Black alder

Alnus glutinosa

Davorin Kajba[1] and Joso Gračan[2]
[1] *Faculty of Forestry, Zagreb, Croatia*
[2] *Forestry Research Institute, Jastrebarsko, Croatia*

These Technical Guidelines are intended to assist those who cherish the valuable black alder genepool and its inheritance, through conserving valuable seed sources or use in practical forestry. The focus is on conserving the genetic diversity of the species at the European scale. The recommendations provided in this module should be regarded as a commonly agreed basis to be complemented and further developed in local, national or regional conditions. The Guidelines are based on the available knowledge of the species and on widely accepted methods for the conservation of forest genetic resources.

Biology and ecology

Black alder (*Alnus glutinosa* (L.) Gaertn) belongs to the genus *Alnus*, family Betulaceae.

Black alder is a monoecious species with unisexual flowers. Flowering starts before bud burst. The seed matures during September and October and the germination rate is 40-80%. In its natural habitat, black alder starts producing fruit relatively early, and once strobili change from green to brown, they can be collected. The trees usually reach a height of 25 m and in very rare cases up to 40 m. The trunk diameter of old trees is normally between 35-40 cm, and the maximum recorded is 175 cm.

In addition to natural seed stands, black alder very often forms coppice. This is due to the strong ability of the species to sprout from stumps, especially while relatively young. Black alder trees grow intensively in height between years five and ten, and in diameter between the fifteenth and twentieth year of age.

In the mountainous regions of central Europe, black alder is found at altitudes of 1500-1800 m It prefers a moderate to cold climate and grows best in deep soils where the water table is high. Optimum precipitation for this species is 800-860 mm per year, and it does not withstand stagnant water or high soil acidity.

Alnus glutinosa (L.) Gaertn.

Distribution

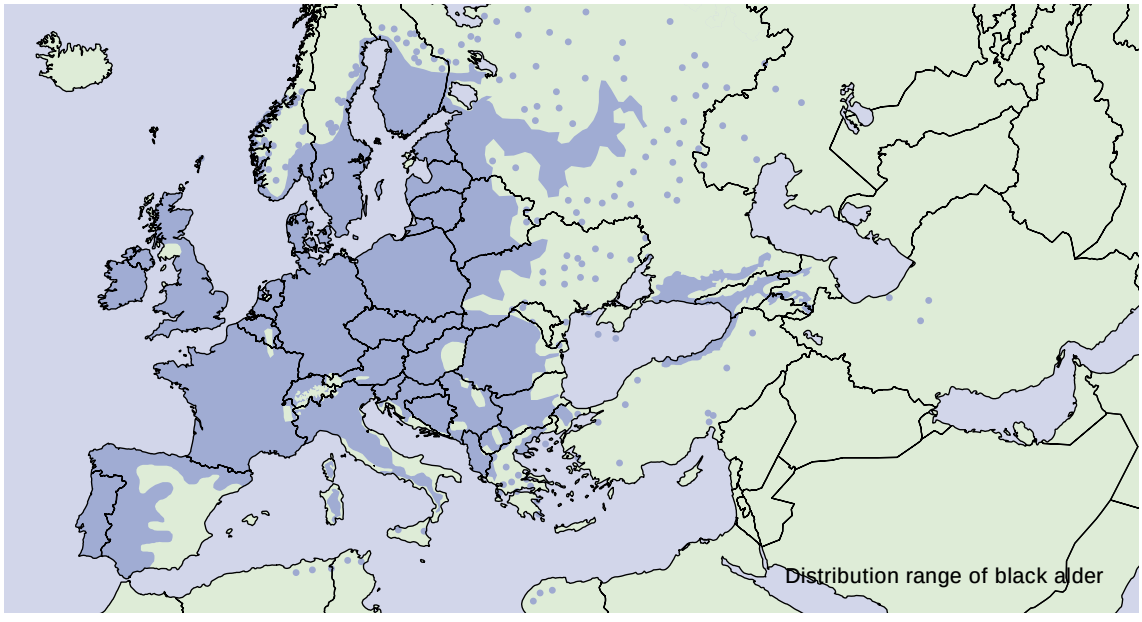
Black alder is found all over Europe from Ireland in the West to western Siberia in the East, as far South as North Africa and up to 65° North. It has been introduced into the Azores and the USA. Its range both in Europe and Africa is markedly scattered.

Importance and use

Owing to its multiple uses in silviculture and the wood industry, black alder is considered a very important forest species. It is renowned as a very adaptable and fast growing species. It also has the ability to fix nitrogen that enriches the soil, due to the symbiotic actinomycetes found on the root nodules.

