3</sup>

- 1 white
- 2 grey
- 3 yellow
- 4 green
- 5 red
- 6 violet
- 7 brown

---

<sup>3</sup> See explanations in Annex.

**2.14. Leaf blade: length**

- |   |            |              |
|---|------------|--------------|
| 1 | very short |              |
| 3 | short      | ref. Italica |
| 5 | medium     | ref. I 214   |
| 7 | long       | ref. Bloom   |
| 9 | very long  |              |

**2.15. Leaf blade: maximum width**

- |   |             |              |
|---|-------------|--------------|
| 1 | very narrow |              |
| 3 | narrow      | ref. Italica |
| 5 | medium      | ref. Robusta |
| 7 | broad       | ref. I 45/51 |
| 9 | very broad  |              |

**2.16. Leaf blade: ratio length of midrib and the maximum leaf width**

- |   |            |
|---|------------|
| 1 | very small |
| 3 | small      |
| 5 | medium     |
| 7 | large      |
| 9 | very large |

**2.17. Leaf blade: angle between the midrib and the second lower lateral vein**

- |   |            |
|---|------------|
| 1 | very small |
| 3 | small      |
| 5 | medium     |
| 7 | large      |
| 9 | very large |

**2.18. Leaf blade: hairiness of the lower side**

- |   |                         |
|---|-------------------------|
| 1 | absent or very weak     |
| 2 | on the veins only       |
| 3 | on the whole leaf blade |

**2.19. Leaf blade: intensity of the hairiness on the lower side**

- |   |        |
|---|--------|
| 3 | weak   |
| 5 | medium |
| 7 | strong |

**2.20. Leaf blade: surface profile**

- |   |                      |
|---|----------------------|
| 1 | flat                 |
| 2 | sunk to the leaf tip |
| 3 | bowl shaped          |
| 4 | roof shaped          |
| 5 | warped               |

**2.21. Leaf blade: general shape of the base<sup>4</sup>**

- 1 wedge-shaped, convex
- 2 wedge-shaped, straight
- 3 wedge-shaped, concave
- 4 broadly wedge-shaped, convex
- 5 rounded
- 6 broadly wedge-shaped, straight
- 7 broadly wedge-shaped, concave
- 8 straight
- 9 weakly cordate
- 10 medium cordate
- 11 distinctly cordate

**2.22. Leaf blade: shape of junction with petiole<sup>4</sup>**

- 1 straight
- 2 shallow
- 3 widely wedge-shaped
- 4 steep
- 5 parallel
- 6 leaf base overlapping

**2.23. Leaf blade: shape of tip<sup>4</sup>**

- 1 narrow acute
- 2 acute
- 3 broad acute
- 4 narrow long acute
- 5 broad long acuminate
- 6 narrow short acuminate
- 7 broad short acuminate
- 8 mucronate
- 9 obtuse

**2.24. Leaf blade: undulation of the margin**

- 1 absent
- 9 present

**2.25. Leaf blade: glands at the base of the leaf**

- 1 absent
- 2 predominantly one
- 3 predominantly two
- 4 predominantly more than two
- 5 variable

**2.26. Petiole: length**

- |   |            |                |
|---|------------|----------------|
| 1 | very short |                |
| 3 | short      | ref. Rochester |
| 5 | medium     | ref. Robusta   |
| 7 | long       | ref. I 45/51   |
| 9 | very long  |                |

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<sup>4</sup> See explanations in Annex.

