

# Autecology of the SYCAMORE

*Acer pseudoplatanus* L.

Fr. : Érable sycomore

Ger. : Bergahorn

Sp. : Arce blanco; Cat.: Fals plàtan (Auró blanc) It. : Acero montano

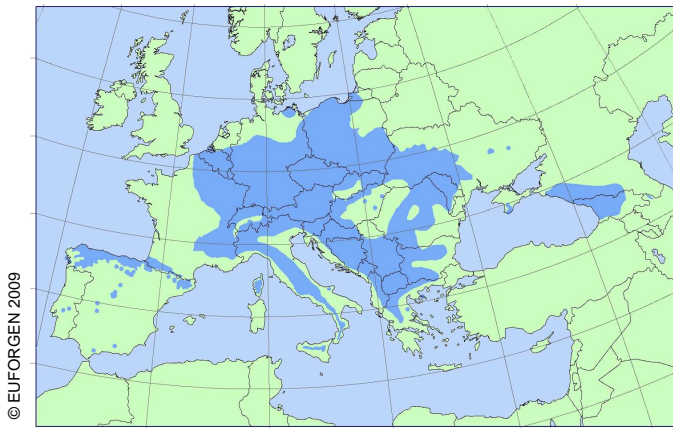


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## Geographical distribution

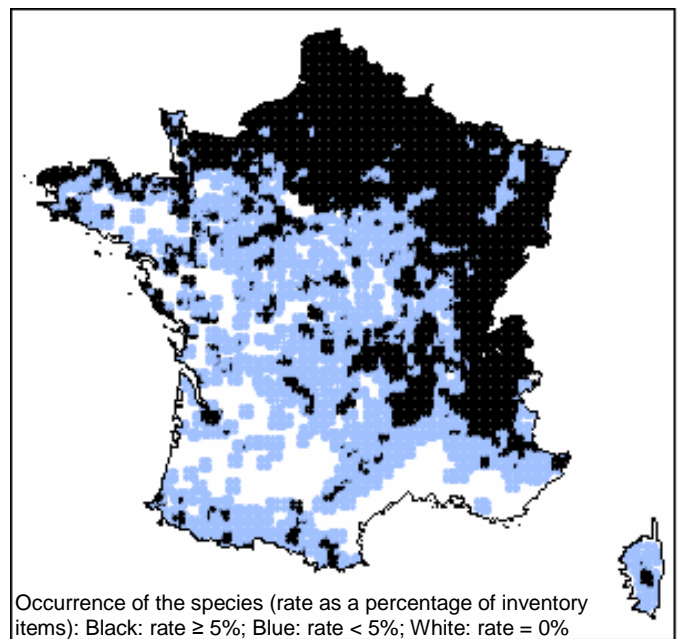
- Extensive distribution in Europe, but absent naturally in large part of western Europe and Mediterranean region [14, 9, 3].
- In France, occurs particularly in mountain areas, but can grow at sub-montane levels, especially in the north-east [14].
- In Spain, it is found in Galicia, in the Pyrenees and Cantabria [3].

Natural distribution range of the Sycamore in Europe



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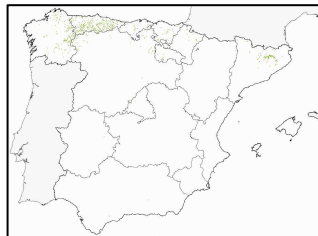
Distribution of the Sycamore in France



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

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Distribution of the Sycamore in Spain



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## Climate and temperament

### Bioclimatic conditions

- Resistant to cold weather [17]. Very sensitive to spring frost due to late budding (causing damage to flowers only) [9, 17, 11], and sensitive to early frost [17].
- Cool climate species [23] that can withstand hot summers [14, 26, 7] but not extreme heat [17].
- Drought sensitive [14, 3]: more so than the Norway maple but less than ash; avoid regions that have more than 2 to 3 months of drought per year [17].
- Requires abundant humidity, although a good water supply can partly compensate for dry weather [14, 23, 18, 26, 9]. Occurs where rainfall ranges from 600mm to 1600 mm/year, but requires at least 800-900 mm/year for proper growth [3, 17, 5].
- Good resistance to frost, heavy snow and wind due to the strong root system [9].

