

Status of sycamore (*Acer pseudoplatanus* L.) in its native range

Pierre Binggeli

Introduction

Sycamore (*Acer pseudoplatanus* L.) is one the commonest and most talked about tree species in the British Isles, yet very little is known about the status of the species in its natural range. The linguistic barriers existing between anglo-saxons and the rest of Europe must be chiefly responsible for this lack of knowledge. In this poster a short overview of the status of sycamore in its native range, based on an extensive literature, is presented.

Distribution

The distribution of sycamore is associated with that of beech (*Fagus sylvatica*) and is centred in Central Europe. The sycamore range extends from Belgium to the Caucasian mountains and from northern Germany to southern Italy. Sycamore does not naturally occur in most of the oceanic areas of western Europe but following planting it has become widely naturalised. This mountain species is found at low altitudes in northern Germany but its altitudinal distribution shifts upwards at lower latitudes (Fig. 1). In any region the altitudinal range varies from 700m to 1300m and it is found up to the treeline in many parts of Europe.

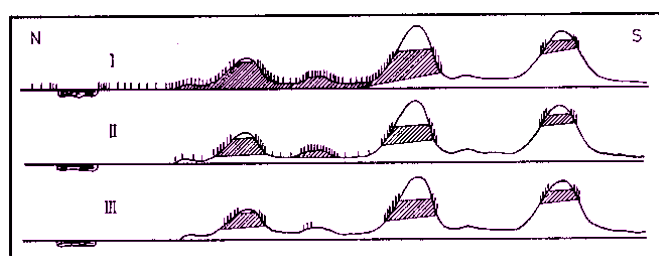


Figure 1: Latitudinal variation in altitudinal distribution of I. beech, II. sycamore and III. *Abies alba*.

Sycamore and humans

Sycamore distribution and abundance have been greatly affected by human activities. The species has been much planted and as it supplies valuable timber it is favoured by foresters. In mountain pastures sycamore is the tree which provides cattle with shelter during hot summer months and in Austria trees used to pollarded for cattle fodder. In these mountain regions sycamore, a tree which can live up to

500 years, has been venerated just like oak has been in the British Isles. In the eastern Swiss Alps a major political treaty was signed in 1424 in the village of Trun under a sycamore. This sacred tree was blown down in 1870 and its remains are now preserved in the local museum. A new tree was allegedly propagated from a shoot of the old individuals (Fig. 2).



Figure 2: This sycamore growing in the village of Trun (eastern Swiss Alps) was allegedly propagated from a shoot of the old sacred individual blown down in 1870. Under the original tree a major treaty was signed in 1424.

Beech forests

Typical forests of central Europe are dominated by beech or a mixture of beech and fir (*Abies alba*) and/or spruce (*Picea abies*) which often include sycamore, *Fraxinus excelsior* and *Acer platanoides*. Sycamore commonly constitutes less than 1% of the total number of trees and occasionally reaching up to 3.5% in some Bohemian forests. In some beech dominated forests on steep slopes a mosaic of forest patches with different mixtures of species may be found in some damper areas maples (mainly

sycamore) constituted up to 55% of the total number of trees.

Sycamore is found in a small number of typically wet communities such as lowland alder, ash and elm carrs and along northern European rivers and streams. In the alluvial Rhine Valley it is present in forests dominated by hornbeam (*Carpinus betulus*) and in oak or oak-hornbeam forest in northern France and Belgium.

In south and southeast Europe sycamore is sometimes associated with a different spectrum of tree species. In subalpine zone of Corsica it is found in *Abies alba* dominated forests above the beech forest zone. In the mountains of the Balkans is found in unusual associations dominated by either *Alnus glutinosa*, or *Aesculus hippocastanum* - *Juglans regia* - *F. excelsior* or in species rich *Castanea sativa* - *Q. petraea* - *Carpinus betulus* - *Fagus sylvatica* forest. Sycamore even occurs with *Rhododendron ponticum* in *Fagus orientalis* dominated ravine forests in Bulgaria.

Sycamore-dominated forests

Sycamore only becomes an important or dominant canopy tree in habitats not suitable to beech. Sycamore-dominated forests are small and mainly found along moist ravines or on scree slopes in the western Alps where winter snowfalls are heavy. Often the trees do not form a continuous canopy.

Phytosociologists have recognized six forest associations dominated by sycamore. One such forest type (*Phyllitido-Aceretum*), characterised by *Phyllitis scolopendrium*, is found in mountain regions at an altitude exceeding 700m. Several other tree species may be present including *Ulmus glabra*, *Fagus sylvatica*, *Fraxinus excelsior*, *Tilia platyphyllos* and *Corylus avellana*. The ground vegetation is variously dominated by *Mercurialis perennis*, *Urtica dioica*, *Geranium robertianum*, *Galium odoratum*, *Dryopteris filix-mas*, *Lamium galeobdolon* spp montanum. In these stands the trees are slow-growing and small but occasionally limited disturbance (e.g. rock falls, avalanches) allows trees to grow old.