**2.27. Petiole: ratio length of petiole / length of midrib**

- 1 very small
- 3 small
- 5 medium
- 7 large
- 9 very large

**2.28. Petiole: hairiness**

- 1 absent or very weak
- 3 weak
- 5 medium
- 7 strong
- 9 very strong

**2.29. Stipules: duration of adherence to stem**

- 3 short ref. Marilandica, Serotina
- 5 medium ref. Heidemij
- 7 long ref. Gelrica, Robusta

**2.30. Stipules: attitude**

- 1 adpressed
- 2 divergent

**2.31. Terminal bud: time of appearance of green tips (stage 2 of bud burst; in the spring of the second year)<sup>6</sup>**

- 1 very early
- 2 very early to early ref. Rochester
- 3 early ref. Fritzi Pauley
- 4 early to medium ref. I 214
- 5 medium ref. Italica
- 6 medium to late ref. I 45/51
- 7 late ref. Marilandica
- 8 late to very late ref. Blanc de Poitou
- 9 very late ref. Serotina

**2.32. Plant: time of termination of growth of the main shoot (in the first year)**

- 1 very early
- 3 early
- 5 medium
- 7 late
- 9 very late

**References**

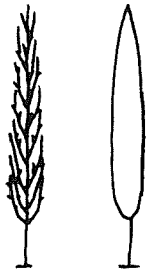
- FAO. 1990. Catalogue international des cultivars de peupliers. Document: FO:CIP: Catalogue/90.
- UPOV. 1981. Guidelines for the conduct of test for distinctness, homogeneity and stability, Poplar (TG/21/7). International Union for the Protection of New Varieties of Plants, Genève, Switzerland.
- IPGRI. 1994. Descriptors for walnut (*Juglans* spp.). International Plant Genetic Resources Institute, Rome, Italy.

<sup>6</sup> See explanations in Annex.

