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Cryphonectria parasitica

Taxonomic status

Scientific name	Cryphonectria parasitica (Murrill) Barr
Synonyms	*Endothia parasitica* (Murrill) P.J. & H.W. Anderson
Taxonomic position	Ascomycetes: Diaporthales
English name	Chestnut blight or canker
German name	Kastanienrindenkrebs
French name	Chancre de l'écorce du châtaignier
Italian name	Cancro della corteccia del castagno

Description and identification

Description	There are several *Cryphonectria* spp. worldwide, which are morphologically difficult to distinguish (CABI, 2001). Some of the other species are found on *Castanea* and *Quercus*, but only *C. parasitica* is pathogenic on these trees. Diagnosis to species level can most effectively be carried out through microscopic examination of ascospores, which do not form until late in the disease cycle. The canker produced by the fungus (described in CABI/EPPO, 1997 and CABI, 2001) is more characteristic. It may be confused with ink disease, caused by *Phytophthora* spp., another serious fungal disease in Europe.

Biology and Ecology

Life cycle	Conidia and ascospores are transported by rain and wind and enter into wood via wounds that are caused by mechanical damage, pruning or natural events. Lesions become sunken as bark erodes and cambium is killed, and the bark swells and cracks. Pale-brown mycelial fans may often be detected in the cambial layers, especially when the fungus is actively growing. Stromata are formed over wide areas of cankered bark, producing conidiomata from which large numbers of conidia are extruded in damp conditions. The stromata expand and coalesce along cracks in the bark, and the ascomata are then formed in large numbers. By this stage, the affected plant tissues are dead (CABI, 2001).
Host plant	Mainly chestnut species (*Castanea* spp.). Other trees are sometimes reported as hosts, especially *Quercus* spp. and *Acer* spp. For a full list of hosts and a discussion of host range, see CABI (2001).
Habitat	Forests and plantations.
Origin	Eastern Asia

Introduction and dispersal

Introduction history	Introduced into North America at the end of the 19th century. Found in Italy in 1938, from where it rapidly spread to most of Europe. It was observed in the Ticino in 1947, and north of the Alps in 1986 (Bissiger and Heiniger, 1991).
Pathways of introduction	The pathway of introduction into North America and Europe is unknown. It was probably carried by host plants, or on wood or bark. There is a small risk of transmission by fruits and seeds.
Dispersal	Conidia and ascospores are spread by wind and rain, but it has been shown that they are also transmitted by beetles (e.g. buprestids of the genus *Agrilus*). Human-mediated transport of host plants or wood may also have been responsible for the spread within Europe.

Current status

Actual Potential distribution in CH	The fungus is now well distributed in Switzerland and probably matches the distribution of its main host, *Castanea sativa*.
Distribution in Europe	Most European countries where *C. sativa* grows have already been invaded.

Impacts

Damage on plant	Tree parts above the point of invasion die. Coppice shoots often regenerate.
Environmental impact	In North America, the introduction of the chestnut blight has resulted in dramatic changes in forest ecosystems. In the early 20th century, the chestnut was one of the most abundant hardwoods of the eastern deciduous forests of the USA. The fungus killed over a billion trees over 36.8 million hectares. Although the American chestnut (*Castanea dentata*) still survives as a species - mainly as a bush - it is no longer a functional part of the ecosystem (Anagnostakis, 1987). In Europe, the damage is less severe, and healthy coppice shoots usually arise from stumps. This has been explained by the occurrence of hypovirulent strains in Europe – infected by a virus – which are vegetatively compatible with virulent strains. A tree infected by the hypovirulent strain is able to produce callus, overgrow the canker, and survive. However, European chestnut forests have also suffered and have often been replaced, naturally or intentionally, by other associations, e.g. in Italy, France and the Ticino.
Economic impact	In Europe and North America, chestnut is a valuable cash crop and an important timber species. The introduction of the chestnut blight has caused serious economic losses in both sectors, on both continents.
Management options	Two main management options have been applied. Firstly, the selection of blight-resistant strains has been widely investigated. In North America, some success was obtained in breeding resistant hybrid chestnuts by making use of the more resistant Asian species. In Europe, however, attempts to develop resistant *C. sativa* strains were not very successful. The second option is the use of hypovirulent strains of the fungus, applied to developing lesions, which enable the lesions to recover and convert the virulent strain into a hypovirulent strain. Chemical control methods have often been investigated, with little success.
Information gaps	There is an obvious lack of information on the real environmental impact of the chestnut blight in Europe.

References

Literature

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