

## Progress on national activities on gene conservation of *P. nigra* in Belgium

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Black poplar (*Populus nigra* L.) is considered to be one of Belgium's rarest native trees. A detailed survey carried out during the past five years estimates that there are at least 360 surviving relict trees. Belgium has a long history of poplar breeding, which is still going on. In the context of the poplar breeding programme and of the conservation of indigenous tree species, the conservation of black poplar has been an important research activity since 1960. Here we report on the Belgian activities on gene conservation of *P. nigra* from January 2000 till May 2003.

### **Field inventories**

Most relict trees were found in the Dender valley in mid-west Belgium (the province of Hainault). The species is extremely rare in the Meuse valley (only five locations detected) and the Scheldt valley (two locations detected). A detailed inventory carried out near the river IJzer in the northwest of Flanders (the province of West-Vlaanderen), near the French border, revealed 99 old black poplar trees. Presumably, all of them were propagated vegetatively and planted by man. Based on the sex of the trees (all of them are female) and on a preliminary study, they probably represent only two different genotypes. A detailed DNA analysis (with AFLP markers) of all 99 trees is under way.

No natural regeneration of black poplar is observed in Belgium. However, introgressive hybridization with *P. × canadensis* is reported along the river Meuse. A DNA analysis revealed that seedlings originated from hybrid × hybrid crosses and that *P. nigra* × hybrid crosses colonize the riverbanks of the Meuse. These seedlings seem to be well adapted to the river dynamics and the local climate.

### **Policy and legislation**

An increasing interest and availability of funds for conservation activities is observed.

### **Research**

#### **Finalized research projects**

A research project running from December 2000 to November 2001, financed by the Flemish Government, was concerned with the restoration of black poplar along the river Meuse on the Dutch–Belgian border (Vanden Broeck *et al.* 2002). The aim of this project was to study whether natural regeneration of black poplar occurs in the study area and to investigate the amount of introgression of foreign genes in the offspring of female black poplars.

#### **Mating system and introgression**

A study was conducted to investigate whether *Populus × euramericana* (Dode) Guinier (syn.: *P. × canadensis* Moench.) and the fastigiated Lombardy poplar (*Populus nigra* L. var. *italica* Moench.) hybridize spontaneously with native black poplar. In the presence of *P. nigra* pollen, *P. × euramericana* was at a selective disadvantage in fertilizing black poplar females. The mating system of *P. nigra* in the orchard under study deviated strongly from panmixis. This research was carried out in collaboration with the Flanders Interuniversity Institute for Biotechnology (the Department of Molecular Genetics, Department of Plant Genetics, Ghent) within the EUROPOP project. Data analysis and publication of the results is under way.

Controlled cross experiments carried out with heterospecific pollen mixtures confirmed the presence of conspecific mating advantage.

### **Genetic, morphological and phenological diversity in the EUFORGEN *P. nigra* core collection and the Belgian *P. nigra* genebank**

A field trial was established in winter 2000 using cuttings of 100 Belgian *P. nigra* individuals, 30 genotypes of the EUFORGEN *P. nigra* core collection and 20 clones of the EUFORGEN reference collection. Morphological leaf characteristics and phenological data were recorded during the first and second growing season. The genetic diversity is currently being studied with microsatellite markers. DNA fingerprinting based on AFLP markers of the whole Belgian *ex situ* collection is also carried out in order to identify identical genotypes.

### **New projects and proposals**

A proposal for a national project on influences of exotic species on the recovery of endangered native tree species, with poplar as a model tree, was submitted to the Flemish Government.

### **Practical implementation**

#### ***In situ* conservation measurements**

There are no natural populations of black poplar in Belgium.

#### ***Ex situ* conservation measurements**

The complete collection of 360 trees is screened for clonal duplicates and genetic diversity with AFLP and microsatellite markers. A total of 12 field plantations were established in April 2002 with 970 black poplars representing the different genotypes of the Belgian *ex situ* collection. The EUFORGEN core collection was also planted together with the Belgium *ex situ* collection on two different sites (Limburg and Vlaams-Brabant).

#### **Rehabilitation and afforestation efforts**

As the relict individuals along the river Meuse (the Dutch–Belgian border) are too sparse to act as a seed source for recolonization, reforestation efforts were started. At this site, a nature development project aims to restore the river dynamics and the floodplain habitats over a distance of 45 km and in an integral nature reserve area of 3000 ha. A total of 400 two-year old trees originating from cuttings representing 20 indigenous genotypes were planted on the riverbank in April 2002. In order to avoid genetic and non-genetic risks, 150 new genotypes from natural populations from the river Rhine, located within 200 km of the restoration site, are propagated in the nursery. They will be planted in winter 2004 on different locations in the area in order to form meta-populations that can act as seed sources for the natural colonization of the river banks.

#### **Public awareness**

A press report was circulated concerning the restoration activities of black poplar along the river Meuse and the current new findings concerning introgression. Based on this press report, two daily papers published an article on black poplar with picture on their regional pages. The restoration of black poplar was also on the local radio news (Radio-2 Limburg).

#### **References**

- Vanden Broeck A., H. Jochems, V. Storme, and K. Van Looy. 2002. Mogelijkheden tot herstel van levensvatbare populaties Zwarte populier (*Populus nigra* L.) langsheen de Grensmaas. [Strategies for restoration of natural populations of Black poplar (*Populus nigra* L.) along the Maas valley]. Vlaams Impulsprogramma Natuurontwikkeling. Eindrapport 0010. 62 pp.