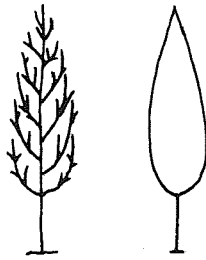


Annex: Explanations and methods

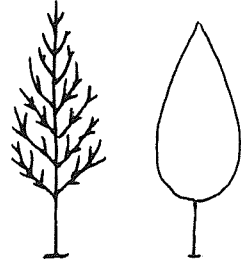
Ad 1.2. Growth habit of the adult tree



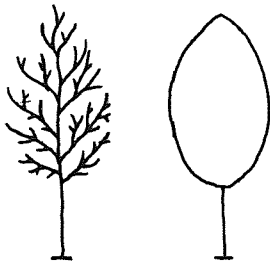
1 fastigate



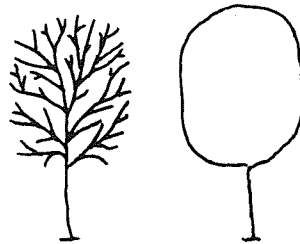
2 very narrow



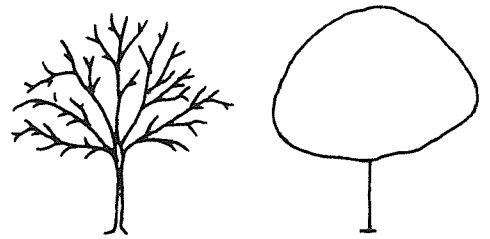
3 narrow



4 slightly spreading

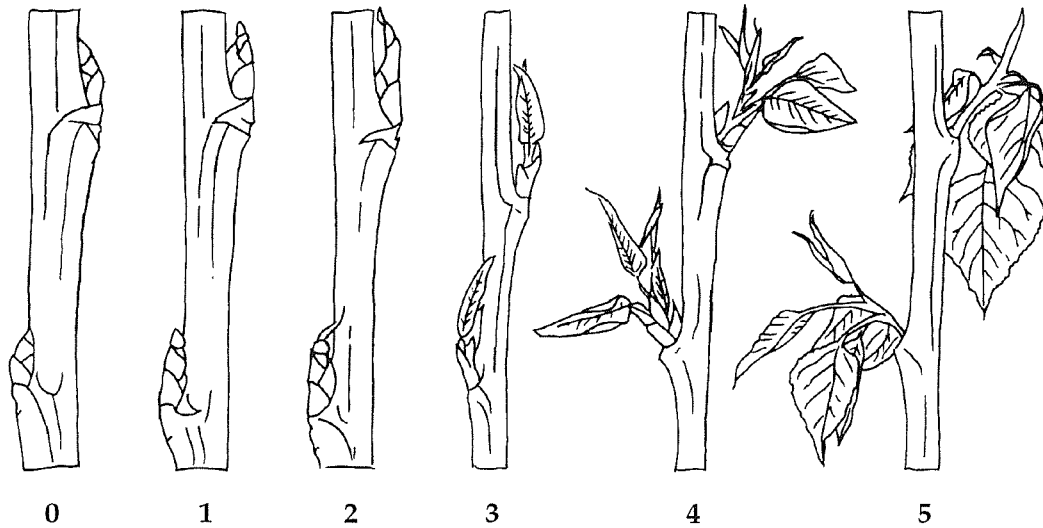


5 spreading



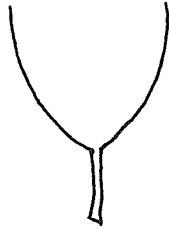
6 very spreading

Ad 2.13. and 2.31. Stages of bud burst

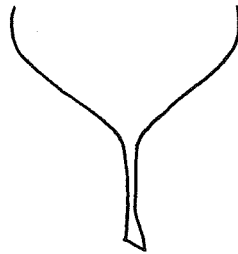


- 0 Dormant bud completely enveloped by the scales (= perulae)
- 1 Bud swelling with scales slightly diverging showing a narrow yellow margin; presence of one or more droplets of balsam
- 2 Bud sprouting, with tips of the small leaves emerging out of the scales
- 3 Buds completely opened with leaves still clustered together; scales still present
- 4 Leaves diverging with their blades still rolled up; scales may be present or absent
- 5 Leaves completely unfolded (but smaller in size than mature ones); lengthening of the axis of the shoot evident; scales absent.

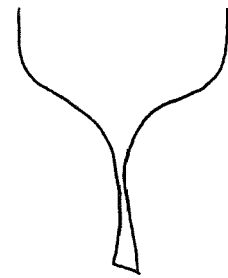
Ad 2.21. Leaf blade: general shape of the base