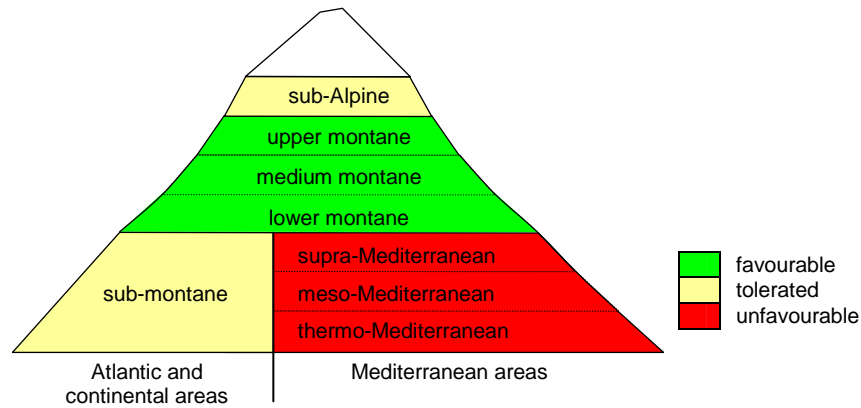
Summary of bioclimatic requirements and sensitivity of the Sycamore

Warmth requirements	Sensitivity					
	cold	late frost	early frost	sticky snow	wind	drought
Low	Low	Low	Moderate	Low	Low	moderate to high

## Vegetation stages

- Mainly a mountain species, but may be found at low altitude on cool sites and in the northern plains [14, 9] or at sub-Alpine level [23].
- Occurs in all French mountains up to 1,500–1,800 m [14, 23, 1, 9, 17].
- Occurs in Spain between 600 and 1000 m [3].

Distribution of the Sycamore by vegetation stages



## Temperament

- Semi-shade species, tolerant of shade in its early stages (grows under a closed canopy for the first 5 to 7 years). Seedlings respond well to opening gaps in the canopy [14, 23, 18, 26, 9, 29, 17, 5, 11, 21].
- Adult trees are heliophilic [18, 12].
- Bark sensitive to sudden exposure to light, causing sun scald and epicormic shoots [14, 18, 26, 9, 4].



Sensitivity to competition for light	Phototropic tendency
Moderate	High

## Soils

### Water and drainage

#### Water supply:

- Prefers moderately humid to cool and humic soils [23, 28], growing best on soil with good water reserves; more demanding than the Norway maple, but less than beech or ash [18, 26, 17, 30].
- Excessively wet or dry soils are unfavourable to seedlings [9].

#### Waterlogging:

- Protect from excessive moisture [14, 26], especially in soils with a permanent water table close to the surface [9, 17, 15], but also avoid soils with a moderately deep temporary water table (less than 70 cm) [6].

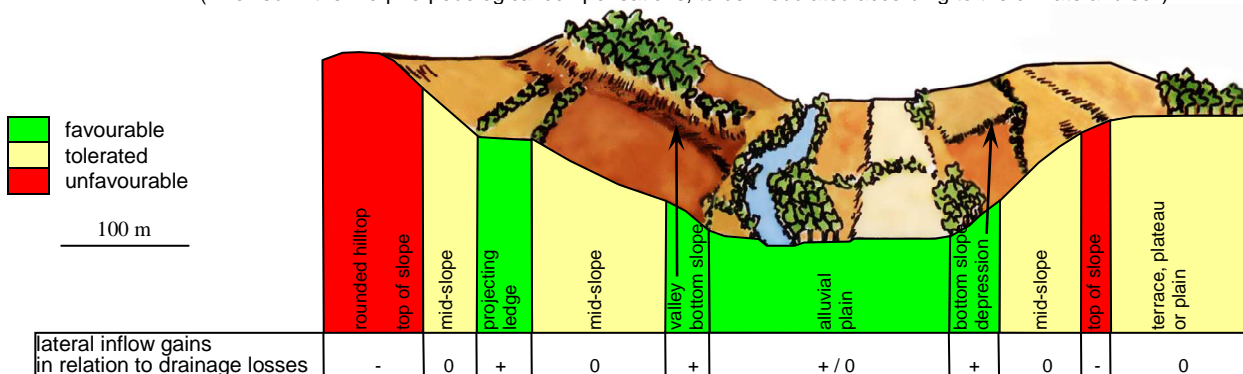
#### Drainage and excess water

		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	absent or > 90cm	60-125cm	40-80cm	20-50cm	0-30cm	20-50cm	0-30cm	
	permanent	reductive waterlogged horizon	-	-	-	-	-	> 80cm	40-80cm	<40cm

From the Species Ecology file, Ministry of the Walloon Region, 1991, amended [18])

### Favourable topographic locations for the Sycamore in terms of water supply

(involved in the morpho-pedological compensations, to be modulated according to the climate and soil)



- Cool, north-facing slopes are preferable [18, 26].
- In Spain, occurs mainly in humid valley bottoms, gorges and canyons and at the base of cliffs [5].

## Texture and materials

- Sensitive to compact soils, prefers deep, friable, cool and aerated soils (> 120 cm deep) [23, 26, 9, 6, 17].
- Occurs on a variety of substrates: siliceous, lime, loam or silt [23, 9, 15], growing best on loamy, even pebbly colluvial or alluvial soils. [27] Can only grow on clay if there is proper drainage [15].

