Autecology of the

COMMON ASH

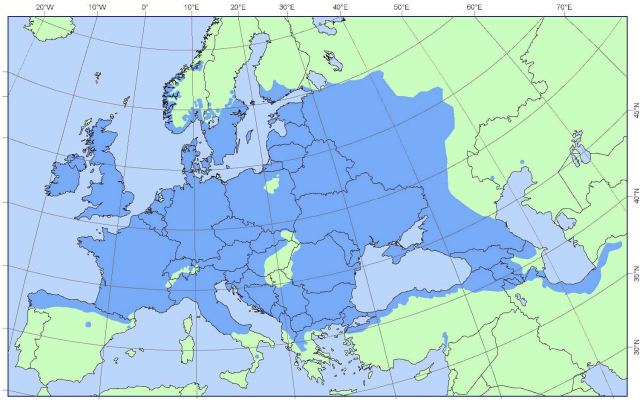
Fraxinus excelsior L.

Fr. : Frêne commun
Sp. : Fresno Común; Cat.: Freixe de fulla gran
Ger. : Esche
It. : Frassino maggiore

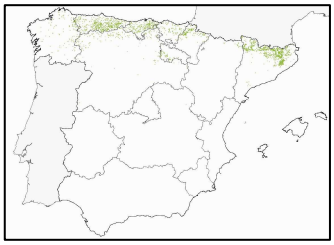
GEOGRAPHICAL DISTRIBUTION

- **European species extending into Sub-Atlantic areas** [28, 27].
- Occurs **throughout France, less common in the Mediterranean region** [27]; occurs in **Spain,** mainly in the **North** of the country.
- Area of stands in France = **583 000 ha** (NFI data, 2005-2009, main species Fraxinus, all species together, but mostly Common ash).

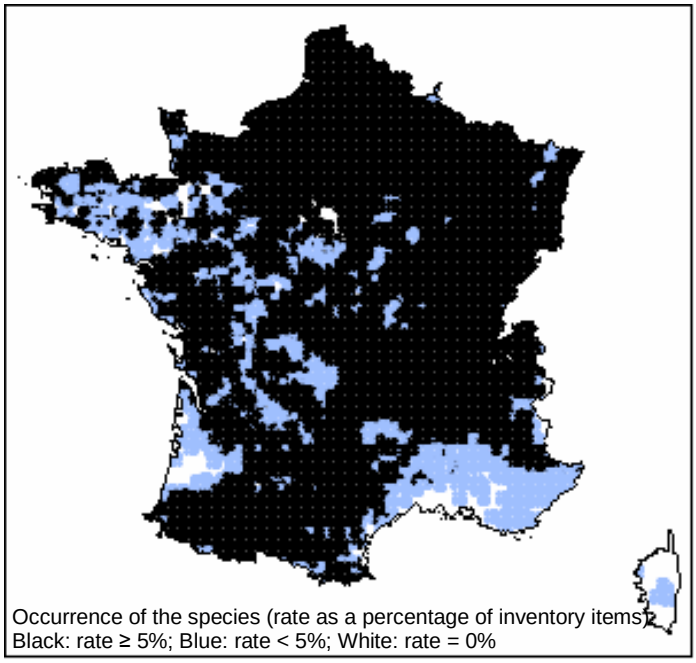
Natural range of the Common ash in Europe



Distribution of the Common ash in Spain



Distribution of the Common ash in France



Occurrence of the species (rate as a percentage of inventory items)
Black: rate ≥ 5%; Blue: rate < 5%; White: rate = 0%

CLIMATE AND TEMPERAMENT

Bioclimatic conditions

- Not sensitive to winter cold [31, 14, 1].
- In mountain areas, mild temperatures at the start of the growing season positively affect growth [15].
- **Sensitive to spring frosts** [31, 28, 22, 14, 1] causing forks [24, 2].
- Poor growth when average annual temperatures < 5.6 ° C [17].
- **Demands abundant water** [28, 19, 22, 2], particularly in May and June [31]; **sensitive to atmospheric drought** [28, 14].
- **Sensitive to the drying action of wind** [31, 14].
- **In Spain,** demands **annual average rainfall > 700 mm** [21, 2, 1].

