

Characteristics of tree species

Trees have different shapes and growth rates depending on the species they belong to. The species determines the growth, the hardness of the wood, the root structure, the longevity, or the type of regeneration of trees. In turn, each species responds differently to environmental conditions and therefore, only lives in certain environments, with certain temperature, humidity, light and soil characteristics. Knowing these characteristics of the species and their response to the environment is essential to be able to properly manage forests.

Species-related characteristics

Different characteristics are specific to each tree species: longevity, hardness of the wood, depth of the roots or type of reproduction (Table 1). Other variables, mainly structural (such as crown shape or height), also depend on the species, but may be more conditioned by environmental components, whether they are environmental or forest management factors.

We can make a first classification of tree species based on the type of growth, fast or slow, that they have. **Fast-growing** trees are trees that live for fewer years, have shallower roots, retain and accumulate less CO₂ in their trunk, and produce **softwoods that decompose more quickly**. In this group we find **conifers** (pines, firs, spruces, etc.) and **riverside trees** (alders, poplars, birches, willows, etc.). In contrast, **slow-growing** trees develop deeper roots, tend to live longer and provide carbon reservoirs for longer. They produce hard, **heavier and slower-degrading woods**. Representative species of this group are holm oak, beech, chestnut, walnut, etc.

Characteristics linked to environmental factors

Trees have strict requirements in relation to the **environmental factors** necessary for them to survive: each species has a maximum and minimum range outside of which it cannot survive. Climate and soil encompass most factors (water, temperature, nutrient availability, etc.) but factors such as **tolerance to shade or response to disturbances** (related to the type of regeneration of each species) must also be considered.

Thermal conditions determine the distribution limits of forest species. Of the climatic factors, **water** is the most important limiting factor in the growth of trees in the Mediterranean area. Forest species are also distributed in a gradient from greater to less **tolerance to shade**, from heliophile species (generally fast-growing, such as birches,



Figure 1. Birch, a heliophile species. Les Planes de Son (Pallars Sobirà). Photo: Lluís Comas/Carles Batlles.



Figure 2. Beech forest in autumn. Beech is a shade tolerant species. Photo: Pixabay. Creative Commons Zero - CC0.

Species	Type of growth	Hardness of the wood	Longevity	Depth of the root	Type of regeneration	Distribution	Frost resistance	Drought resistance	Tolerance to shade	Lim tolerance	Low soil fertility tolerance
PLANIFOLIOS HOLM OAK (<i>Quercus ilex</i>)	Slow	Hardwood	500-700	Deep roots	Seed and regrowth	From 0 to 1400 m	Low	High	Medium	Indifferent	Normal
ROBLE PUBESCENTE (<i>Quercus humilis</i>)	Slow	Hardwood	300-500	Deep roots	Seed and regrowth	From 400 to 1500 m	Low	Medium	Medium	High	Normal
CORK OAK (<i>Quercus suber</i>)	Slow	Hardwood	300-500	Deep roots	Seed and regrowth	From 0 to 1000 m	Low	High	Medium	Low	Medium
CHESTNUT (<i>Castanea sativa</i>)	Slow	Hardwood	500-700	Deep roots	Seed and regrowth	From 0 to 1500 m	Low	Low	High	Low	Low
BEECH (<i>Fagus sylvatica</i>)	Slow	Hardwood	300-500	Deep roots	Seed and regrowth	From 1000 to 1700 m	Low	Low	High	Indifferent	Low
BLACK POPLAR (<i>Populus nigra</i>)	Fast	Softwood	<100	Shallower roots	Seed and regrowth	From 0 to 1800 m	High	Low	Low	Indifferent	High
ALDER TREE (<i>Alnus glutinosa</i>)	Fast	Softwood	100-150	Shallower roots	Seed and regrowth	From 0 to 600 m	High	Low	Medium	Indifferent	High
CONIFERS ALEPPO PINE (<i>Pinus halepensis</i>)	Fast	Softwood	100-150	Shallower roots	Seed	From 0 to 1000 m	Low	High	Low	High	High
SCOTS PINE (<i>Pinus sylvestris</i>)	Fast	Softwood	300-500	Shallower roots	Seed	From 500 to 2000 m	High	Low	Low	Indifferent	Normal
AUSTRIAN PINE (<i>Pinus nigra</i>)	Fast	Softwood	150-300	Shallower roots	Seed	From 800 to 1500 m	High	High	High	High	High

Table 1. Characteristics of some of the main tree species that have to do with the species itself or its ability to respond to environmental factors.

pinus, poplars, etc.), which tend to be **colonisers or pioneers in open areas** (Figure 1) and that depend on high levels of light for their germination and development, to shade-tolerant species that can remain in the understory for decades waiting for a clearing to grow in height and achieve maturity, such as holm oak or beech (Figure 2), among others.

Soil is decisive for the growth of trees, as it represents their support while providing the nutrients and water necessary for their survival. The **pH** and presence of certain ions (Ca ++, Na +, CO - -, etc.) are factors that determine the presence or not of certain species of trees, distinguishing between **calcic and silicic species** depending on the best soil type for them.