GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Cryphonectria parasitica***

Cryphonectria parasitica 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Fungi	Ascomycota	Sordariomycetes	Diaporthales	Valsaceae

Common name Edelkastanienkrebs (German), chestnut blight (English)

Synonym *Endothia parasitica*

Similar species *Cryphonectria radicalis, Endothia gyrosa*

Summary *Cryphonectria parasitica* is a fungus that attacks primarily *Castanea* spp. but also has been known to cause damage to various *Quercus* spp. along with other species of hardwood trees. American chestnut, *C. dentata*, was a dominant overstorey species in United States forests, but now they have been completely replaced within the ecosystem. *C. dentata* still exists in the forests but only within the understorey as sprout shoots from the root system of chestnuts killed by the blight years ago. A virus that attacks this fungus appears to be the best hope for the future of *Castanea* spp., and current research is focused primarily on this virus and variants of it for biological control. Chestnut blight only infects the above-ground parts of trees, causing cankers that enlarge, girdle and kill branches and trunks.

view this species on IUCN Red List

Species Description
The US Forest Service (undated) states that, \"*C. parasitica* forms yellowish or orange fruiting bodies (pycnidia) about the size of a pin head on the older portion of cankers. Spores may exude from the pycnidia as orange, curled horns during moist weather. Stem cankers are either swollen or sunken, and the sunken type may be grown over with bark. The bark covering swollen cankers is usually loose at the ends of the canker. Trees die back above the canker and may sprout below it. Frass and webs from secondary insects are common under loose bark.\" Davelos and Jarosz (2004) state that, \"*C. parasitica* branches are killed when a canker girdles the stem disrupting phloem transport and cambrial growth. As the pathogen cannot enter the root system, genets survive and new sprouts are produced from the root collar. The epidemic is perpetuated when the sprouts become infected. An intracellular hyperparasite of *C. parasitica* can alter the interaction between chestnuts and blight.\" Davelos and Jarosz (2004) state that, \"*C. parasitica* infection occurs most commonly at branch points, where movement creates small wounds that allow the pathogen to enter the tree. Individuals less than 50cm in height are only rarely infected and disease incidence increases with plant size, presumably because of an increase in the number of potential wound entry sites.\"
Please see PaDIL (Pests and Diseases Image Library) Species Content Page *Fungi: Chestnut blight* for high quality diagnostic and overview images.

Notes
Davelos and Jarosz (2004) state that, \"The blight pathogen, *C. parasitica* (Murrill) Barr, was introduced into the United States from Japan (Milgroom, 1995; Milgroom *et al*., 1996) around 1904 (Merkel, 1905) and rapidly spread throughout the range of the American chestnut, *Castanea dentata* (Marsh.) Borkh. Heiniger & Rigling (1994) postulated that the natural spread of hypovirulence in Europe has led to a decline in the severity of disease and has allowed many stands of European chestnut to recover. Many attempts have been made to introduce hypoviruses as biological control agents of *C. parasitica* in the eastern United States (reviewed in MacDonald and Fulbright, 1991), but they have failed to spread and contain the epidemic.\" The authors also state that, \"Naturalised populations of *C. dentata* occur throughout the lower peninsula of Michigan (Brewer, 1995). Populations originated from seed or seedlings planted by early settlers of the state. Blight was first reported in Michigan in the late 1920s (Baxter and Strong, 1931), and hypovirus was detected in the late 1970s (Day *et al*., 1977). In some cases hypoviruses have spread naturally, leading to recovery of some chestnut populations (Fulbright *et al.* 1983).
\"The bark miner *Spulerina simploniella* (Lepidoptera: Gracilariidae) was found in coppice chestnut (*Castanea sativa*) forests in Greece but was not found in chestnut orchards. Its larvae mine under the thin periderm of young trees, 4–10 years old, while the stem bark is still smooth. Under normal conditions it does not cause any damage to the trees. However, when chestnut blight caused by *Cryphonectria parasitica* is present in the area, the insect may be an agent of disease spread. Experiments revealed that spraying of 23 pupation sites with a *C. parasitica* conidiospore suspension caused canker formation at a rate of 100% in the coppice chestnut forests of Mount Athos, North Greece. It is believed that rain during the pupation period (approximately May 23 to June 15) may deposit conidiospores on the freshly exposed phloem and cause cankers. This bark miner has been detected in several parts of Greece, however, always in intensively managed chestnut coppice forests. [ABSTRACT FROM AUTHOR] (Diamandis and Perlerou, 2005).

Habitat Description
Cryphonectria parasitica is a fungus that attacks primarily *Castanea dentata* and *Castanea sativa* although it can attack a variety of other hardwood tree species such as: *C. mollissima*, *Alnus cordata*, *Ostrya carpinifolia*, *Carpinus betulus*, *Quercus pubescens*, *Q. petraea*, *Q. frainetto*, and *Q. ilex* (Dallavalle and Zambonelli, 1999).