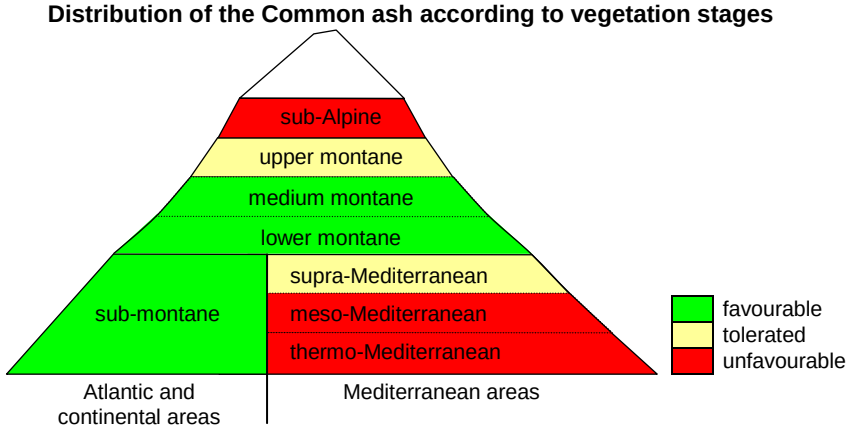
Summary of bioclimatic requirements and sensitivity of the Common ash

Warmth requirements	Sensitivity					
	cold	late frost	early frost	sticky snow	wind	drought
Moderate	Very low	Very high	Very low	Very high to high	High	Very high to high

Vegetation stages

- Occurs from the **sub-montane** to the **upper montane** stage (400 to 1800 m) [28, 27, 14, 2, 13, 1].

Distribution of the Common ash according to vegetation stages



Temperament

- **Heliophilic** [30, 31, 28, 27, 22, 14, 2, 13, 1].
- Shade-tolerant in the first years [30, 31, 28, 22, 14, 25, 2, 1].
- **Vulnerable to competition** when adult [14, 4].
- Reported **sensitivity to strong lateral light** that appears to cause bark necrosis [14].

Young adult  Adult 

Sensitivity to competition for light	Phototropic tendency
High	Moderate

SOILS

Water and drainage

Water supply:

- Essential growth factor [12, 19, 7, 5, 3, 9, 14, 2, 32].
- **Needs soil with a good water supply** for sustained growth (thick soil with a high maximum useful reserve) [28, 7, 9, 14, 8, 1]. Occurs on dry soil but smaller in size and less productive [31, 27, 10, 32].
- **Topographic** position ensuring a lateral water supply [12199, 14, 4, 10] or presence of a permanent **water table** [9, 8, 10] significantly increase growth.
- **Very vulnerable to interruptions in the water supply** [3, 14] which cause forking [24]; delays in regulating transpiration [3, 5].

Waterlogging:

- Prefers **well-drained soils** [31, 7, 22, 14, 2, 13, 1].
- Occurs on temporarily flooded ground or permanently flooded areas around springs [10], but **waterlogging very close to the surface reduces growth** [28, 12] and may even prevent growth [9, 10] in marshy conditions.
- Waterlogging promotes black heartwood [7, 9].

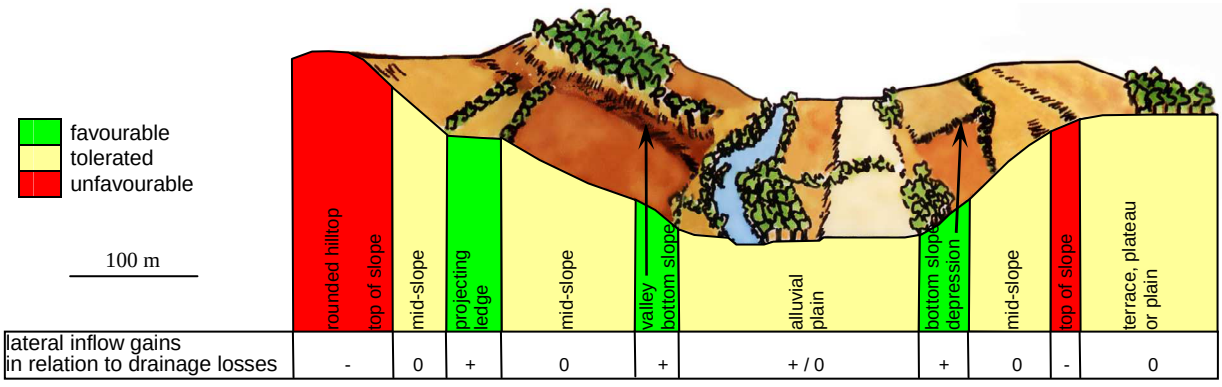
Drainage and excess water

			a	b	c	d	h	i	e	f	g
Natural drainage			excessive	good	moderate	imperfect	poor	very poor	partial	virtually non-existent	non-existent
Water table	temporary	redox horizon with rust patches	no water table	absent or > 90cm	60-125cm	40-80cm	20-50cm	0-30cm	20-50cm	0-30cm	
	permanent	reductive waterlogged horizon		-	-	-	-	-	> 80cm	40-80cm	< 40cm

favourable
tolerated
unfavourable

(from the *Species Ecology* file, Ministry of the Walloon Region, 1991, amended [20])

