

Eucalyptus globulus and other eucalypts in Europe: distribution, habitat, usage and threats

S. Cerasoli, M. C. Caldeira, J. S. Pereira, G. Caudullo, D. de Rigo

The *Eucalyptus globulus* Labill., commonly named as Tasmanian blue gum, is an evergreen broadleaf tree native to south-eastern Australia. In Europe it is mainly cultivated in the Iberian Peninsula for paper pulp production, managed as short rotation coppice stands. It is appreciated for its adaptation and fast-growing aptitude. Rapid environmental changes in the Mediterranean region menace Tasmanian blue gum trees increasing the risk of fire, drought and the outbreaks of pests and diseases.

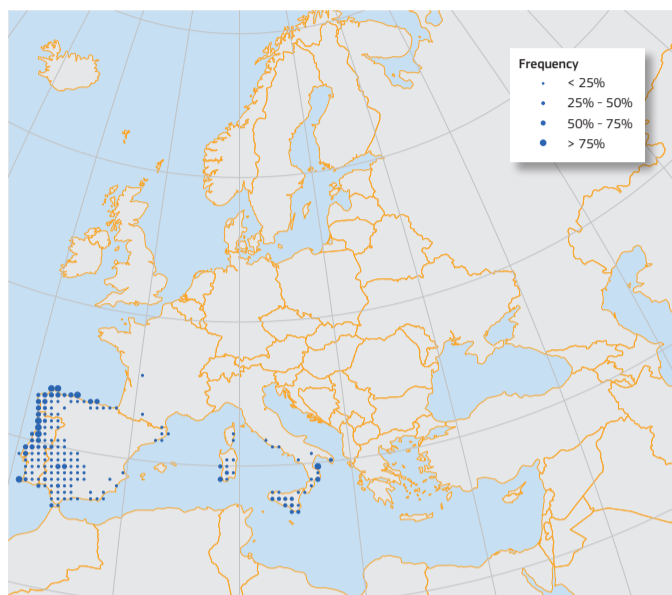
The Tasmanian blue gum (*Eucalyptus globulus* Labill.) is a medium to large evergreen broadleaf tree, growing up to 70 m, and is the tallest tree species recorded in Europe¹. The bark is smooth and shed yearly in long ribbons when a new layer of the outermost tissue is formed. Juvenile leaves are ovate, thin, sub-horizontal and covered with a blue grey wax bloom that gives rise to the common name of the species. The adult leaves are lanceolate and shift to vertical hanging. The leaves have roughly circular glands containing aromatic oils. Flowers are solitary and are formed in the axils of leaves. The sepals and petals are united to form a cap (operculum) that covers stamens and that drops off at anthesis². The name Eucalyptus originates from this trait common to the entire genus, the words *eu* and *kalyptos*, meaning well and covered respectively². The fruit is a woody capsule 0.6 to 2.5 cm in diameter³.

Distribution

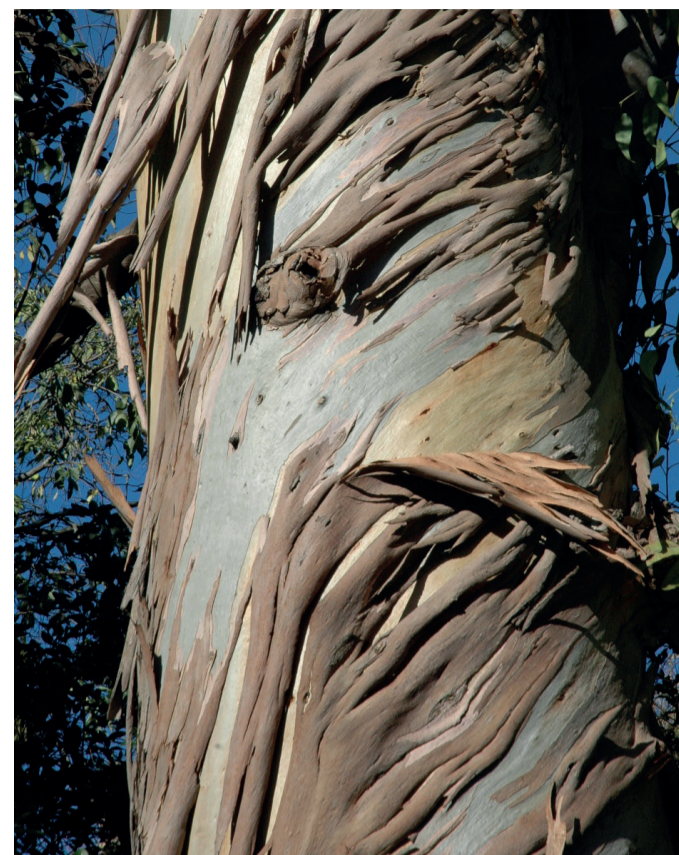
The Tasmanian blue gum, a native tree of south-eastern Australia (Tasmania and southern Victoria⁴), belongs to the angiosperm family of *Myrtaceae*, which includes more than 800 species². It was introduced in south-western Europe (Portugal, Spain) and Northern Africa in the mid 19th century and was planted for industrial purposes, mainly timber and paper pulp³. Nowadays it is the major pulpwood species planted in temperate regions of the world⁵. In Europe, it covers 1.3 million hectares of forested area, mainly in the Iberian Peninsula (more than 80%), France and Italy⁶. In Portugal, the Tasmanian blue gum plantations are at their best in the northern half of the littoral, where winters are mild and precipitation higher (700-2000mm) than in the Southern and inland regions of the country⁷. In Spain, eucalypt plantations are mainly in the North Western region (Galicia)⁸.