### Textures favouring the growth of Sycamore

(involved in the morpho-pedological compensations, to be modulated according to the other site characteristics)

very sandy S	coarse SA, LS, SL	loamy LmS, Lm, Li, LIS	intermediary LAS, LSA, LA, AL	clayey A, AS	very clayey Alo	 favourable
						 tolerated
						 unfavourable

## Nutrients

### Nutritive elements:

- Fairly demanding in terms of nutrients [14, 23, 26, 9, 12, 27, 22, 5], especially at a young age [30].
- Oligomull to carbonated eumull humus [14, 23, 9].
- Occurs on basic to slightly acidic soils (pH between 4.5 and 7.5, optimum = 5.5 to 7.5), excessively acidic soils are harmful to the growth of seedlings [18, 26, 9, 17].

### Nitrogen and phosphorus:

- Requires abundant potassium and nitrogen, less calcium and magnesium [9, 15, 30].
- Tolerates a lack of phosphorus [26, 9].
- The C/N ratio does not affect growth significantly [15].

### Lime in fine soil:

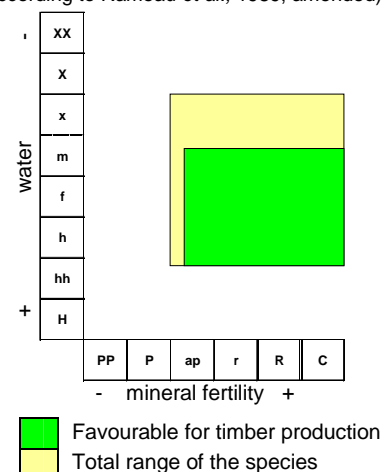
- Tolerates active lime [17], which is beneficial in the soil in small doses [26].
- Tolerates the presence of heavy metals [17].

### Synthesis of water and nutrient requirements and sensitivity of the Sycamore

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

### Ecogram for Sycamore

(according to Rameau *et al.*, 1989, amended)



## DYNAMIC BEHAVIOUR AND CHARACTERISTICS

- Good growth of basal shoots [14, 13, 11].
- Vulnerable to herbaceous competition [17, 11].
- Occurs as single trees, never in pure stands, due to its vulnerability to competition [14, 9].
- Colonising species [23].

### MAIN FACTORS LIMITING THE PRODUCTION OF GOOD QUALITY TIMBER

- Inconsistent water supply during the growing season
- Permanent surface waterlogging
- Slowly mineralising humus
- Atmospheric drought

# Autecology of the **NORWAY MAPLE**

*Acer platanoïdes* L.

Fr. : Érable plane  
Sp. : Arce real ; Cat.: Erable

Ger. : Spitzahorn  
It. : Acero riccio



## Geographical distribution

- European range, more northern, eastern and subcontinental [14, 9] than that of the Sycamore; rare in the Pyrenees [23].
- Less common than Sycamore [2].

**Natural range of the Norway maple in Europe**  
(according to Meusel *et al.*, 1978, modified in Barenco *et al.*, 2001 [2])

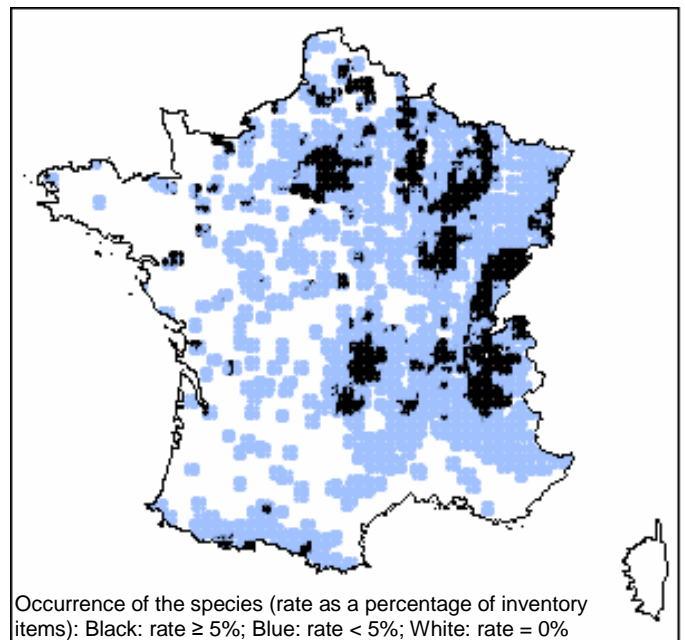


**Distribution of the Norway maple in Spain**



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**Distribution of the Norway maple in France**



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## Climate and temperament

### **Bioclimatic conditions**

- Withstands cold weather [25]. Sensitive to spring frost due to late budding (only causing damage to flowers) [9, 17]. Fairly sensitive to early frost. [17]
- Needs summer heat, but not in excess [14, 9, 2].
- Less sensitive to drought than the Sycamore [14, 12] with a broader distribution range on dry sites.
- Needs moist air [14, 26, 12].
- Good resistance to frost, heavy snow and wind thanks to strong fasciculate root system and tap roots [9, 12, 2].