Favorable topographic situations for the Common ash with regard to water supply
(involved in the morpho-pedological compensations, to be modulated according to the other site characteristics)



Texture and materials

- Materials favouring **good water retention** [28, 7, 2722, 14, 13, 1] and poor in coarse components.

Textures favourable for growth of the Common ash
(involved in the morpho-pedological compensations, to be modulated according to the climate and soil)

very sandy S	coarse SA, LS, SL	loamy LmS, Lm, Ll, LlS	intermediate LAS, LSA, LA, AL	clayey A, AS	very clayey Alo

favourable
tolerated
unfavourable

Nutrients

Nutritive elements:

- This growth factor is less crucial than the water supply [121914, 21, 2, 1].
- Occurs over a **wide pH range** from 3.8 to 7.8 [16, 9]. However, **growth is very poor on very acid soils** [31, 28, 19, 8, 1] due to the sensitivity of the species to aluminium toxicity, which causes root necrosis [33].
- Adult tree growth limited by availability of K [15].
- Juvenile growth depends on availability of Ca and Mg [33].

Nitrogen and phosphorus:

- Humus in mull form. Ash tree litter has a low C/N ratio [16, 22, 14].
- Growth depends mainly on the availability of **nitrogen** [16, 28, 17] associated with phosphorus [18, 20].

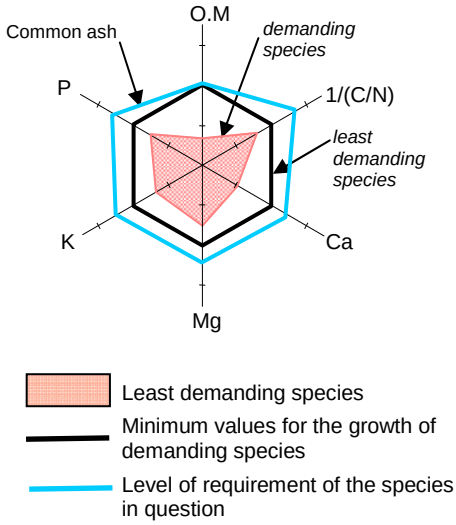
Lime in fine soils:

- **Appears unaffected** unless the concentration is very high [9].

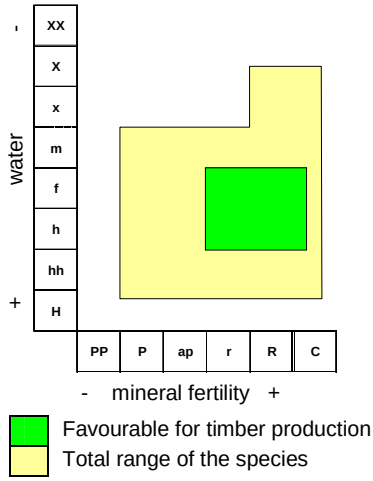
Summary of water and nutrient requirements and sensitivity of the Common ash

Water requirements	Very high
Sensitivity to temporary waterlogging	Moderate
Nutrient requirements (Ca, Mg, K)	Moderate
Nitrogen (and phosphorus) requirements	High
Sensitivity to lime in fine soil	Low to zero

Mineral nutrition of the Common ash



Ecogram for the Common ash
(According to Rameau *et al*., 1989, amended)



DYNAMIC BEHAVIOUR AND CHARACTERISTICS

- **Nomadic species with a pioneer temperament** [30, 31, 25].
- Good growth of basal shoots
- Life span about 150 to 200 years [27]. Timber harvesting recommended at **less than 60 years** to **minimise black heartwood** [9]. In areas favourable to production, ash trees can reach 180 cm in circumference in 60 years [99.
- Common ash is easily established because the seedlings can develop a dense and robust root system [17] even in poor light.
- In 2008, ash dieback appeared for the first time in north-east France, linked to the fungus *Chalara fraxinea*. This is an ash tree parasite in North-Eastern Europe, causing twig die-back followed by necrosis and leaf wilt on the branches, and even crown dieback [23]. Particular attention should be paid to the spread of this so far little-known disease.

