Sycamore

Acer pseudoplatanus

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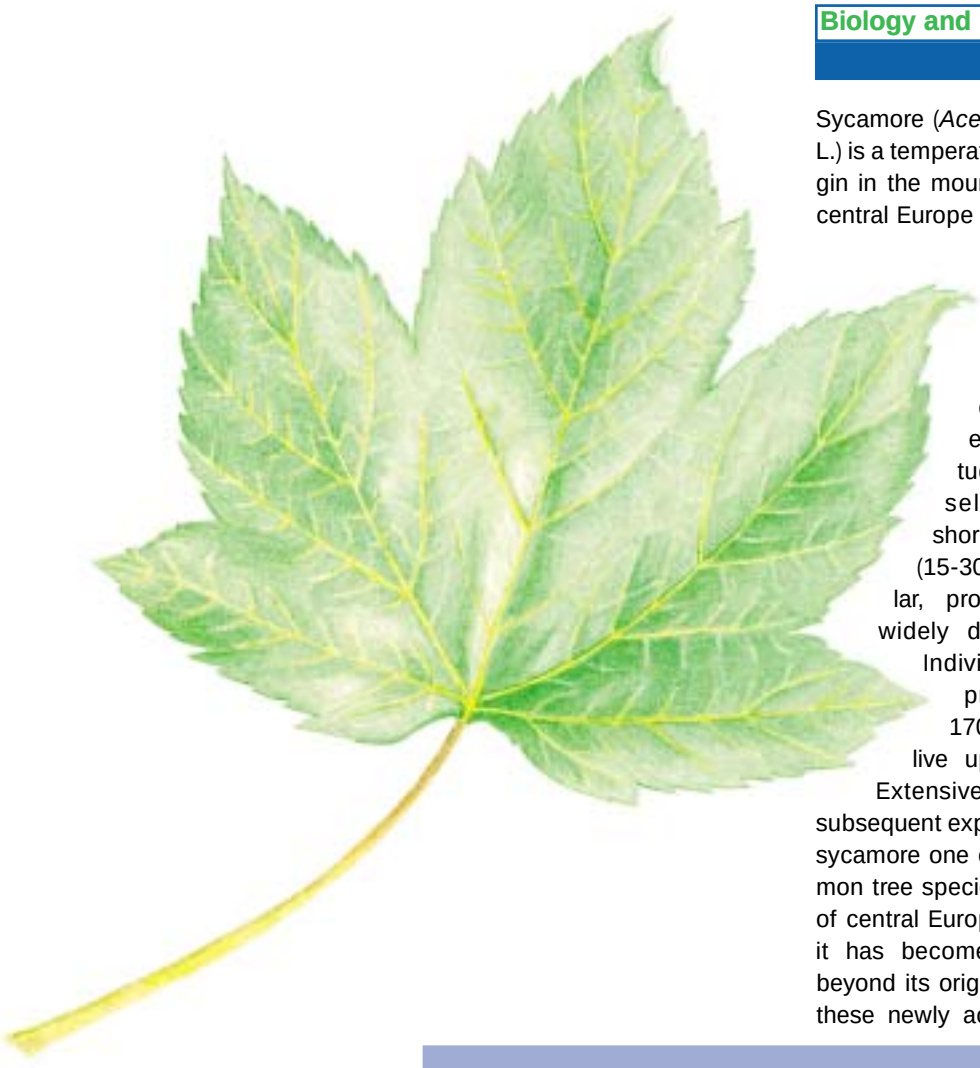
These Technical Guidelines are intended to assist those who cherish the valuable sycamore genepool and its inheritance, through conserving valuable seed sources or use in practical forestry. The focus is on conserving the genetic diversity of the species at the European scale. The recommendations provided 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

Sycamore (*Acer pseudoplatanus* L.) is a temperate tree with its origin in the mountainous areas of central Europe and is the largest member of the genus *Acer* in Europe. It has strong invasive properties owing to its wide ecological amplitude, at least partial self-compatibility, short generation time (15-30 years) and regular, prolific production of widely dispersed seeds. Individual trees can produce up to 170 000 seeds and live up to 500 years. Extensive planting and subsequent expansion has made sycamore one of the most common tree species in urban areas of central Europe. Consequently it has become naturalized far beyond its original range. Within these newly acquired ranges it

prefers areas influenced by human activities and is often among the first species to invade abandoned pastures. Since it is invasive and exotic in many parts of Europe, sycamore has caused some controversy, with conservation bodies trying to eradicate the species where it threatens to take over remnant ancient woodlands.