**Summary of bioclimatic requirements and sensitivity of the Norway maple**

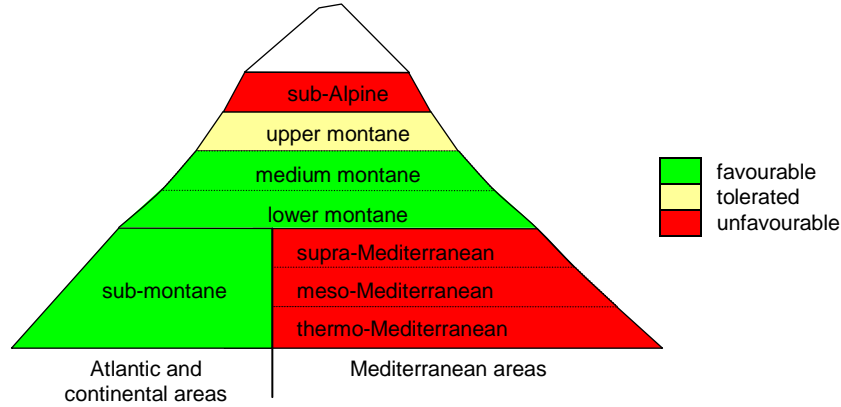
Warmth requirements	Sensitivity					
	cold	late frost	early frost	sticky snow	wind	drought
Moderate	Low	Low	Moderate	Low	Low	Moderate



## Vegetation stages

- Occurs in sub-montane and montane vegetation stages up to 1500 m, more abundant at the sub-montane level than Sycamore [14, 1, 9] and at lower altitudes [14, 26, 9].

Distribution of the Norway maple by vegetation stages



## Temperament

- Semi-shade species, more tolerant to shade at a young age than Sycamore (seeds will germinate under a dense canopy) [14, 26, 9, 2].
- Requires light for optimum growth of mature trees [2].
- Bark sensitive to sudden exposure to light [14].



Sensitivity to competition for light	Phototropic tendency
Moderate	High

## Soils

### Water and drainage

- Grows in humid, cool or semi-humid [14, 28] and fairly dry conditions [23]; more tolerant than Sycamore in terms of water supply [26, 2].
- Excessively wet or dry soils are unfavourable to seedlings. [9]

#### Waterlogging:

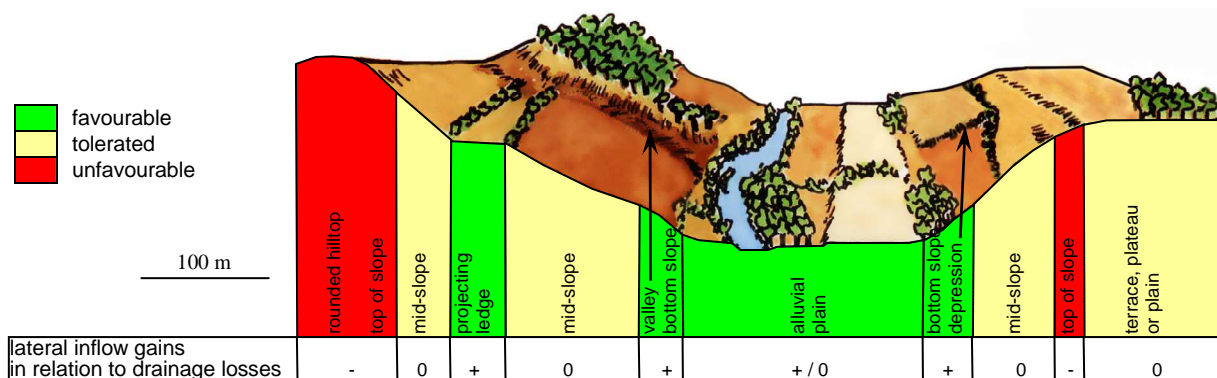
- Protect from excessive moisture [14, 12], especially in soils with a permanent water table near the surface, although the Norway maple is less sensitive than the Sycamore [2]. Tolerates temporary waterlogging [12].
- Does not grow on dry filtering soils [23, 9].

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	absent or > 90cm	60-125cm	40-80cm	20-50cm	0-30cm	20-50cm	0-30cm	
	permanent	reductive waterlogged horizon	-	-	-	-	-	> 80cm	40-80cm	<40cm

From the Species Ecology file, Ministry of the Walloon Region, 1991, amended [18]

Favorable topographic locations for the Norway maple with regard to the water supply (involved in the morpho-pedological compensations, to be modulated according to the climate and soil)



## Texture and materials

- Occurs on a wide variety of substrates [2]: decarbonated clay, pebble colluvium and loam [23].
- Avoid very sandy or compact soils [26, 12].

### Textures favourable to the development of the Norway maple

(involved in the morpho-pedological compensations, to be modulated according to the other site characteristics)

very sandy S	coarse SA, LS, SL	loamy LmS, Lm, LI, LIS	intermediary LAS, LSA, LA, AL	clayey A, AS	very clayey Alo	favourable
						tolerated
						unfavourable

## Nutrients

### Nutritive elements:

Fairly demanding in nutrients, growing less well on acidic soils, hence a smaller range than Sycamore [14, 23, 12, 2].

