

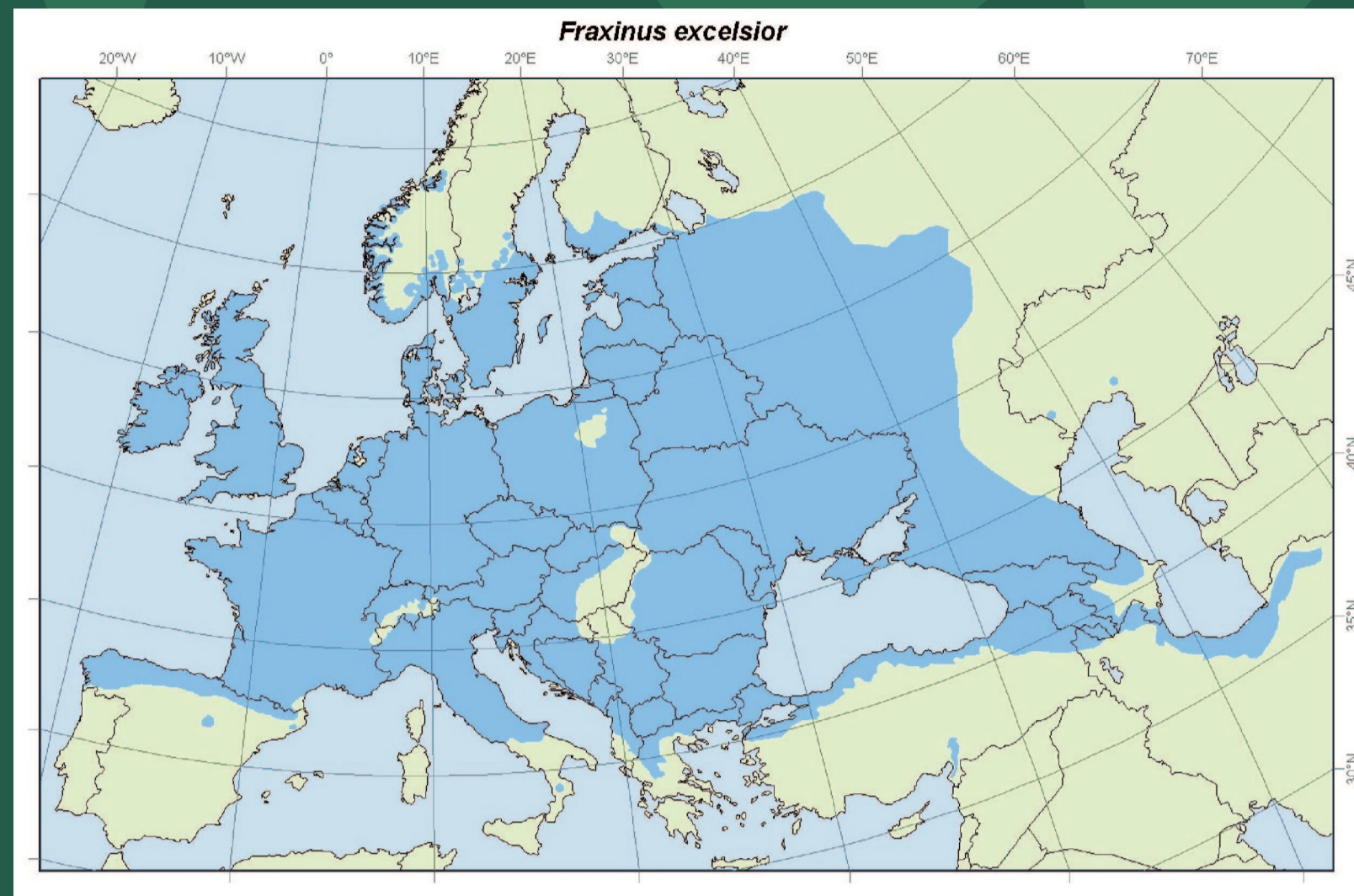
# ECOLOGY AND GROWTH OF EUROPEAN ASH (*FRAXINUS EXCELSIOR* L.)

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## Introduction

The natural range of European ash includes almost entire Europe except central and southern parts of the Iberian Peninsula, southeast Turkey, northern Scandinavia, Iceland and the northernmost parts of the British Isles. Ash belongs to the most important valuable broadleaved trees on the European continent.