Genetic knowledge

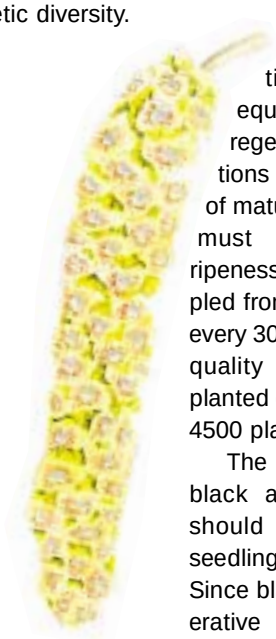
The large distribution range of black alder of relatively small isolated populations has led to extensive genetic diversity. Genetic differentiation of local populations occurs as the result of various selection pressures to which local populations are exposed. These include ecological differences (climatic, edaphic, altitudinal) and the result of inbreeding in small populations. The genetic differences between provenances occur throughout the range of the species. It is therefore particularly important to protect the existing diversity of natural populations and to enhance the range of black alder by establishing plantations on suitable sites.



Distribution range of black alder

Threats to genetic diversity

Extensive difficulties were encountered in the early 20th century with black alder plantations in Germany. Many plantations were lost due to the lack of adaptation to local conditions, causing inadequate development, early flowering, crooked trunks and slow growth. It is recommended that autochthonous populations, that are well adapted to local conditions, are used for plantations of this species. Thus, the major threat to loss of genetic diversity is the lack of suitable and specific growing conditions. The extensive adaptation of populations to local conditions means that they require these specific conditions to survive. As these habitats are lost, so is the genetic diversity.



Guidelines for genetic conservation and use

Black alder can not be naturally regenerated as other broadleaved forest tree species. Following fertilization, there is a 30 day seed period, followed by a further 30 days as cotyledons. The supply of nutrients during this germination period is critical as well as sufficient moisture and light, to ensure the development of the leaves and stem. In natural stands of black alder these conditions are almost impossible due to weed vegetation and old tree canopies. The natural regeneration of black alder is successful when the humus layer of the soil is removed to promote germination.

To generate progeny from a natural population to be genetically equivalent that from natural regeneration, several conditions must be met: the felling of mature trees in a given stand must coincide with seed ripeness; seeds must be sampled from 10-50 diverse trees on every 30-40 ha of area, and good quality seedlings should be planted on a prepared site (3000-4500 plants/ha).

The *ex situ* conservation of black alder genetic resources should be undertaken using seedling or clonal seed orchards. Since black alder reaches regenerative maturity relatively early, seedling seed orchards can be used if seeds are sampled from 200-300 trees throughout all natural populations (which represent one seed unit or ecological race). For the establishment of clonal seed orchards it is necessary to select about 100 normal (typical) and plus trees from one seed zone or region. In this way the clonal seed orchard established would represent a “breeding population”, and could be used for conservation as well as for breeding purposes.

These Technical Guidelines were produced by members of the EUFORGEN Noble Hardwoods Network. The objective of the Network is to identify minimum genetic conservation requirements in the long term in Europe, in order to reduce the overall conservation cost and to improve the quality of standards in each country.

*Citation: Kajba D. and J. Gračan. 2003. EUFORGEN Technical Guidelines for genetic conservation and use for black alder (*Alnus glutinosa*). International Plant Genetic Resources Institute, Rome, Italy. 4 pages.*

Drawings: Alnus glutinosa*, Giovanna Bernetti. © IPGRI, 2003.*

ISBN 92-9043-566-6

Selected bibliography

Krstinič, A. 1994. Genetics of Black Alder (*Alnus glutinosa* /L./ Gaertn.). Annales Forestales, 19/2:33-72, Zagreb, Croatia.

Krstinič, A., J. Gračan and D. Kajba, 2002. *Alnus* spp. genetic resources conservation strategy. Pp. 44-49 *in* Noble Hardwoods Network, Report of the fourth meeting, 4-6 September 1999, Gmunden, Austria, and the fifth meeting, 17-19 May 2001, Blessington, Ireland, (Turok, J., G. Eriksson, K. Russell and S. Borelli, compilers). IPGRI, Rome, Italy.

EUFORGEN Secretariat c/o IPGRI
Via dei Tre Denari, 472/a
00057 Maccarese (Fiumicino)
Rome, Italy
Tel. (+39)066118251
Fax: (+39)0661979661
euf_secretariat@cgiar.org

More information

www.euforgen.org