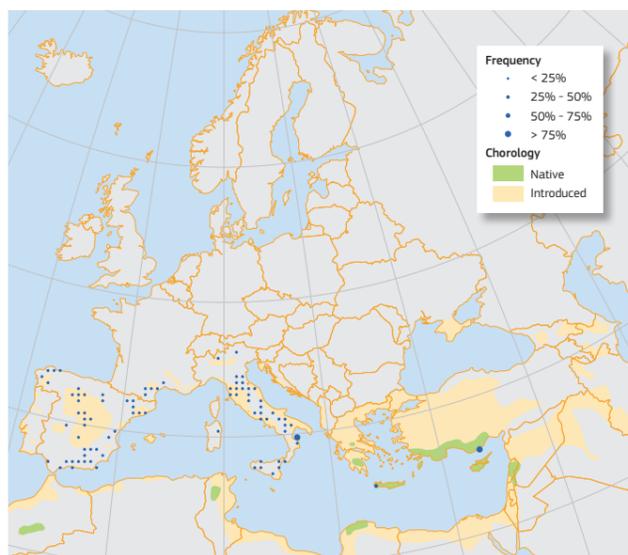


Cupressus sempervirens in Europe: distribution, habitat, usage and threats

G. Caudullo, D. de Rigo

Cupressus sempervirens L., known as Mediterranean or common cypress, is a medium-sized evergreen coniferous tree characterised by a very variable crown shape, from columnar to spread, dark green foliage and small ovoid brown cones. Its natural habitats are the semi-arid mountains around the eastern Mediterranean basin and Middle East. However, as it has had a long tradition of cultivation since the time of ancient civilizations, its natural range is still not clear. It is a pioneer species, growing quickly when young on most types of soils, including rocky and compact ones, adapted to the Mediterranean climate with dry and hot summers and rainy winters. It can form pure forests or be the dominant tree in pine forests or **maquis** vegetation. This cypress is widely planted as an ornamental tree, especially the columnar and conical forms, making a characteristic feature of the Mediterranean landscape. Its wood is also appreciated for its durability and scent. Main pests of this cypress are fungal cankers, caused by *Seiridium cardinal* and *Diplodia pinea*, and the sap-sucking aphid *Cinara cupressi*.

The Mediterranean cypress (*Cupressus sempervirens* L.) is a medium-sized evergreen coniferous tree, which grows up to 35–40m with trunks of 1m in diameter, rarely over 2m^{1,2}. The crown is very variable, from about as broad as it is tall with spreading branches, to the conical or columnar **fastigiated** form (known also as Italian cypress). Although the two forms have often been described as two different taxa, the columnar is considered to be a cultivated form selected for planting long ago and rare in natural habitats^{3, 3}. The scale-like dark-green leaves are dense and closely pressed against the twigs, 2–5mm long. Flowers appear in early spring and may occur on 3–6 year old plants. The cypresses are **monoecious** wind-pollinated plants. The male flower is cylindrical, 3–5mm long, yellow when ripe. Pollination occurs from mid-winter to early spring. The female flowers are brownish-green and **globose**, ripening after one year into brown-grey woody cones, ovoid-shaped, 2–4cm long, composed of 8–14 opposite scales. Seeds are 8–20 per each scale, brown and narrowly winged, 3–5mm long, releasing in autumn-winter. Bark is grey-brown with stringy ridges^{2,4-7}.



Map 1: Plot distribution and simplified chorology map for *Cupressus sempervirens*. Frequency of *Cupressus sempervirens* occurrences within the field observations as reported by the National Forest Inventories. The chorology of the native and introduced spatial range for *C. sempervirens* is derived after Faini and Della Rocca¹⁶.