The natural range of ash in Europe (www.euforgen.org)

## Site requirements

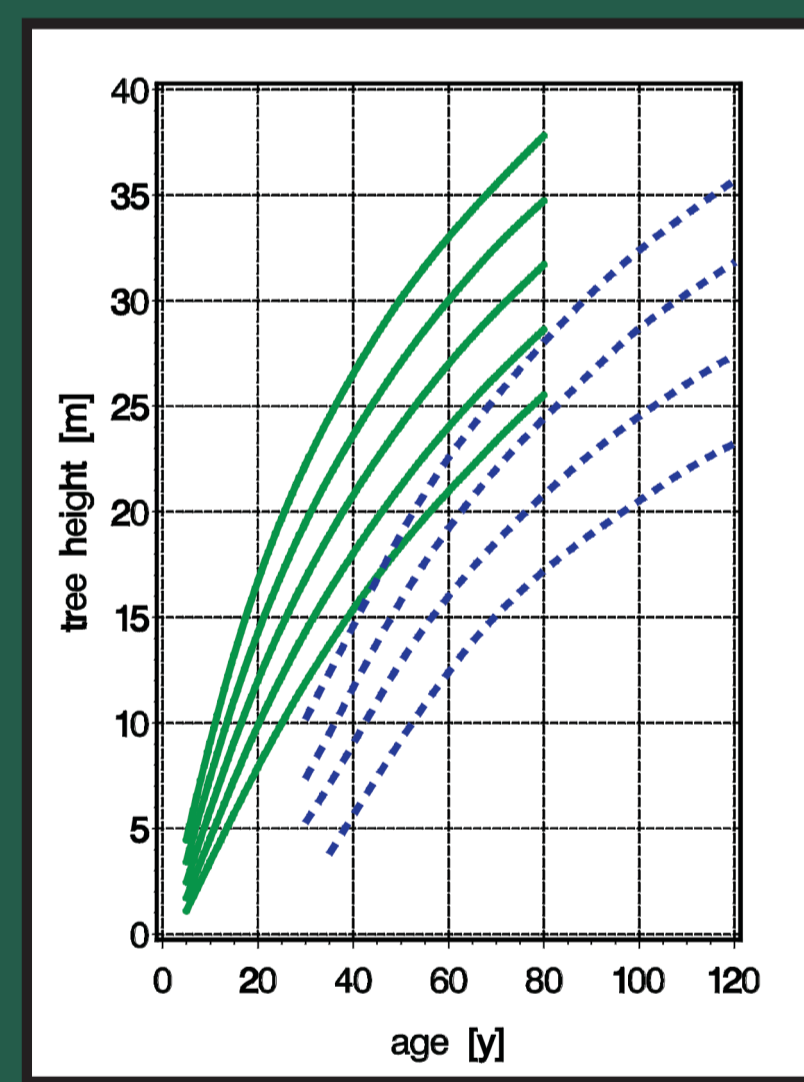
Good sites for ash have a warm climate (>137 day degrees with temperatures > 5.6 °C), fresh to very moist soil (depth to the winter water table between 40 and 100 cm) with rich to very rich nutrient status (soil pH in the range of 5.0-7.5).



Trunk of European ash (Photo P. Gach)

## Growth pattern

Ash can achieve large dimensions, for example in Bialowieza National Park in Poland. In moist forests, ash can achieve a dbh of 130-200 cm, a height of 45 m and stand volumes of more than 700 m<sup>3</sup>/ha. However, all current growth variables reach their maximum values early in tree life: The current annual diameter increment generally culminates in less than 25 years, thus much earlier than beech.



Left side: European ash in Bialowieza National Park (Photo P. Gach)

Right side: Height growth of ash (solid, green curves) compared to beech (blue, dotted curves) (modified from Hein 2003). Hein, S. 2003. Controlling Natural Pruning and Diameter Growth with Common Ash (*Fraxinus excelsior* L.) and Sycamore Maple (*Acer pseudoplatanus* L.). Ph.D. Universität Freiburg. (Original in German, with English summary).

## Growth dynamics

Harvesting (target) diameter [cm]	Mean radial increment [mmyr <sup>-1</sup> ]	Production time (rotation) [yr]	Number of crop trees/ha [-]	Length of clear bole [m]
50	3	83	100	19.3
	4	63	90	15.2
	5	50	85	12.0

Diameter growth and also the length of the branch free bole are strongly affected by initial spacing and subsequent thinning practices. The number of potential crop trees per hectare, radial increment and pruning height are main determinants for the length of rotation period, which can vary considerably (see table).

## Branch development

The stem quality of young ash trees can be improved by formative shaping. If necessary, it should be carried out when trees are 1-3m tall. Thinning strongly influences natural pruning and branch occlusion. Heavy thinning should be done early (< 30 years), as the capacity of ash to expand its crown decreases significantly as trees get older.



Clear bole of European ash (Photo P. Gach)