Sycamore is a hardy tree, withstanding exposure and industrial pollution. Mature trees are frost hardy and tolerant to salt-laden winds along coasts. It is a useful windbreak, both around upland farms and in coastal areas, and is well suited for protecting forests against falling rocks due to its capacity for healing wounds. Sycamore thrives in calcareous soils, and requires a permanent and good water supply, but avoids wet soils. Few other tree species respond so well to increased nitrogen levels.

The reproductive system is complex. The majority of flowers are morphologically hermaphrodite, but all flowers are functionally unisexual. In each inflorescence there are both male and female flowers - but the number of male flowers is higher, and the duration of the male flowering sequence is always much longer than that of the female sequence. At the tree level, half of the individuals function predominantly as male or female, but there may be some annual variation in sex expression. Flowers are a vital source of pollen and nectar for bees and bumble bees, which are the primary vectors for pollination. A small proportion of the flowers are also pollinated by wind. Bunches of fertilized flowers develop into winged seeds or “helicopters” which, when ripe, spin away from the parent tree in the autumn wind. Winter dispersal is important in the Alps.

Juvenile growth is faster than that of most European tree species, growing more than 1 m annually on base rich soils. Seedlings are tolerant to low light levels, but this property diminishes with maturity.

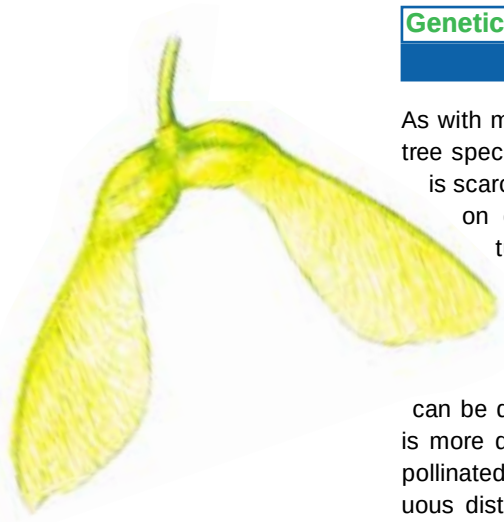
Distribution

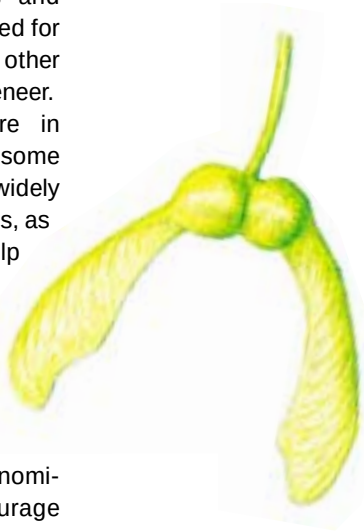
The natural range of sycamore covers most of Europe with the exclusion of the most northern parts, and the extreme easterly limit is at the Caspian Sea. It is especially common in mountainous areas. Although it is not native to the British Isles, Belgium, the Netherlands, northwest France, northern Germany or Scandinavia, it is flourishing in these countries and in many places is considered naturalized.

Importance and use

Sycamore timber is creamy white, clean and free from unpleasant smells or tastes, making it ideal for uses associated with food. It is widely used for furniture making and joinery, and is excellent for flooring. The hard, strong timber can be worked to a very smooth finish but it is not durable outdoors without a preservation treatment. Occasional trees produce “wavy-grained” or “fiddle-back” wood, which is very valuable and highly prized by cabinetmakers and craft workers. This is reserved for making the best violins, other musical instruments and veneer.

The role of sycamore in forestry is variable, but in some European countries it is widely used for the above purposes, as well as for sawn and pulp wood and even for fire wood. Due to its highly valuable timber, short generation turnover and regular seed set, sycamore can potentially increase in importance economically, which may encourage breeding activities.