Distribution

The natural distribution of this cypress is unclear, due to its long horticultural history in the Mediterranean region^{2, 8}. Natural stands occur in the south-western Mediterranean basin over several geographically non-adjacent areas reaching eastwards the Caucasus and south-western Iran, from sea level (Crete) up to 2000m (Turkey)⁷. Various authorities attribute its native distribution to the Aegean islands (Crete, Samos, Rhodes, Kos and Syros), Cyprus, Turkey, Middle East (Syria, Jordan, Lebanon and Iran), and in North-East Africa (Libya, Tunisia)^{3, 7, 9}, although recent studies on genetic and paleobotanic records presume the presence of central Mediterranean natural populations¹⁰. Today the distribution of this species, principally the columnar form, comprises most of the Mediterranean basin and Middle East, favoured by human cultivations since the time of ancient civilisations, and more recently all over the world as an ornamental tree^{3,7}. Some populations are recognised as separate varieties and for some authors are treated as different species: *Cupressus sempervirens* var. *numidica* in Tunisia and *Cupressus sempervirens* var. *indica* in northern Iran¹⁰. The endemic Moroccan cypresses in the High Atlas Mountains are considered as a separate species (*Cupressus atlantica*)^{8, 11}, but some authors classify it as variety of the common cypress (*Cupressus sempervirens* var. *atlantica*)² or of the Tassili cypress (*Cupressus dupreziana* var. *atlantica*)^{1, 10}.

Habitat and Ecology

In natural habitats this cypress occurs in Mediterranean climates with dry and hot summers and rainy winters, or in semi-arid climates in the eastern and interior areas of its range¹. It is

a light demanding, drought and heat tolerant species, growing with a rain rate of just 200 mm per year^{7, 12}. Its vegetative growth period coincides with spring and autumn: during the winter period it is **quiescent**, while it is **dormant** during the hot summer, from which the cypress can quickly resume after rain thanks to its large shallow root system¹³. Young plants do not tolerate low temperatures, while adults can survive temperatures down to -20 °C⁷. It is a pioneer species, growing quickly when young on most substrates but not clay or waterlogged ones. It thrives better than other species on rocky, dry and compact soils, even if it prefers rich, deep, moist and well aerated soil with neutral pH, where however it is less competitive^{12, 14}. This cypress can live for over a hundred years: in natural stands 200–500 year old plants are not rare⁷. One of the oldest living cypresses is located in Italy and is dated as more than 800 years old¹⁵. Mediterranean cypress forms open woodlands, as its litter might prevent the development of understorey vegetation due to **allelopathic** effects¹². Over its natural range it develops pure stands or is mixed with Aleppo pine (*Pinus halepensis*), Turkish pine (*Pinus brutia*), black pine (*Pinus nigra*) or species of **maquis** scrubland often associated with junipers (*Juniperus* spp.)^{1, 6, 16}.



One-year old ovoid-shaped seed cones: they take two years to reach maturity. (Copyright Alan Gregg, www.flickr.com: CC-BY)

Importance and Usage

The Mediterranean cypress has a long history of exploitation of its natural forests, leading to their strong decline. On the other hand it has been widespread planted throughout the Mediterranean area, and other regions, for ornamental and religious purposes^{7, 9}. Since ancient times its wood has been particularly appreciated for its resistance to fungi and insects, especially if immersed in water⁷. The wood is suitable for small carpentry, exterior woodworks (doors, windows, garden furniture, etc.) and ship building. The insect repellent odour makes the wood suitable for chests and wardrobes to store linens and foods. It is also used for coffins⁶. The columnar or conical forms have been used since Greek and Roman times as an ornamental tree for shading gardens, cemeteries, as a windbreak along roads, and it has become a characteristic feature of the Mediterranean coastal and urban landscapes^{7, 9, 10}. More recently, thanks to its ecological qualities, this cypress has been used in forest protection against desertification and soil conservation in hot areas, where the soil is shallow and degraded and no other forest tree species could grow^{16, 17}. Its deep and dense litter and the crown are difficult to ignite, so it can be used as firebreak¹⁸, even if regeneration is scarce after wildfires¹². Mediterranean cypress also tolerates salty winds, so it is used as coastal windbreak. It has a good resistance to frequent frost damage, trimming and grazing, as it is able to re-sprout quickly, thus is also suitable as evergreen hedge^{6, 7, 12, 17}.