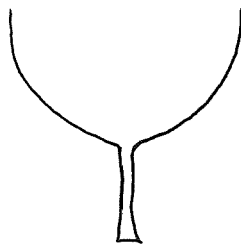
1 wedge-shaped, convex



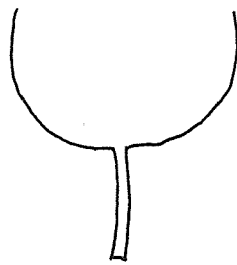
2 wedge-shaped, straight



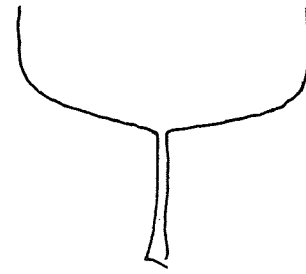
3 wedge-shaped, concave



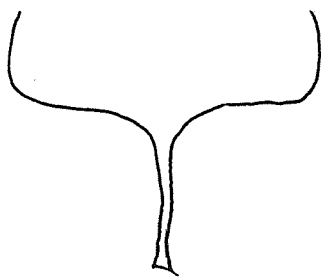
4 broadly wedge-shaped, convex



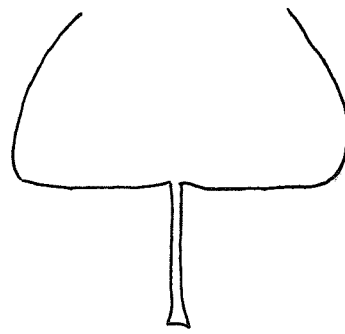
5 rounded



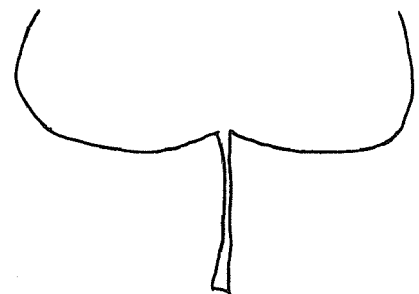
6 broadly wedge-shaped, straight



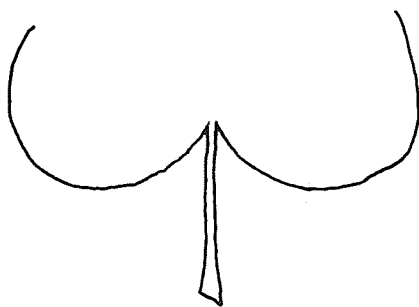
7 broadly wedge-shaped, concave



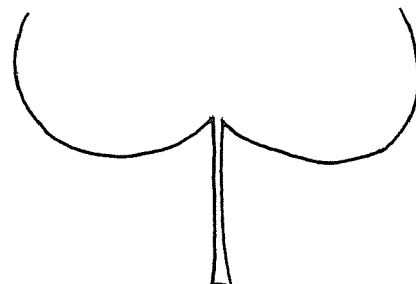
8 straight



9 weakly cordate

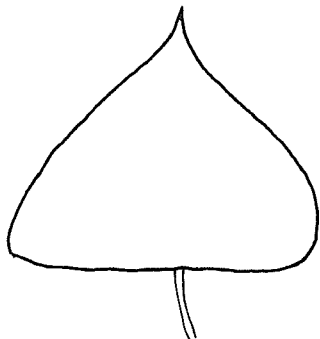


10 medium cordate

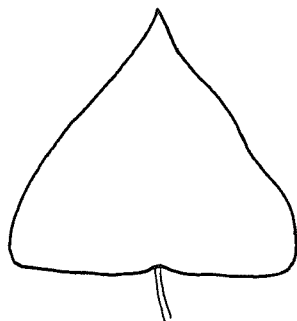


11 distinctly cordate

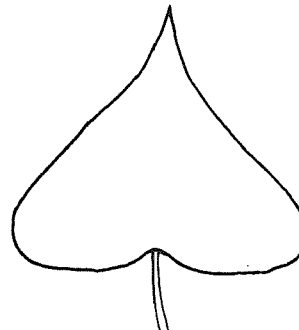
Ad 2.22. Leaf blade: shape of junction with petiole



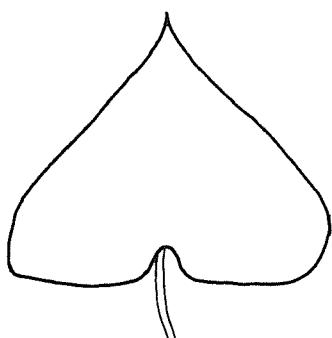
1 straight



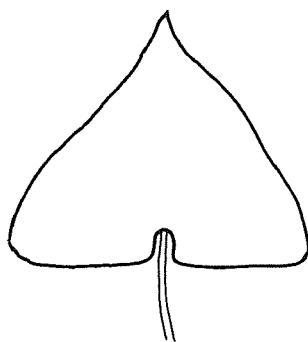
2 shallow



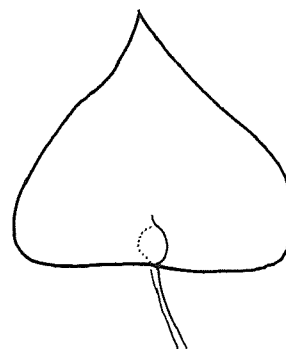
3 widely wedge-shaped



4 steep

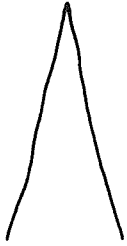


5 parallel



6 leaf base overlapping

Ad 2.23. Leaf blade: shape of tip



1 narrow acute



2 acute



3 broad acute



4 narrow long acuminate



5 broad long acuminate



6 narrow short acuminate



7 broad short acuminate



8 mucronate



9 obtuse



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