Habitat and Ecology

Among eucalypts, *Eucalyptus globulus* is the species most used for industrial purposes in Europe. The tree is well adapted to the climate conditions of the Mediterranean region. Limited water supply, together with nutrient supply, are main limiting factors to the growth of the species⁹. Also, low temperatures are a major constraint to growth, with air temperatures below -5 °C causing up to 50% of foliar tissue mortality¹⁰. The Tasmanian blue gum is a fast-growing tree usually managed as short rotation coppice stands (around 12 years) thanks to the ability of the species to regenerate from dormant buds on the stem (epicormics) after felling¹¹. The fast growth rates result largely from indeterminate shoot growth and the ability to increase leaf area whenever



Map 1: Plot distribution for *Eucalyptus* spp. Frequency of *Eucalyptus* spp. occurrences within the field observations as reported by the National Forest Inventories.



Bark sheds in long ribbons. (Copyright J.R. Pinho: CC-BY)



Eucalypt plantation for industrial purposes. (Copyright J.R. Pinho: CC-BY)

the conditions of soil nutrients, moisture and temperature are good¹². Another feature favouring high growth rate during the early growth stage is the large partitioning of assimilated carbon to leaves at the expense of roots, enhancing leaf area and carbon assimilation rates⁷.

Importance and Usage

This eucalypt species was introduced as an ornamental tree, but its rapid growth and adaptability to a variety of ecological conditions turned it into a widely planted species for industrial uses, mainly paper pulp, firewood and timber³. Plantations are managed as short-term coppice crops with rotations from 8 to 12 years. Replanting usually takes place after 2-3 rotations^{5, 13}. The wood is light yellowish-brown, moderately durable, and has also a high incidence of spiral grains, so that it is difficult to nail. It needs care when sawing and drying to minimize defects. Generally the sawn timber is not of high quality¹³. Tasmanian blue gum is also utilized for non-wood products, such as the extraction of essential oils for medical and cosmetic applications from leaves⁵. Although this species has modest concentrations of crude oil compared with other eucalypts, the large amount of leaf biomass helps to increase the production per unit land area. Its flowers produce abundant pollen and nectar, which are used for honey production¹³. It has also been planted for windbreak and shelter belts along orchards, pastures and roads, and also for environmental purposes, such as erosion and salinity control, or even mining site rehabilitation and for drying marshy areas¹³.



Flower caps, which protect them before blossoming. (Copyright John Tann, www.flickr.com: CC-BY)



Juvenile leaves are ovate with a blue grey wax bloom. (Copyright J.R. Pinho: CC-BY)



Adult leaves are lanceolate and contain glands with aromatic oils. (Copyright Forest & Kim Starr, commons.wikimedia.org. CC-BY)



Flowers have numerous white stamens which give a feathery appearance. (Copyright J.R. Pinho. CC-BY)

Threats and Diseases

The Tasmanian blue gum is facing major rapid environmental changes in the Mediterranean region¹⁴, with increased risks of drought, fire, pests and diseases. As an exotic species in Europe, the Tasmanian blue gum was free of natural enemies for more than 100 years. However, a number of pests and diseases with biological and economic impact have been detected in the last decades¹⁵. Examples are the bark borer (*Phoracantha semipunctata*), defoliating insects from the genus *Gonipterus* spp. or fungal leaf pathogens (*Mycosphaerella* spp.). Although the risk of fire in the Mediterranean region is high, the Tasmanian blue gum is a fire-resilient species that has a high probability of surviving fires due to its capability of re-sprouting from epicormics and/or basal buds¹⁶. Eucalypts are also vulnerable to the soil borne *Phytophthora* pathogens such as *Phytophthora cinnamomi*, that causes severe widespread tree dieback particularly in south-western Australia¹⁷⁻¹⁹.