- Mesomull to eumull humus [14, 9].

### Nitrogen and phosphorus:

- Grows best in potassium and nitrogen rich soils [23, 26].
- Tolerates phosphorus deficient soil [26].

### Lime in fine soil:

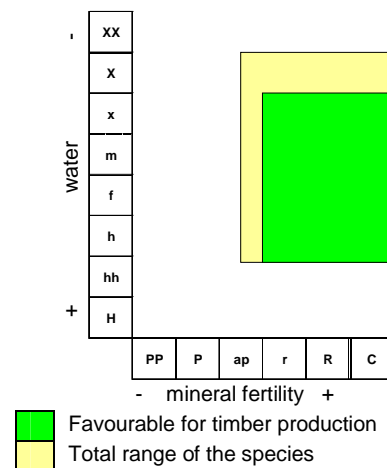
- Tolerates active lime, which is beneficial in the soil in low doses [26].

### Synthesis of water and nutrient requirements and sensitivity of the Norway maple

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

### Ecogram for the Norway maple

(according to Rameau *et al.* 1989)



## DYNAMIC BEHAVIOUR AND CHARACTERISTICS

- Good growth of basal shoots; bears fruit well [14].
- Occurs as single trees, never in pure stands [14].
- Pioneer species on humid sites or steep slopes [2].

### MAIN FACTORS LIMITING THE PRODUCTION OF GOOD QUALITY TIMBER

- Inconsistent water supply during the growing season
- Permanent surface waterlogging
- Slowly mineralising humus
- Atmospheric drought

# Autecology of the **FIELD MAPLE**

*Acer campestre* L.

Fr. : Érable champêtre  
Sp. : Arce moscón ; Cat.: Auró blanc

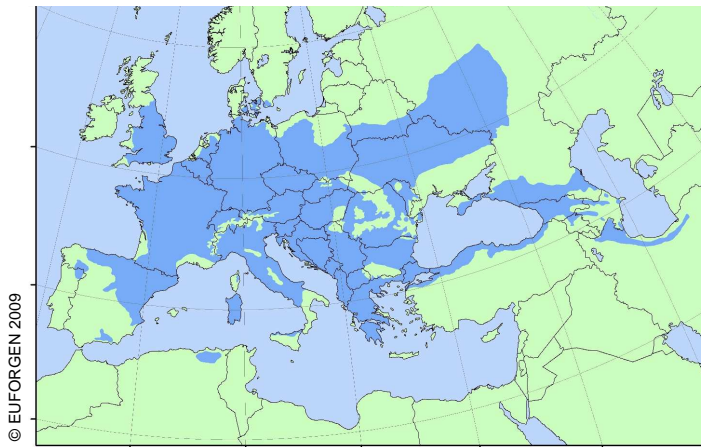
Ger. : Feldahorn  
It. : Acero campestre



## Geographical distribution

- Occurs on plains and sub-montane level in mid-Europe [14] and western Asia [9]; less common in the Mediterranean region [23] except in Mediterranean mountain areas [17].

**Natural range of the Field maple in Europe**



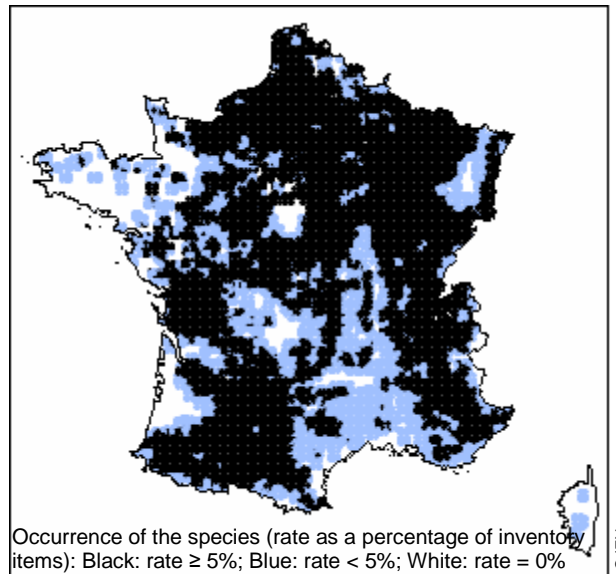
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**Distribution of the Field maple in Spain**



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**Distribution of the Field maple in France**



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

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## Climate and temperament

### **Bioclimatic conditions**

- Very good resistance to cold [14, 17].
- Requires a sufficiently warm climate [12].
- Good tolerance to drought [14, 12], although more sensitive than the Montpellier Maple or Italian Maple [29].
- Resists wind [12].

