

Celtis australis in Europe: distribution, habitat, usage and threats

D. Magni, G. Caudullo

Celtis australis L., commonly known as southern nettle tree or European hackberry, is native in South Europe from the Mediterranean Basin to Asia Minor. It prefers sunny exposures in **thermophile** mixed deciduous forests, well adapted to rocky soils lacking in humus, where it is able to crush rocks entering their fissures with its strong roots. Thanks to its frugality, this tree is used for afforestation in difficult terrains against erosion. It is also an ornamental tree because of its dome-shaped crown. During the last 50 years nettle tree has been showing decline symptoms especially in urban areas due to a combination of climate change effects and the action of different pathogens.

The nettle tree, or European hackberry, (*Celtis australis* L.) is a deciduous tree which usually grows 15–20 m in height, only exceptionally reaching 25–30 m¹. Its shape appears as a low dome, with a wide, regular, dense, light green crown². The trunk is vertical, robust and enlarging at the bottom with age, with girth of 3 m, exceptionally up to 6 m³. The bark is thin, grey or pale brown, and smooth, with horizontal wrinkles similar to beech; sometimes becoming more rugged with warty excrescences in old age^{2–4}. The leaves are simple, from 5 to 15 cm long, usually wavy, alternate, lanceolate or oval-lanceolate, **serrate** with regular jagged teeth (except near the base), **acuminate** or twisted apex, and **cuneate** or rounded slightly asymmetric base^{3,4}. They are dark green and **scabrous** above, green-greyish and **tomentose** beneath^{3–5}. This species is **andromonoecious**, the flowers are small, greenish, solitary or grouped in 3–5 elements, forming in the branches developed in the current year⁶. The fruits are **drupes**, ovoid or spherical, 10–12 mm in diameter, with a scant sweetish fleshy part⁶. The fruit colour changes from whitish to brown-reddish and then to blackish when the fruits ripe in late summer or autumn^{1,2,6}.

Distribution

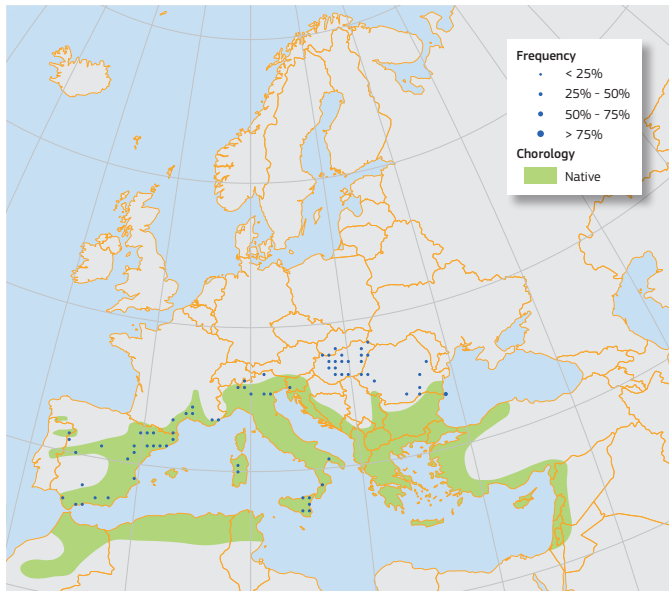
The nettle tree is native to the Mediterranean basin and Western Asia. It occurs from Morocco and the Iberian Peninsula to Syria comprising the Mediterranean islands, up to the Black Sea and the Caucasus. It grows in lowlands and low hills from sea level to 1 200–1 300 m in Spain and Northwest Africa^{1–3,6–8}. In the Middle East its distribution area overlaps with the Caucasian hackberry (*Celtis caucasica* Willd.)^{3,7,9}. They are very similar and difficult to identify; some authors consider them as subspecies¹⁰. Outside its natural range it is present as an ornamental plant in Central Europe with a northern limit set by severe winter frosts⁵. Outside Eurasia, this species is naturalised in Australia and in south-western United States^{11,12}.

