**Castanea sativa** in Europe: distribution, habitat, usage and threats

M. Conedera, W. Tirner, P. Krebs, D. de Rigo, G. Caudullo

The sweet chestnut (*Castanea sativa* Mill.) is the only native species of the genus in Europe. The broad diffusion and active management by man resulted in the establishment of the species at the limits of its potential ecological range, which makes it difficult to trace its original natural area. The present distribution ranges from North-Western Africa (e.g. Morocco) to North-Western Europe (southern England, Belgium) and from south-western Asia (e.g. Turkey) to Eastern Europe (e.g. Romania), the Caucasus (Georgia, Armenia) and the Caspian Sea. In Europe the main chestnut forests are concentrated in a few countries such as Italy, France and the Iberian Peninsula. The sweet chestnut has a remarkable multipurpose character, and may be managed for timber production ( coppice and high forest) as well as for fruit production ( traditional orchards), including a broad range of secondary products and ecosystem services.

The sweet chestnut tree (*Castanea sativa* Mill.) is a medium-large deciduous tree that may reach 30-35 m. When cultivated, the tree is long-living (up to 1000 years) and may also reach a significant girth (up to 12 m at breast height). The bark is brown-greyish and often has net-shaped venations with deep furrows or fissures. Leaves are oblong- lanceolate (8-25 cm long, 5-9 cm broad) with a dentate-crenate margin and a brighter green upper leaf surface. This species tree is **monocious** and flowers develop in late June to July and may be pollinated by wind (more usual in case of dry weather during flowering) or insects (dominating in wet weather conditions). Male flowers are gathered in catkins (5 to 15 cm in length) whereas female flowers are usually positioned at the base of the male ones in the upper part of the current year’s shoots. By autumn the female flowers develop into spiny cupules (commonly called bur) containing 3-7 brownish nuts that are shed during (September)-October. Some cultivars, especially the varieties of the Mannor-group, develop only one large nut per cupule (rarely up to three). The nut is an **achene** composed of two skins; the external part is shiny brown (pericarp) and the internal is a pellicle adhering to the fruit (achene).

**Distribution**

The distribution area ranges from Southern Europe (Iberian Peninsula, Italy, Balkans, Mediterranean Islands) and North Africa (Morocco), to North-Western Europe (England, Belgium) and eastward to Western Asia (North East Turkey, Armenia, Georgia, Azerbaijan, Syria), with an altitudinal range between 200 and 1,800 m, depending on the latitude and site aspect. In Europe the sweet chestnut covers an area of more than 2.5 million hectares (about the dimension of Sardinia Island). Most of the area (89%) is concentrated in just a few countries (France, Italy, followed by Spain, Portugal, and Switzerland) with a long tradition of chestnut cultivation. European settlers introduced the species in other continents, so that chestnut trees or plantations are nowadays present in different parts of South and North America as well as Australia. The broad diffusion and active management by man have resulted in the establishment of the species at the limits of its fundamental niche, which makes it nowadays difficult to trace its original range and its ecology. The most probable natural range is delimited by several macro-regions: the Transcaucasian region, north-western Anatolia, the hinterland of the Tyrrenian coast from Liguria to southern Italy along the Apennine range, and its ecology along with its fundamental niche, which makes it nowadays difficult to trace its original range. The chorology of the native and introduced spatial range for *C. sativa* is derived after several sources. The most probable natural range is delimited by several macro-regions: the Transcaucasian region, north-western Anatolia, the hinterland of the Tyrrenian coast from Liguria to southern Italy along the Apennine range.

**Habitat and Ecology**

The sweet chestnut is a warm-temperate deciduous species, that likes a mean yearly temperature ranging between 8° and 15°C and monthly mean temperatures over 10°C during 6 months. The species needs a minimum rainfall that ranges between 600 and 800 mm according to its distribution and interaction with temperatures. The lowest elevations are recommended for the highest latitudes and vice versa. The chestnut tree displays a high sensitivity to summer droughts issuing from the combination of high temperatures and lack of precipitation. It does not thrive on limestone, preferring well-drained, from

**Map 1**: Plot distribution and simplified chorology map for *Castanea sativa*. The chorology of the native and introduced spatial range for *C. sativa* is derived after several sources. The most probable natural range is delimited by several macro-regions: the Transcaucasian region, north-western Anatolia, the hinterland of the Tyrrenian coast from Liguria to southern Italy along the Apennine range, and its ecology along with its fundamental niche, which makes it nowadays difficult to trace its original range. The chorology of the native and introduced spatial range for *C. sativa* is derived after several sources. The most probable natural range is delimited by several macro-regions: the Transcaucasian region, north-western Anatolia, the hinterland of the Tyrrenian coast from Liguria to southern Italy along the Apennine range.

**Map 2**: High resolution distribution map estimating the relative probability of presence.

**Figure**: Edible nuts of the sweet chestnut: they are traditionally roasted but can also be candied, boiled, dried, or used as flour. (Copyright Patrik Krebs: CC-BY)
Castanea sativa

Tree species | European Atlas of Forest Tree Species

Importance and Usage

Due to its multipurpose character, the chestnut tree has always been cultivated in different management systems according to the targeted products and services. Chestnut wood is particularly suitable for external use, thanks to its natural high durability, which has always been cultivated in different management systems. A good example of a natural community might be the Georgian chestnut forests where the species grows with other thermophilous broadleaved deciduous species such as oriental beech (Fagus orientalis), hornbeam (Carpinus betulus syn. Carpinus caucasica), black alder (Alnus glutinosa), field elm (Ulmus minor), Cappadocian maple (Acer cappadocicum syn. Acer tataricum), Quercus spp., Caucasian zelkova (Ulmus carpinifolia), red lime (Tilia rubra subsp. caucasica syn. Tilia caucasica) and yew (Taxus baccata).

Different ways: roasted, candied, boiled, dried, or transformed to flour. Orchards also provided several secondary products such as pasture, hay, mushrooms, berries, etc. In some cases, orchards were also intercropped with cereals. Flowers are rich in pollen and nectar and therefore really appreciated for honey production by beekeepers.

Threats and Diseases

Traditional chestnut management approaches (i.e. coppices, high forests, orchards) requires continuous cultural inputs. In the absence of management, chestnut stands tend to be invaded by other species and to evolve towards mixed deciduous forests. This has caused a severe decrease of biodiversity in the affected regions and reduced ecosystem service provision. Further threats for chestnut trees include the xyle disease (Phytophthora spp.), the spread of the newly introduced chestnut blight (Cryphonectria parasitica), and the impact of the Chinese gall midge (Cecidomyia saligna). Due to its multipurpose character, the chestnut tree has always been cultivated in different management systems. A good example of a natural community might be the Georgian chestnut forests where the species grows with other thermophilous broadleaved deciduous species such as oriental beech (Fagus orientalis), hornbeam (Carpinus betulus syn. Carpinus caucasica), black alder (Alnus glutinosa), field elm (Ulmus minor), Cappadocian maple (Acer cappadocicum syn. Acer tataricum), Quercus spp., Caucasian zelkova (Ulmus carpinifolia), red lime (Tilia rubra subsp. caucasica syn. Tilia caucasica) and yew (Taxus baccata).

References


This is a summary of the main characteristics of the species. The full version of this chapter (in English) is available on the website of the European Forest Information System (EFIS).

Field data in Europe (including absence)

Autecological diagrams based on harmonized field observations from forest plots.

References


Map: High-resolution map estimating the maximum habitat suitability.