Such a stand from the calcareous Prealps of western Switzerland is illustrated on Figs 3 and 4. The site is situated at an altitude of around 1400 m in the Bonaudon Valley. The stand is just below the tree line on a steep ESE facing calcareous boulder/scree slope (Fig. 3a) transected by a small seasonal stream. The mean annual rainfall is around 2000mm and much of it in the form of winter snowfalls. Much of the site consist of an unstable scree slope with very poor soil development (Fig. 3b) while elsewhere the ground is strewn with large boulders. In this forest sycamore trees reach a size (GBH 3m) / age rarely observed in sycamore-dominated forests. No indications of past forest logging was observable. There is a large spectrum of tree size, but saplings as well as a shrub layer are noticeably absent. As shown on Fig. 3 and 4 the ground vegetation is generally luxuriant resulting from light through a large number of small canopy gaps. The more accessible areas, adjacent to pasture, are grazed by cattle.



Figure 3: Top: The forest is situated on a steep scree slope (Alt. 1400m). Note the mountain pasture in the foreground and the cliffs in background.

Middle: Uneven-aged stand with luxuriant ground vegetation dominated by *Phyllitis scolopendrium*. Note the lack of saplings and shrub layer.

Bottom: Calcareous scree showing the poor soil development and ground instability.

The base of most tree trunks is bent (Fig. 4a) as a result of the downward pressure of winter snow at the sapling stage. The base of many large trees is oval with a larger uphill-downhill diameter. The trunk and branch architecture of large specimen is markedly different from trees observable in the British Isles (Fig. 4b,c).

Most sycamore-dominated forests have the same constant tree species as beech forests and occur in the same vegetation zone. The differences consist in the relative percentage occurrence of the respective tree species, canopy cover, related ground flora and soil characteristics. However forest types with different groupings of species occur. The *Sorbo-Aceretum* usually has rowan (*Sorbus aucuparia*) as codominant with sycamore, while other stands contain a high proportion of *Alnus incana* and both types are restricted to the western Alps. It is also associated with *Alnus viridis* in the Prealps at the edge of avalanche corridors. In the subalpine zone of Corsica sycamore with *A. viridis* and *S. aucuparia* or with *Abies alba*, *Betula pendula* and *S. aucuparia* constitute the tree line on northern slopes. On lower slopes sycamore is sometimes found in *Pinus nigra* forests.

Habitat and climatic requirements

Habitat characteristics which appear to favour the dominance of sycamore include:

- good humidity and soil moisture;
- shady and moist sites, usually strewn with rock fragments and boulders, chiefly on substrata rich in calcium, near places where water seeps out of the ground; and
- high air humidity, permanent good water supply (from precipitation, stream, spring or ground, without the soil being deprived of oxygen) and a certain instability of the soil.

As a subcalcifuge species it is favoured by heavier (more clay) sediments. In northern France and Belgium sycamore is common mostly on north facing slopes but is absent from south facing slopes.

Successional status and competitive ability

The species status is variously described along a spectrum ranging from pioneer to mature, including subordinate, ecologically specialized or nomade and in Britain as opportunist or pioneer with a somewhat weedy character and, in relation to calcium, as subcalcifuge. The communities in which sycamore is dominant have been called edaphic climax or extreme pioneer and the sites have been described as typical of specialized habitats. When dominant, sycamore's habitats are characterized by soil surface instability and there it is described as pioneer, whereas when it is a minor component of mature forests stands it is referred to as a mature species. Although sycamore is sometimes described as having a narrow ecological amplitude, the species is found in many habitat types, and particularly in habitats with different disturbance regimes.



Figure 4: **Top:** Bent trunk indicative of downward pressure of winter snow at the sapling stage or slippage..
Middle and bottom: Unusual tree architecture of two large sycamore.

The low representation of sycamore as a canopy tree in beech-dominated forests appears to be related to its incapacity to compete with beech as an adult. The factors involved probably involve a combination of slower growth rates, smaller maximum height, higher light requirements as adult, and smaller canopy with a higher susceptibility to crown competition in adult sycamore, although these interactions have yet to be investigated.

Habitat similarities between native range and British Isles

There are some similarities between the habitat types where sycamore becomes dominant in its native range and the British Isles. In the Alps sycamore dominates unstable scree-slopes at the base of cliffs which in Ireland are usually occupied by *Coryllus avellana*. In its native range sycamore is also dominant in areas strewn with large boulders and is known to be highly invasive in such terrain in the British Isles. In the British Isles sycamore becomes dominant in areas with no or limited ground instability and

where soils are well developed, while on the continent this is occasionally the case on wet grounds. Although it is not clear how forest communities of the British Isles will change, it appears that sycamore should ultimately be more common in them than it is in those of its native range.

Article's history

This note was presented as a poster at the Irish Botanists' Meeting held at University of Ulster. The abstract was published in the 1994 Proceedings of the Irish Botanists' Meeting, University of Ulster, pp. 33-34.