Aesculus hippocastanum

Aesculus hippocastanum L., the European horse-chestnut, is a mesophytic broad-leaved tree native to a few mountain ranges in the Balkan Peninsula, but widespread in the urban landscape of moist, warm-temperate Europe. The morphology and ecology of its large seeds are very distinctive, and they are also known for their medicinal properties. Natural populations are reduced and declining after strong insect infestations, pollution, wood extraction and forest fires. For this reason it recently received the status of near-threatened species.

Description

European horse-chestnut (Aesculus hippocastanum L.) is the only European native species belonging to the Aesculus genus, which counts 13 tree and shrub species living in temperate deciduous forests. It is a large and tall tree growing up to 35 m and potentially very long-living. It develops an oval crown, bearing large shade-giving leaves composed by 5-7 palmate leaflets. Numerous white hermaphrodite flowers are born in a pyramidal inflorescence. The petals are yellow at the base, as are their major veins at pollination maturity, while turning deep orange and thus afterwards rejected by bumblebees and honeybees. Pollen is very distinctive, with coarse spines. Only 2-5 (8) flowers from the base of each inflorescence develop the subglobose fruit, provided with spiny sharps and contains one to three seeds. The ripe seed recalls the chestnut fruit in its dark brown colour and is used for horse feeding, justifying the origin of the common name. The surface of the seed also bears a large, scaly, scurf-like mark, which is the hilum, attaching them to the ovary.

Distribution

The European horse-chestnut is endemic for two relict main ranges, each containing small isolated populations respectively in mountains of Greece, Albania and the former Yugoslav Republic of Macedonia4 and in the Piresylvian Balkan, Bulgaria5,6. It is a relic species from the Early Pleistocene, about 1 million years ago. At that time it was still widespread in Europe1,7,8. Its subsequent decline may be related to the extinction of large mammals acting as dispersers of its large seeds3,9,10 and to low tolerant seed physiology to desiccation11. In 1537, 40 seeds of uncertain provenance were imported from Turkey to Prague, beginning the tree cultivation in Europe. Claims of occurrence in the Bronze Age pile dwellings from North Italy12,13 turned to be modern contaminants.

Habitat and Ecology

The European horse-chestnut is a mesophytic tree, growing in moist deciduous broad-leaved forests under a warm-temperate climate. It thrives especially at the bottom of shady ravines on limestone bedrock and on alluvial soils in association with hornbeam (Carpinus betulus), but also in mountain mixed forests up to 1600 m altitude14,15. It is very sensitive to forest fire; moreover seed are both dormant and recalcitrant, i.e. they do not tolerate water desiccation even at maturity16. This is why horse-chestnut seedlings do not establish on open and dry substrates, limiting species ability to pionering moist rocky and karstic sites only and preventing migration after forest withdrawals and climate worsening17.

Importance and Usage

Horse-chestnuts are favourite trees of gardens, parks and roadways under moist climates. Numerous horticultural varieties have been described. The seeds have traditionally been used as a therapy for chronic venous insufficiency18,19 and are processed by the pharmaceutical industry. It has been shown that they contain antioxidants, preventing accumulation of white blood cells responsible for poor blood flow in the legs, in common problems with ageing20. Unprocessed seeds are poisonous, but a decoction of the bark and leaves is also used in folk medicine of Albania, Kosovo and Central Italy to treat circulatory and rheumatic problems.

Threats and Diseases

Total population in the native habitat is reduced to less than 2500 mature individual21, with declining subpopulations due to strong infections by Ceroomoria ochroleuca (ornocilllaria moth, Lepidoptera), which feeds on the leaves, causing mid-summer defoliation and exhaustion of the trees and may reduce reproduction in natural populations22. Horse-chestnuts are highly vulnerable23 to the Asian longhorn beetle (Anoplophora glabripennis) which is a large wood-boring beetle native of Asian countries, such as Japan, Korea and China. Other threats are road construction, local tourism, wood extraction, pollution, and forest fires in the residual native areas. European horse-chestnut is assessed as vulnerable in Greece and Bulgaria and near-threatened at European scale24.

References


This is an extended summary of the chapter. The full version of this chapter (revised and peer-reviewed) will be published online at the following URL: https://doi.org/10.1016/j.research.2021.09.001. The purpose of this summary is to provide an accessible dissemination of the related main topics.

The full version of this chapter can be downloaded for free from the following URL: https://doi.org/10.1016/j.research.2021.09.001. The purpose of this summary is to provide an accessible dissemination of the related main topics.

The full version of this chapter can be downloaded for free from the following URL: https://doi.org/10.1016/j.research.2021.09.001. The purpose of this summary is to provide an accessible dissemination of the related main topics.