Other eucalypts in Europe

Other eucalypts have been selected for plantation in Europe for their better adaptation to different environmental conditions and purposes. The red gum (*Eucalyptus camaldulensis* Dehnh.) is the dominant species in plantations around the Mediterranean basin, appreciated for its ability to thrive and produce acceptable yields on relatively poor soils with a prolonged dry season³. In Europe it is planted principally in Spain and Portugal^{22, 23}, but it is also present in past and recent plantations or afforestation programmes in Italy (Sardinia, Sicily, mainland coasts)^{24, 25}, France (French Riviera and Corsica)^{26, 27}, Greece (Aegean Islands)²⁸, Malta²⁹, Cyprus^{30, 31} and Turkey³². This species is better adapted for timber than pulp production, and is also employed for shelterbelts and as an ornamental³. The shining gum tree (*Eucalyptus nitens* (Deane & Maiden) Maiden) is adapted to cold temperate climates, as it is less susceptible to low temperatures and frost. In Europe it is planted in northern Portugal and Spain, France, United Kingdom and Ireland for pulpwood, appreciated for its high yields and good quality wood^{33, 34}. The cider gum (*Eucalyptus gunnii* Hook. f.) has greater frost resistance and is cultivated in France, United Kingdom and Ireland. This species, usually used for ornamental purposes and windbreaks, has encountered recent interest as a source of wood fuel, even if it shows slower growth rates and poorer pulping quality in comparison with *E. globulus* and *E. nitens*^{3, 33, 35, 36}. In France and United Kingdom the *Eucalyptus viminalis* Labill. is planted for shelterbelts or as an ornamental³. Beside the selection of well adapted species, genetic improvement of the eucalypts has been carried out targeting productivity, genetic diversity and wood quality, and improved clonal or seminal plants are nowadays used in European plantations mainly in Portugal and Spain³⁷.



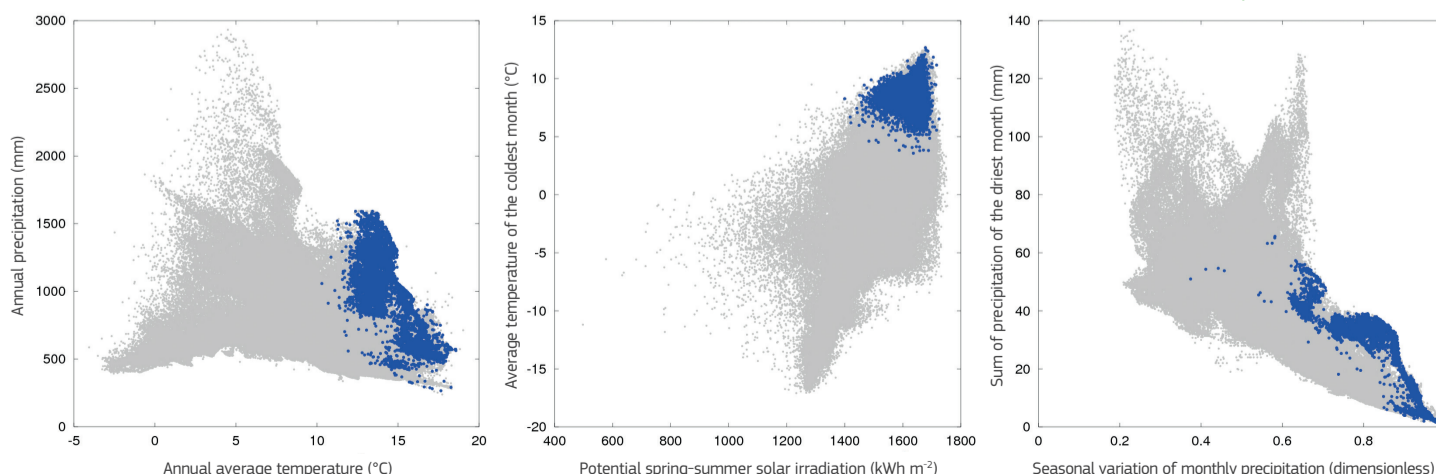
Understorey of a eucalypt plantation with dense covering of shed bark making it difficult for other vegetation to grow. (Copyright Forest & Kim Starr, commons.wikimedia.org. CC-BY)

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

Autoecology diagrams based on harmonised field observations from forest plots.



This is an extended summary of the chapter. The full version of this chapter (revised and peer-reviewed) will be published online at <https://w3id.org/mtv/FISE-Comm/v01/e01b5bb>. The purpose of this summary is to provide an accessible dissemination of the related main topics.

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Cerasoli, S., Caldeira, M. C., Pereira, J. S., Caudullo, G., de Rigo, D., 2016. *Eucalyptus globulus and other eucalypts in Europe: distribution, habitat, usage and threats*. In: San-Miguel-Ayanz, J., de Rigo, D., Caudullo, G., Houston Durrant, T., Mauri, A. (Eds.), *European Atlas of Forest Tree Species*. Publ. Off. EU, Luxembourg, pp. e01b5bb+