MAIN FACTORS LIMITING THE PRODUCTION OF GOOD QUALITY TIMBER

- Inconsistent water supply during the growing season
- Permanent waterlogging in surface horizons
- Slowly mineralizing humus
- Presence of exchangeable aluminium
- Nutrient-poor soils
- Heavy snow
- Late frost
- Atmospheric drought

Autecology of the
NARROW-LEAVED ASH

Fraxinus angustifolia Vahl

Fr. : Frêne oxyphylle
Spa. : Fresno de hoja estrecha
Cat. : Freixe de fulla petita

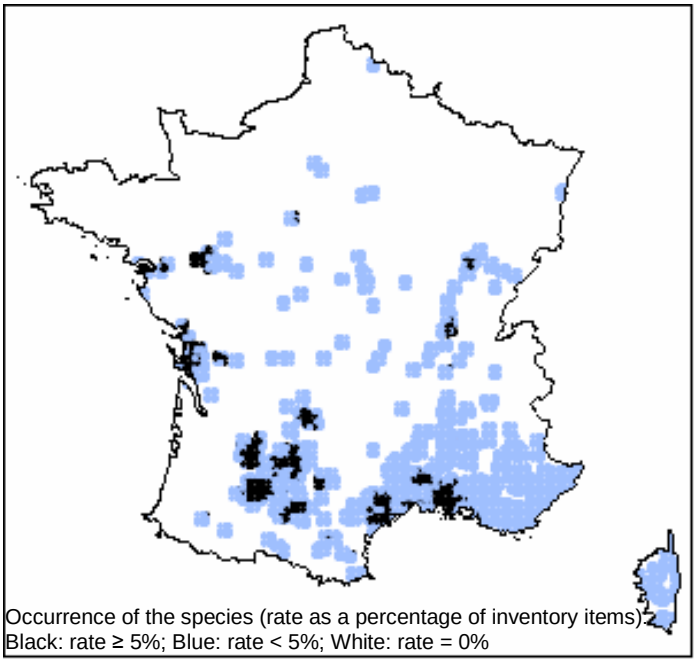
Ger. : Schmalblättrige Esche
It. : Frassino meridionale

- A **Supra-Mediterranean species** [27, 1].
- Occurs in **France at heights of up to 300 m** in the **Mediterranean** region and in **south-west France** at sub-montane, supra-Mediterranean and meso-Mediterranean stages, less common in the north of France [27]
- Occurs throughout **the Iberian Peninsula, except in the mountains** and along the upper reaches of rivers in the northern third of the country, where it is replaced by the Common ash.

- Thermophilic [27], occurs where average rainfall is >450 mm/year [21]; **not susceptible to summer drought** provided that there is a good **water supply** in the soil [21, 1]; **not susceptible to winter cold** [21].

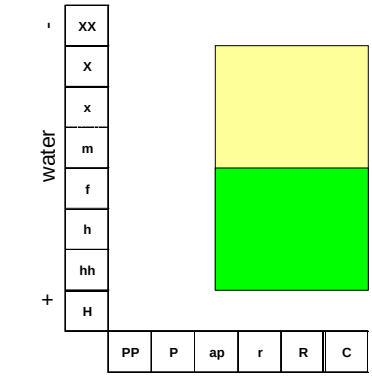
- **Susceptible to waterlogging** [11; prefers soils with sandy textures [21, 1]; rarely occurs on highly acidic soils [27].
- Like Common ash, this species can be affected by ash dieback disease [23].

Distribution of the Narrow-leaved ash in France



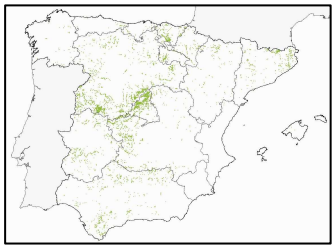
Occurrence of the species (rate as a percentage of inventory items)
Black: rate ≥ 5%; Blue: rate < 5%; White: rate = 0%

Ecogram of the Narrow-leaved ash
(According to Rameau et al., 1989, amended)



Favourable for timber production
Total range of the species

Distribution of Narrow-leaved ash in Spain



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