Habitat and Ecology

The nettle tree grows in woods, meadows, riverbanks, cliffs, in dry and poor areas especially on rocky soils. Its strong and widely developed roots can crack rocks¹³. It is a **heliophilous** species, preferring sunny exposures, and suffers during intense cold and late frosts². The fruits are very appetizing for birds (and also for foxes, badgers and martens), which are responsible for seed dissemination¹. It can also reproduce vegetatively by root suckers³. This species can be often found in **thermophile** mixed deciduous forests together with downy oak (*Quercus pubescens*), hop-hornbeam (*Ostrya carpinifolia*), manna ash (*Fraxinus ornus*), common hazel (*Corylus avellana*), and maples (*Acer* spp.), or in riparian vegetation with willows (*Salix* spp.), poplars (*Populus* spp.) and elms (*Ulmus* spp.), very rarely as the dominant species¹⁴. This tree has a high growth rate and in its native range can live up to 1 000 years and attain significant size^{2,3}.

Importance and Usage

The grey-whitish wood is heavy, elastic, water resistant and lasting. It has been used in the past in carriage-building, in boat-building, for door or window lintels, and to make tools and tool-handles needing good resistance^{1,3}. The wood was also appreciated for cabinet-making and lathe works and to produce musical instruments (e.g. flutes, small drums) and toys for children in the last century. Due to mechanization in agriculture and the availability of new more resistant materials, the wood industry of nettle tree is in clear decline and its use is now limited to local handmade manufacture¹. This tree also produces good coppice shoots when cut³ and yields high quality fuel wood and charcoal¹³. Nettle tree is principally used for afforestation in rocky and difficult terrains against erosion thanks to its frugality, for plantations in urban areas and along roads because of its pollution tolerance, and as ornamental plant for its domed crown, with long arching branches¹³. The fruits are edible and contain seeds from which sweet oil can be extracted. They are also used to produce specialist liqueurs or, in the past, to substitute sugar during famine periods¹. This tree has applications for natural medical remedies (e.g. in India and Spain) for amenorrhoea, diarrhoea and colic (fruits), to reduce blood pressure (leaves), as a diuretic agent or to reduce cholesterol (fruits and leaves), and



Map 1: Plot distribution and simplified chorology map. Frequency of *Celtis australis* occurrences within the field observations as reported by the National Forest Inventories. The chorology of the native spatial range for *C. australis* is derived after several sources^{23–27}.



Spherical drupe fruits in different stages of maturity. (Copyright Vito Buono, www.actaplantarum.org; AP)

to treat liver problems (the internal part of the bark)¹. The bark is also used to make a dye, yielding a yellow pigment. The foliage (and in some regions also the bark and thin branches) can be used as fodder for cattle^{1,3,9}.

Threats and Diseases

Decline of nettle tree has been registered in its Mediterranean distribution area for more than fifty years, especially in towns, where more than 50% of trees were already affected by the 1980s^{15,16}. Symptoms of tree weakness are evident in drought years and cold winters. One of the causes seems to be the presence of **phytoplasmas** belonging to the aster yellows and elm yellows groups, affecting sprouting buds, fruit-set and adventitious buds^{15,17}. In Italy the decline of nettle tree is also increased by the eriophide mite *Aceria bezzii*, responsible for the delayed sprouting of buds and loss of fruit production¹⁷. In southern European towns the fungus *Inonotus rickii* was discovered to contribute to the decline of the species, causing decay and cankers. This fungus is able to infect several ornamental species making it particularly invasive and widespread in urban areas^{18–20}. The **oomycete** *Phytophthora megasperma* can seriously damage nettle trees, with wilting, dieback and death. The long-term survival of spores in the soil makes this threat rather dangerous²¹. In its easternmost Asian Minor distribution, with a possible future extension into the Mediterranean basin because of the hot dry climatic conditions, nettle tree is affected by *Xylotrechus namanganensis* (namangan longhorn beetle or willow longhorn beetle). Symptoms of the presence of this pest are wilting and drying leaves, holes made by larvae in the trunks, large branches and at the bases of infested trees, and beetles on the flowers and trunks²².



Canopy of a large plant in the botanical garden of Villa Carlotta (Como Lake, North Italy). (Copyright Davide Fumagalli: CC-BY)



Oval-lanceolate leaves with serrated margins. (Copyright Vito Buono, www.actaplantarum.org; AP)

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