**Summary of bioclimatic requirements and sensitivity of the Field maple**

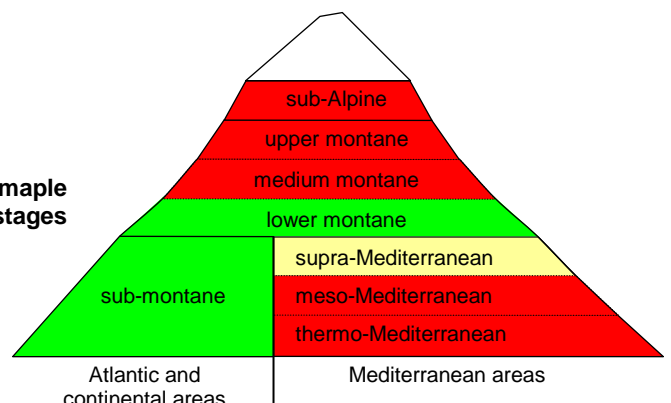
Warmth requirements	Sensitivity					
	cold	late frost	early frost	sticky snow	wind	drought
Moderate	Low	Low	Low	Low	Low	Low

### **Vegetation stages**

- Occurs at low altitudes from sub-montane to lower montane [14, 12], where it is rarely found above 1,000 m [1].
- Replaced by the Montpellier Maple in the Mediterranean region [14].

**Distribution of the Field maple according to vegetation stages**

■ favourable  
■ tolerated  
■ unfavourable



## Temperament

- Prefers full light, but tolerates shade [14, 23].



Sensitivity to competition for light	Phototropic tendency
Moderate	Moderate

## Soils

### Water and drainage

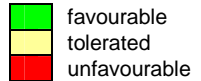
#### Water supply:

- Grows in moderately dry to temperate conditions [23].

#### Waterlogging:

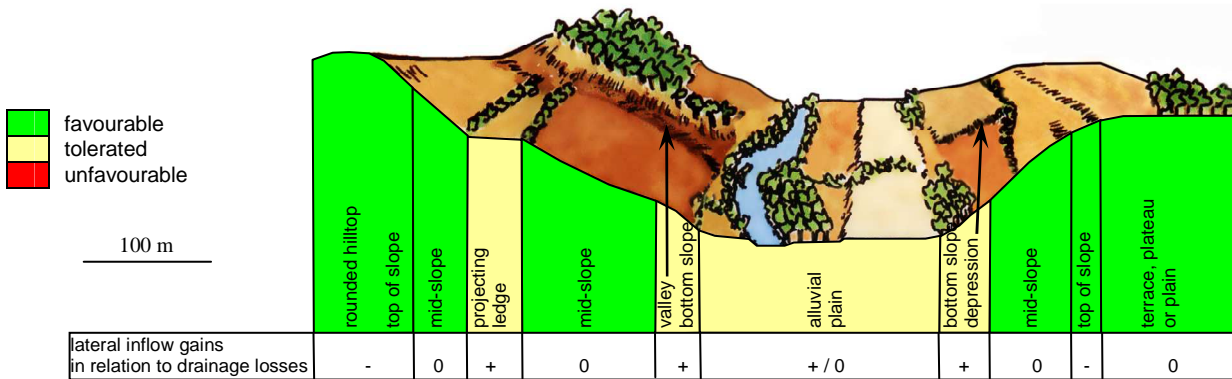
#### Drainage and excess water

		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	absent or > 90cm	60-125cm	40-80cm	20-50cm	0-30cm	20-50cm	0-30cm	
	permanent	reductive waterlogged horizon	-	-	-	-	-	> 80cm	40-80cm	<40cm



(From the Species Ecology file, Ministry of the Walloon Region, 1991, amended [18])

### Favourable topographic locations for the Field maple in terms of water supply (involved in the morpho-pedological compensations, to be modulated according to the climate and soil)



## Texture and materials

- On surface limestone or marl and marly limestone [14]; avoid stony soils [19].

### Textures favourable to the development of the Field maple

(involved in the morpho-pedological compensations, to be modulated according to the other site characteristics)

very sandy S	coarse SA, LS, SL	loamy LmS, Lm, LI, LIS	intermediary LAS, LSA, LA, AL	clayey A, AS	very clayey Alo	
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## Nutrients

### Nutritive elements:

- Carbonated eumull – mesomull humus [14, 23], on alkali-rich soils rich with a basic to neutral pH [23, 1].

### Nitrogen and phosphorus:

- Nitrogen rich soils [23, 1].

### Lime in fine soil:

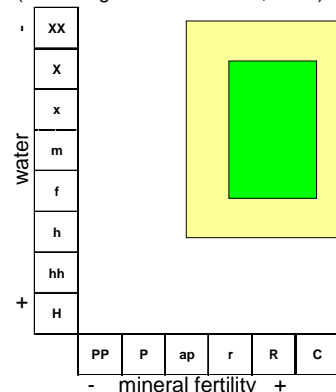
- Typically lime-loving species adapted to calcareous soils, but also occurs on soils decarbonated at the surface [14, 12].