## Ability to grow in mixture

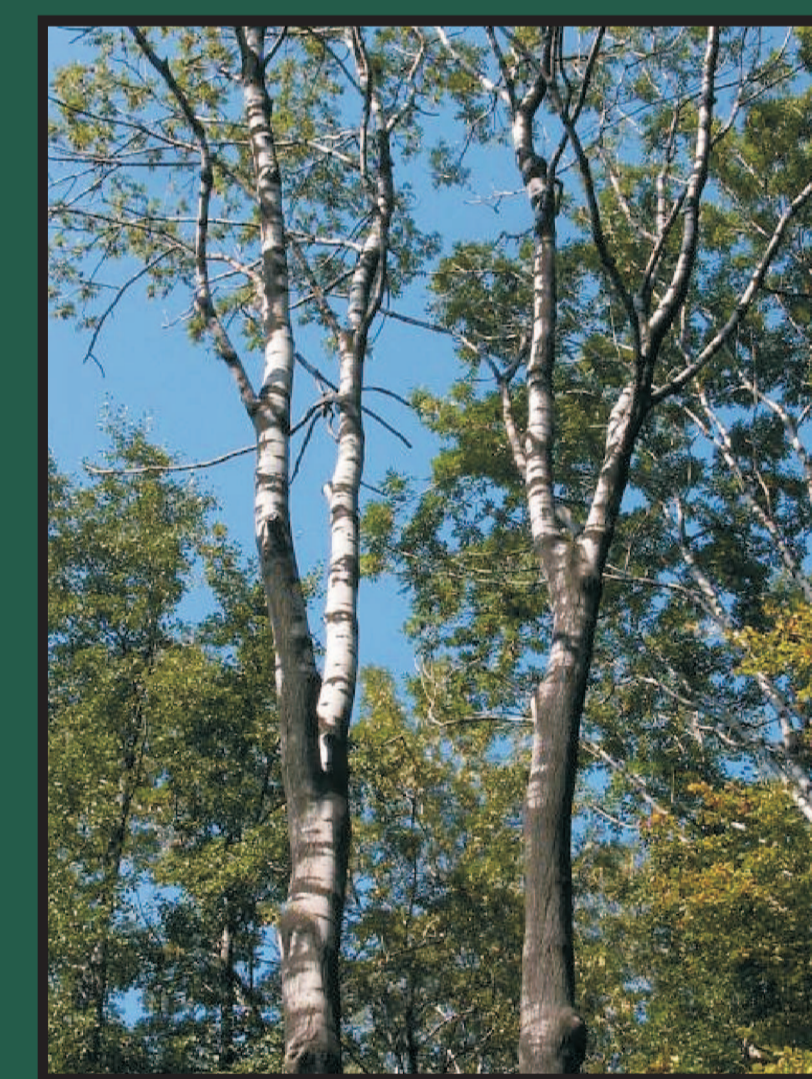
European ash can grow in pure stands, but it is a tree species typical of mixed forests. It grows in oak-lime-hornbeam communities (alliance *Carpinion*) and fertile beech forests (alliance *Fagion sylvaticae*). Depending on site conditions and forest management ash occurs together with pedunculate oak, elm, black alder and sycamore. Ash also grows with white poplar, elm, lime and sycamore. When producing high valuable timber in mixed forests, it is important to consider that the competitiveness of ash is decreasing considerably as tree age increases.

## Regeneration

European ash easily regenerate by natural seeding. Natural regeneration can be achieved by using the group shelterwood system (in ash-oak stands), the strip shelterwood system (in ash-dominated stands) or an irregular shelterwood system (in multilayered stands with the composition of ash and oak). After successful regeneration it is important to open the crown layer as regeneration of ash is light demanding.

## Defects

Ash trees are facing two major defects: forking (mainly due to late frosts) and blackheart. Silvicultural practices can limit the negative effects of these defects. These include weeding, tending (thus favouring height growth and natural pruning) and thinning. As black heart seems to be related to tree age, a short (< 75 yrs) production time (rotation) is recommended.



Forking of young ash trees (Photo P. Gach)

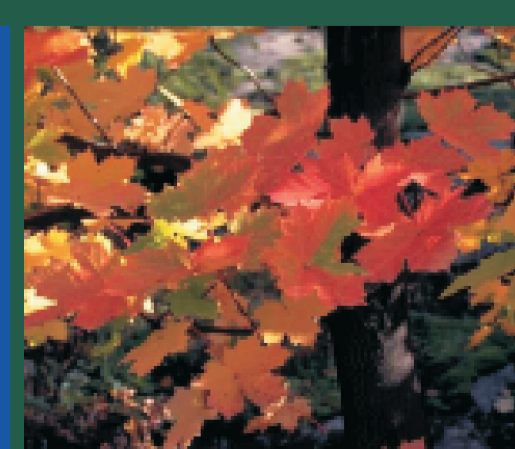
## Ash decline

Since the 1990s, a large-scale ash dieback has been observed in countries around the Baltic Sea and recently spreading to other regions of Europe. The symptoms include wilting of leaves, cankers on young shoots and stem bark necroses.



Ash decline in Poland (Photo J. Szwalkiewicz)

Ash is widespread throughout Europe but its abundance is restricted by site requirements. Ash trees can reach heights of 30-40 m, but the growth pattern depends on climatic region and site quality. For given site conditions, the length of the clear bole on potential crop trees can be managed by regulating stand density, possibly combined with artificial pruning, and the diameter growth of can be controlled by thinning. This provides a range of opportunities for the : get long clear boles by natural pruning with late and light thinnings during an extended rotation, or get short clear boles with early and heavy thinning combined with artificial pruning over a shorter rotation.



Growing Valuable Broadleaved Tree Species