Genetic knowledge

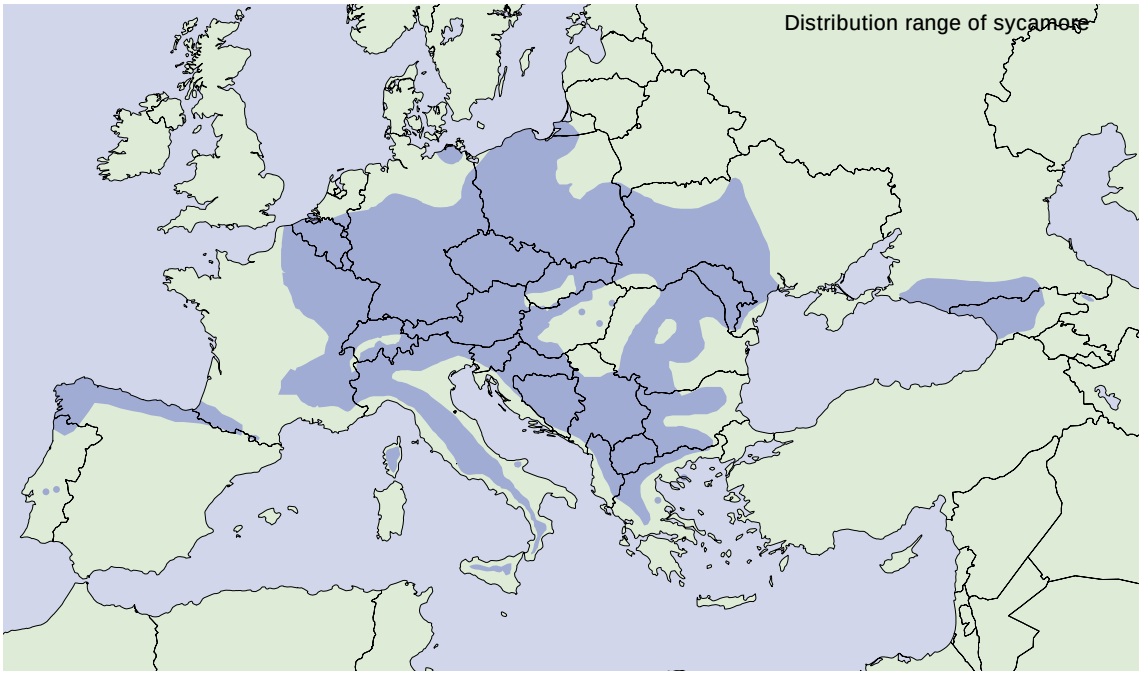
As with most broadleaved forest tree species, genetic knowledge is scarce for sycamore. Based on certain ecological features of the species, such as insect pollination, scattered occurrence and self-compatibility, it can be deduced that sycamore is more differentiated than wind pollinated species with a continuous distribution, such as birch and spruce. Species in which much of the genetic variation exists between populations run a greater risk of erosion than species with greater intra-population variation. In Germany and Switzerland, sycamore landraces have developed when introduced to new locations. However, this has not been the case after 250 years growing in Norway, indicating that more time is needed.

Threats to genetic diversity

Although sycamore is not an endangered species, it may be under threat at the population level. Often growing in scattered, mixed stands, the effective population size could be insufficient to maintain the genetic diversity. This is thought to be particularly true at the margins of the distribution range. In Ireland, where sycamore is naturalized, it is under threat by the grey squirrel. Forest management practices can also pose a threat in mixed stands if they over favour the main species.

Guidelines for genetic conservation and use

Genetic conservation aims at ensuring continuous survival and adaptability of the target species. These proposed guidelines reflect the view that sycamore is not considered an endangered species. Sycamore has significant potential for forestry, and its use as a timber resource should be promoted. In most cases this will require intensive management, since on fertile soils sycamore is easily suppressed by beech. If sycamore is regenerated artificially, special attention should be given to the choice of seed source. For gene conservation, a low intensity *in situ* conservation approach is recommended. One possibility is to include already existing nature reserves in gene conservation programmes. This requires the reserves to be managed to maintain a broad genetic base in species, so that the potential for future adaptation is safeguarded. A further step of gene conservation is to establish a network of *in situ* conservation stands. To capture the existing adaptability, at least 20 populations of about 50 flowering and seed producing individuals, spread over the natural distribution area of the species, should be selected and allowed to differentiate over time. The marginal areas in the distribution should also be covered. When selecting conservation stands, putative hybrids with ornamental cultivars (colour and leaf variants) should be excluded. The *in situ* network should secure adaptation to changing environments over the whole range of the species. In areas where stands of 50 sycamore trees are not available, *ex situ* collections should be established to complement the *in situ* approach. The *ex situ* collections can be used for both conservation and seed production, and should be designed to enhance variability within a region and avoid inbreeding. Secondary breeding activities for timber improvement are also conceivable.



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The distribution map was compiled by members of the EUFORGEN Noble Hardwoods Network based on an earlier map published by A. Boratyński in 1999 in Systematyka i geograficzne rozmieszczenie. In: W. Bugała (Ed.). Klony. Nasze drzewa leśne, Monografie popularnonaukowe 18, PAN Instytut Dendrologii, Poznań-Kórnik. (in Polish)

EUFORGEN

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.

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