### Synthesis of water and nutrient requirements and sensitivity of the Field maple

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

### Ecogram for Field maple

(according to Rameau *et al.*, 2008)



Favourable for timber production  
 Total range of the species



# DYNAMIC BEHAVIOUR AND CHARACTERISTICS

- Post-pioneer, nomadic species [14].
- Good growth of basal shoots [14].

## MAIN FACTORS LIMITING THE PRODUCTION OF GOOD QUALITY TIMBER

- Permanent surface waterlogging
- Slowly mineralising humus

## Autecology of the ITALIAN MAPLE

### *Acer opalus* Mill.

Fr. : Érable à feuilles d'Obier  
Sp. : Acirón; Cat.: Rotaboc

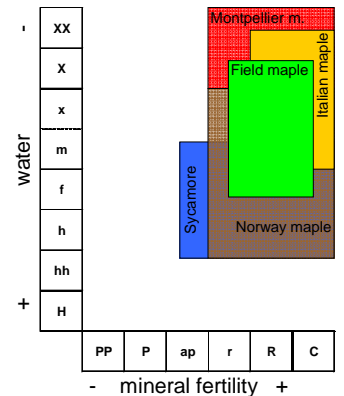
Ger. : Italienischer Ahorn  
It. : Acero opalo

Species centred in the western Mediterranean [14]. Occurs in the foothills and lower slopes of southern mountain ranges (Pyrenees, Cevennes, Alps), extending north up to the Jura Mountains and Burgundy, from supra-Mediterranean to montane stages [14, 23, 9, 12].

Key features:

- Resistant to heat and summer drought (thermophilic species);
- Fairly resistant to cold, but prefers mild climates; fairly sensitive to frost [12];
- Lime-loving species;
- Mesoxerophilic species occurring in soils that dry frequently and soils with a slight water balance deficit [28];
- Full light or semi-shade species.

**Ecogram for Maple species**  
Favourable for timber production  
(according to Rameau *et al.*, 1989, 2008, modified)



## Autecology of the MONTPELLIER MAPLE

### *Acer monspessulanum* L.

Fr. : Érable de Montpellier  
Sp. : Arce de Montpellier; Cat.: Auró de Montpellier

Ger. : Französischer Ahorn  
It. : Acero minore



Occurs in southern Europe, western Asia and northern Africa and around the Mediterranean [14, 9, 12]. Supra-Mediterranean species occurring on hills and lower mountain slopes around the Mediterranean [14, 23, 9, 12] and at the sub-montane level in suitable sites.

Key features:

- Heat and light demanding; withstands cold very well;
- Mesoxerophilic to xerophytic species, very resistant to drought, occurring in shallow, dry, aerated soils [28];
- Occurs on lime-rich alkaline soils;
- Avoid acidic, heavy and clay soils and cold, wet sites [12].



Union européenne



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■ Factsheet references: **Lestrade M., Gonin P., Coello J.** – Autecology of the Sycamore (*Acer pseudoplatanus* L.), Norway maple (*Acer platanoides* L.), Field maple (*Acer campestre* L.) and other Maple species. In : Gonin P. (coord.) *et al.* - *Autecology of broadleaved species*. Paris : IDF, 2013, 65 p.