Threats and Diseases

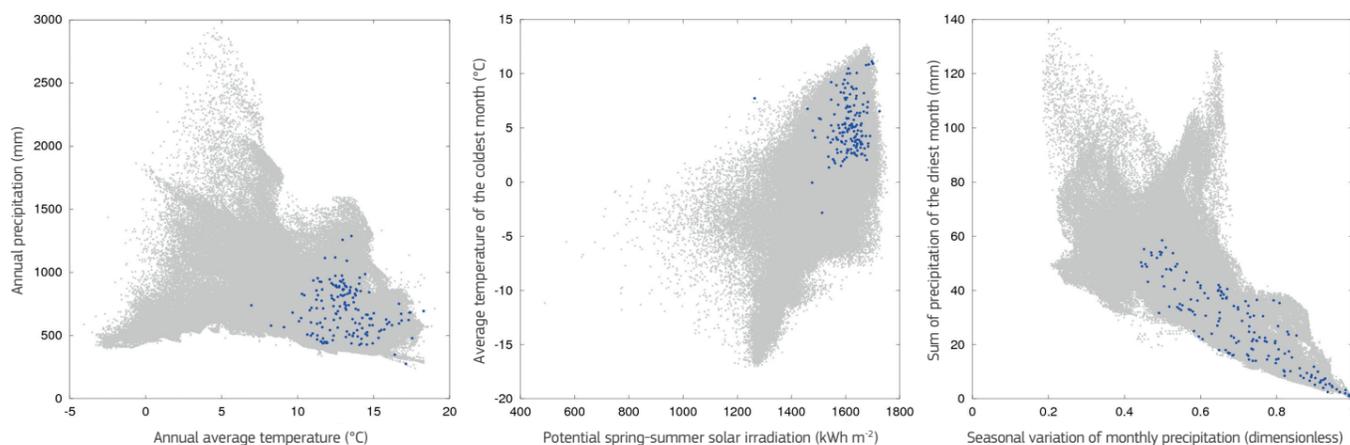
The most dangerous and widespread disease of cypress is the bark canker caused by the fungus *Seiridium cardinal*. It was probably introduced from the USA during World War II with military materials sent to European combat zones (Italy, France) or earlier (end of XIX century) with the trade of ornamental cypresses from California¹⁹. This parasite has seen numerous successive severe outbreaks in Mediterranean countries since the 70s, also affecting other species of the genus *Cupressus*. The fungus disperses with water, wind and also with animals, such as birds and insects. It occurs in artificial stands and on ornamental trees. Its management requires the removal of infested trees and the use of genetically resistant forms.



Tall ornamental cypress with columnar habit in an urban garden (Udine, North-East Italy). (Copyright Graziano Propetto, www.actaplantarum.org: AP)

Field data in Europe (including absences) ● Observed presences in Europe ●

Autoecology diagrams based on harmonised field observations from forest plots.





Vegetation of a dry riverbed (wadi) with flowering oleander shrubs (*Nerium oleander*) and cypress trees behind in West Susa (Jabal al Akhdar, North-East Libya).
(Copyright Maher27777, commons.wikimedia.org: PD)



Cypress in the coastal cliffs near Paleokastritsa (Corfu Island, Greece).
(Copyright Jennifer Slot, www.flickr.com: CC-BY)



Yellow-orange male flowers at the end of the twigs and a seed cone of the previous year.
(Copyright Silvano Radivo, www.actaplantarum.org: AP)

The fungus *Diplodia pinea* f. spp. *cupressi* causes cankers on the stem and branches of water stressed cypresses. Outbreaks have been reported principally in eastern countries of the Mediterranean basin, starting from Israel. The aphid *Cinara cupressi* is an important pest of several cypress species, causing death in affected trees with intensive sap-sucking activity during outbreaks. This aphid is presumed to have originated from the Mediterranean area; now it is reported in all countries where cypresses are planted. The mite *Trisetacus juniperus* colonises the foliage of several species of the genera *Cupressus* and *Juniperus* and causes also destruction of the apical sprout, giving to affected plants a typical bushy appearance^{6, 13, 20}. Natural stands of Mediterranean cypress are relict of more widespread forests and nowadays are reduced and degraded by centuries of exploitation, deforestation, fires and cattle grazing. They cover an important environmental and naturalistic role, in addition to their genetic biodiversity value. Only recently these stands have been included in protected areas. However, Mediterranean cypress is sufficiently abundant, even in the truly wild forms, to be considered as not in danger of extinction^{6, 16}.



Interior of the wooden seed cone containing up to 20 small winged seeds.
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