Rehabilitation of the European Black poplar (*Populus nigra* L.): case studies from Italy, Belgium and Germany

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Floodplain forests are among the most diverse and important ecosystems in Europe.

*Populus nigra* is the most representative tree species of these riparian habitats.
Biology and ecology

- *P. nigra* is a typical pioneer species
- natural regeneration depends on the river dynamics and hydrological conditions
- it initiates the hydromorphological processes of island formation
- it dominates the early successional stage of riparian forests
Importance and use

- indicator species for biodiversity of riparian woodlands
- it contributes to the natural control of flooding and water quality
- planted East EU Countries for domestic use
- parent pool in breeding programs
- used for soil protection, afforestation of polluted industrial areas, restoration
Restoring Black poplar populations ... Why?
*P. nigra* trees perform scattered on rivers

The species is threatened by extinction in large parts of the distribution area (IUCN Red List of threatened species)
Threats to genetic diversity

- alteration of riparian ecosystems by human activities
- overexploitation of natural resources and faster-growing hybrids poplar cultivation
- gene introgression from cultivated clones and \textit{P. nigra} var. \textit{italica}
Scattered Broadleaves Network - Technical Papers

technical papers produced by the former Noble Hardwoods Network:

- Bibliography on *Ulmus* spp
- Evaluation of genetic resources in Noble Hardwoods
- *In situ* conservation and promotion of Noble Hardwoods
- Inventories of Noble Hardwoods genetic resources
- Common minimum descriptors for Noble Hardwoods
- Long term conservation strategies

technical papers produced by the former *Populus nigra* Network:

- European Database of *Populus nigra* Clones
- Technical Bulletin: *in situ* conservation of *Populus nigra*
- *Populus nigra* bibliography
- Clone passport data
- Dynamic processes in riparian ecosystems - Implications for *P. nigra* gene conservation strategies
- Minimum list of descriptors for inventories of *P. nigra* stands
- *Populus nigra* EUFORGEN Core Collection of Clones
- Poplars and biodiversity
- *Populus nigra* identification sheet
- *Ex situ* conservation of Black poplar in Europe
EUFORGEN

Scattered Broadleaves Network

• to maintain genetic diversity (in-situ and ex-tu methods)
• to conserve the still existing *P. nigra* genetic resources available (European network of GCUs and CAP)
• to encourage the dynamic conservation of the genetic resources
conservation and restoration of riparian habitats are of high priority in Europe nowadays …

…restoration projects aiming to restore river ecosystems can effectively contribute to *P. nigra* conservation …
Identifying potential areas for *P. nigra* restoration
lack of ecosystem dynamics

presence of *P. nigra* mature trees

lack of ecosystem dynamics

lack of *P. nigra* adult trees

ecosystem dynamics

lack of *P. nigra* adult trees
1. Italian site: main characteristics

- upper/mid Po river catchement
- 30 ha included in the Po River fluvial Park
- gravel and sandy alluvial cover
- presence of river banks
- floodplain width 500-2500 m
- frequent flooding occurrence
- former cultivated area (crops, poplars)
- high risk of introgression
2. Belgian site: main characteristics

• middle course of the Meuse river
• 17 hectares
• gravel-loamy alluvial cover
• presence of riverbanks, dikes
• floodplain width 300-2500 m
• occasionally flooding occurrence
• agriculturally used as meadows, mining
• high risk of introgression
3. German site: main characteristics

- lower Oder river valley
- 53 ha included in the Lower Oder Valley National Park
- fine sandy soil
- presence of dikes, polder systems
- artificially flooding occurrence
- agriculturally used as meadows
- high risk of introgression
Common goals of the three restoration projects

• to restore *P. nigra* populations supporting dynamic conservation

..... to establish stands able to produce seeds of such quantity and genetic quality to initiate regeneration and contribute to the evolution of local genetic resources ...
Common goals of the three restoration projects

- to test: planting material type, planting material origin, spacing, planting layout & patterns, pre-planting measures, after planting care

- to restore river dynamics & ecosystems (bed widening, bank lowering, side channel reconnection)
Genetic, demographic and ecological factors considered

- genetic origin of planting material (adaptation to environmental conditions)
- genetic variability to limit inbreeding (proportion of unrelated genotypes, balanced sex-ratio, half-sib, full-sib families)
- pattern of planting (mosaic of clonal plots vs clonal mixtures)
- non native species removal to limit the risk of introgression
Results

Italian site, Po river

- 19 hectares afforested (2005-2008)
- genotypes from gene bank national collection
- 2-year old unrooted poles
- 2 hectares GCU (80 italian *P. nigra* genotypes)
- success rate from 70% to 90%
Results

Belgian site, Common Meuse river

- 2 hectares afforested (2002, still ongoing)
- 1-year old rooted stems, 2-year old unrooted poles
- Genotypes from national gene bank collections, from controlled crosses, from neighbouring regions
- Success rate from 20% to 80%
Results

German site, Oder river

• 16 hectares afforested (2005-2007)
• 4000 poplars planted genotypes of local origin (seedlings, half-sib families, poles, seeds)
• success rate from 50% to 60%
Further management

- re-planting and integrating
- removal of unsuitable clones
- establishment of new restoration sites
- create a network of different restored patches with different ages
- genetic monitoring
General consideration

the success rate depends on:

• soil characteristic of the site
• pre-planting measures
• water availability in the first year
• after planting care (watering, weed control fencing, sheltering ...)
• climate conditions
• cooperation among river managers, private land owners, forest researchers and nature conservationist
the main humps to be over are:

• the availability of suitable genetic material for initial planting
• site preparation in nature conservation areas
• after planting management
• funding
**Peuplier Noir**

*Populus nigra*

Le peuplier noir, *Populus nigra* L., est une essence dominante le long de nos fleuves et rivières. Aujourd'hui, la diversité de cette espèce se trouve menacée par les activités humaines au sein de la ripisylve et les hybridations possibles avec les peupliers ornementaux et cultivés.


Le bruissement que font ces feuilles au moindre souffle de vent rappelle le bruit confus d'une foule.

Ce site a pour objectif de vous faire découvrir ce patrimoine naturel, mais aussi de vous informer de la nécessité de le protéger et de le replanter.

N'hésitez pas à nous contacter pour nous faire part de vos remarques et de vos connaissances sur ce géant si fragile.
native poplars can be successfully used in restoration of river ecosystems ... as pioneer species they can start the natural evolution of riparian forests in a short time

the artificial *in-situ* gene conservation units, if established on suitable sites and with appropriate material may be founder populations for new establishments and source for gene flow into neighbouring scattered natural stands
matching the needs for 
*P. nigra* gene conservation 
and river restoration

... more trees ... better rivers

and better life ....
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