## **BIBLIOGRAPHIC REFERENCES – MAPLE SPECIES**

1. Arbogast M., 1992 - L'érable à fibres ondulées: ressources, critères de reconnaissance. *Rev. For. Fr.* XLIV - n° sp., p. 160-175.
2. Barengo N., Rudow A., Schwab P., 2001 - *L'érable plane*. Chaire de sylviculture EPFZ, Direction fédérale des forêts OFEFP, 8 p. (SEBA, Projet Favoriser les essences rares)
3. Bravo A, Montero G., 2008 - Selvicultura de *Acer pseudoplatanus* L. In Serrada R., Montero G., Reque J. A., *Compendio de Selvicultura Aplicada en España*. INIA, p. 1039-1114
4. Cisneros Ó., Montero G., 2008 - Selvicultura de *Acer pseudoplatanus* L. In Serrada R., Montero G., Reque J. A., *Compendio de Selvicultura Aplicada en España*. INIA, p. 29-44
5. Cisneros O., Martinez V., Montero G., Alonso R., Turrientes A., Ligos J., Santana J., Llorente R., Vaquero E., 2009 – *Plantaciones de frondosas en Castilla y León - Cuaderno de campo*. Cesefor, FAFCYLE, INIA, JCYL
6. Claessens, H., Pauwels, D., Thibaut, A., Rondeux, J., 1999 - Site index curves and autecology of ash, Sycamore and cherry in Wallonia (Southern Belgium). *Forestry*, Vol. 72, N° 3, 1999, p. 171-182
7. Feliksik, E., Niedzielska, B., Wilczynski, S., 2000 - An attempt to evaluate the influence of rainfall and temperature on the radial increment of Sycamore (*Acer pseudoplatanus* L.). *Sylvan* 2000. Vol. 144, n° 6, p. 63-72.
8. Fontnoire J., 1972 - Les érables. *La Forêt Privée*, n°85, p. 55-65
9. Franc A. et Ruchaud F., 1996 - *Autécologie des feuillus précieux: frêne commun, merisier, érable sycomore, érable plane*. Collection Etudes du Cemagref, série Gestion des territoires, n°18, 170 p.
10. Gonin P., 2001 - *Reconnaissance des milieux et guide des stations forestières en Midi-Pyrénées. Petites Pyrénées, Plantaurel et Bordure sous-pyrénéenne. Guide pratique*. Cetef garonnais, CRPF Midi-Pyrénées, 52 p.
11. Hein S., Collet C., Ammer C., Le Goff N, Skovsgaard J.P., Savill P., 2009 - A review of growth and stand dynamics of *Acer pseudoplatanus* L. Europe: implications for silviculture. *Forestry* 82, p. 361-385
12. Helmut P., 1996 - *Les érables*. Ed. Eugen Ulmer, Paris, 240 p.
13. Illian A., 2005 - Arce pseudoplátano ó blanco. *Acer Pseudoplatanus* L. *Navarra Forestal* 11, p. 16-18
14. Jacamon M., 1987 - *Guide de dendrologie. Arbres, arbustes, arbrisseaux des forêts françaises. Tome II Feuillus*. Nancy : ENGREF, 256 p.
15. Jensen J.K., Rasmussen L.H., Raulund-Rasmussen K., Borggaard O.K., 2008 - Influence of soil properties on the growth of Sycamore (*Acer pseudoplatanus* L.) in Denmark. *European Journal of Forest Research* 127(4), p. 263-274
16. Lyr H., 1996 - Effect of the root temperature on growth parameters of various European tree species. *Annals of forest sciences* n° 53, p. 317-323
17. Montero G., Cisneros O., Canellas I., 2002 - *Manual de selvicultura para plantaciones de especies productoras de madera de calidad*. Ministerio de Ciencia y Tecnología
18. MRW (Ministère de la région Wallonne), 1991 – *Le fichier écologique des essences*. Namur : MRW, t1 : Texte explicatif, 45 p. ; t2 : Fiches des essences, 190 p.
19. MRW (Ministère de la région Wallonne), 1996 - *Le fichier écologique des essences. Tome 3*. Namur : MRW, 203 p.
20. Poulain G., 1992 - L'érable sycomore, 1<sup>ère</sup> partie. *Forêts de France*, n° 356, p. 21-23
21. Petritan A., Lupke B., Petritan C., 2009 - Influence of light availability on growth, leaf morphology and plant architecture of beech (*Fagus sylvatica* L.), maple (*Acer pseudoplatanus* L.) and ash (*Fraxinus excelsior* L.) saplings. *European Journal of Forest Research*, Vol. 128, n°1, p. 61-74
22. Pinto P., Gegout J.-C., 2005 - Effet du climat et de la nutrition minérale sur la distribution des essences dans le massif vosgien. *Annals of forest sciences* n° 62, p. 761-770

23. Rameau J.C., Mansion D., Dumé G., 1989 – *Flore Forestière Française ; tome 1 : plaines et collines*. Institut pour le Développement Forestier, 1785 p.
24. Rameau J.C., Mansion D., Dumé G., Gauberville C., 2008 – *Flore Forestière Française ; tome 3 : Région méditerranéenne*. Institut pour le Développement Forestier, 2426 p.
25. Richer-Leclerc C., Arnold N., Rioux J. A., 1994 - Growth evaluation of the Norway maple (*Acer platanoides* L.) under different natural temperature regimes. *Journal of environmental horticulture*, v. 12(4), p. 203-207
26. Ruchaud F., 1995 - Caractérisation autécologique et sylvicole des feuillus précieux.
27. Ruiz de la Torre J., 2006 - Flora mayor. Organismo Autónomo de Parques Nacionales, Dirección General de Biodiversidad. Madrid. 1756 p.
28. Thibaud A., 2004 - Autécologie du merisier et de l'érable sycomore en région wallonne. *Forêt Wallonne* n°73, p. 40-47
29. Tissier J., Lamps L., Peltier J.-P., Marigo G., 2004 - Etude des relations entre les caractéristiques hydrauliques et les exigences écologiques de six espèces d'Acer dans les Alpes françaises. *Annals of forest sciences* n°61, p. 81-86.
30. Kazda M, Wagner C, Pichler M, Hager H., 1998 - Light utilisation potential of *Quercus petraea*, *Fagus sylvatica* and *Acer pseudoplatanus* in the year of advanced planting. *Allgemeine Forst und Jagdzeitung* 169(9), p. 157-163
31. Weber-Blaschke G., Heitz R., Blaschke M., Ammer C., 2008 - Growth and nutrition of young European ash (*Fraxinus excelsior* L.) and Sycamore maple (*Acer pseudoplatanus* L.) on sites with different nutrient and water statuses. *European Journal of Forest Research*, Vol. 127, n°6, p. 465-479