Reproduction
Marra and Milgroom (1999) state that, \"Although *C. parasitica* functions nearly exclusively as a self-incompatible fungus in the laboratory, with extremely rare occurrences of self-fertilization documented (Marra, 1998), self-fertilization constitutes about 25% of the mating system in nature (Milgroom *et al*., 1993; Marra, 1998).\"The authors also state that, \"Self-fertilization occurs under both laboratory and field conditions in *C. parasitica*. The disparity between observations of frequent selfing in nature and rare selfing in the laboratory suggests that the mating system is under ecological as well as genetic control.\"
Guerin *et al*. (2001) state that, \"Under American conditions, numerous perithecia (the sexual fruiting bodies of *C. parasitica*), maturing in stromata, were visible on the infected bark surface. Ascospores were discharged from these perithecia during periods of warm rain events in spring, summer and autumn. Discharged ascospores were further dispersed in air by wind and may be the source of primary inoculum each season. *C. parasitica* has a mixed mating system and both outcrossing and self-fertilization can occur within a population. Perithecia of *C. parasitica* occur but are not very frequent in most areas of Europe. More recently, in a survey of *C. parasitica* populations in Italy, the sexual stage was found in nine out of 10 populations, indicating the potential for sexual reproduction (Milgroom and Cortesi, 1999).\"

General Impacts
Cryphonectria parasitica has had a negative cascading effect upon native forest composition and diversity throughout most of the United States since its introduction. Davelos and Jarosz (2004) state that, \"American chestnut, *C. dentata*, was a dominant overstorey species in hardwood forests of the eastern United States of America prior to the introduction of blight (Day and Monk, 1974; Karban, 1978; Russell, 1987). In Southern Appalachian forests, the loss of mature chestnuts may have substantially reduced the forest's carrying capacity for certain wildlife species (Diamond *et al*., 2000). After the spread of *C. parasitica*, oak (*Quercus* spp.), red maple (*Acer rubrum*) and hickory (*Carya* spp.) became the dominant overstorey tree species (Keever, 1953; Stephenson, *et al*., 1991). Today, chestnuts continue to be an important understorey species because of sprouts produced by extant tree root systems (Keever, 1953; Russell, 1987; Stephenson *et al*., 1991). However, infected sprout clusters exhibit reductions in survival and size, particularly when in competition with other hardwoods (Griffin *et al*., 1991; Parker *et al*., 1993). Vandermast *et al*. (2002) state that, \"Allelopathic qualities of chestnut leaves could have affected large areas of eastern forests. Chestnut foliage was dense, the leaf litter abundant and the leaves slow to decay (Zon, 1904). Other studies indicate rain throughfall, dripping off live foliage, can contain concentrations of phytotoxic chemicals sufficient to inhibit germination of co-occurring species (Al; Lodhi and Nilsen). With the abundance of competitive tree and shrub species in the southern Appalachians, it is possible allelopathy had an influence on maintaining chestnut's dominance in the region.\"
In Italy, Dallavalle and Zambonelli (1999) state that, \"There is a very high occurrence of chestnut blight on oak in the mixed woods of southern-central Italy where the pathogen still causes severe damage on chestnut (Luisi *et al*., 1994). Although the occurrence of the disease on hosts other than chestnut does not involve damage to these trees it could play an important role in the epidemiology of the fungus.\"

Management Info
Integrated Management: The American Chestnut Cooperators' Foundation (undated) states that, “Integrated management for *C. dentata* revival combines hypovirulence (by inoculation) with *C. parasitica* resistance (grafted) on sites identified as ideal *C. dentata* habitat, to produce *C. parasitica* control. In Virginia's Lesesne State Forest, 3 resistant *C. dentata* were grafted in 1980. In 1982 and 1983 the first cankers were inoculated with hypovirulence. These trees are thriving; they have produced nuts for more than 10 years, and they make excellent annual growth”. .
For details on biological control options, please see *management information*.

Pathway
The Chestnut blight fungus was likely introduced to North America on nursery stock from Asia and was first observed killing trees in the Bronx Zoo (New York City) in 1904 (The Canadian Chestnut Council, undated).

Principal source: Liu, Y. C., M. L Double, W. L. MacDonald, and M. G. Milgroom. 2002. Persistence of Cryphonectria hypoviruses after their release for biological control of chestnut blight in West Virginia forests. Forest Pathology 32: 345-356

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ALIEN RANGE

[1] AUSTRIA
[1] BELGIUM
[1] BOSNIA AND HERZEGOVINA
[1] BULGARIA
[2] CANADA
[1] CROATIA
[1] CZECH REPUBLIC
[1] EUROPEAN UNION (EU)

[1] FRANCE
[1] GERMANY
[1] HUNGARY
[1] ITALY
[1] POLAND
[1] ROMANIA
[1] SLOVAKIA
[1] SPAIN
[1] TUNISIA
[1] UKRAINE
[1] GEORGIA
[1] GREECE
[1] INDIA
[1] MACEDONIA, THE FORMER YUGOSLAV REPUBLIC OF
[1] PORTUGAL
[1] RUSSIAN FEDERATION
[1] SLOVENIA
[1] SWITZERLAND
[1] TURKEY
[25] UNITED STATES

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