



A Comprehensive Analysis of the Chestnut Blight Plant Disease and Pathogen Interaction

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DESCRIPTION

Chestnut blight is a plant disease caused by the fungus "*Cryphonectria parasitica*" (formerly *Endothia parasitica*). Accidentally introduced from Asia, this disease was first discovered in 1904 at the New York Zoo. By 1925, it had devastated American chestnut (*Castanea dentata*) populations in an area extending 1,600 km (1,000 mi) north, south, and west from its entry point. Since then, the disease has killed virtually all Native American chestnuts in the United States and Canada.

An estimated 4 billion trees died due to the disease, significantly changing forest structure and causing serious economic consequences for the grain and wood processing industries. Chestnut blight also wreaks havoc in other countries and in several other tree species.

The pathogen *Cryphonectria parasitica* is an ascomycete fungus and produces pods in small stromal tissues. They can appear at any time of the year when conditions are favorable. The necks around the cloth are very long and meet where they protrude from the bark. The spores are repelled by the wind and spread vigorously. Normally, before the presence of pycnidia, pycnidia are produced in the same small stromal tissue or in another stromal tissue.

The pathogen overwinters as fungal hyphae in lesions and other colonized bark. In spring, fruiting bodies called pycnidia develop on the surface of the gall, and orange-yellow spore tendrils can be seen on the bark as they protrude from the yellow-brown pycnidia. Several weeks to a year later, darker fruiting bodies called colonies also develop in the infected tissue and release a second type of spore, ascospores. Rain splashes and birds, insects or animals can move the conidia and contaminate other bark elsewhere on the tree or move the conidia to another tree. The ascospores are

ejected from the fruiting bodies so they can become airborne and spread to new areas. Spore dispersal may continue into the late fall and winter months if conditions are mild.

All symptoms on infected plants appear on the surface. Compare to parasitica attacks the bark of European chestnut trees and enters through cracks or wounds. On grafted trees, infection most often occurs in the grafting area, where calluses form. In bushes or orchards, the infection is often localized at the base of the trunk, although the dead bark does not spread to the root system.

This fungus can spread so rapidly through the bark of infected trees that the trunk or branch quickly becomes sealed and the dead bark becomes a sunken ulcer. The orange fruiting bodies produce spores that spread blight and can also be seen on tree bark. These fruiting bodies burst through the lenticels and secrete long tendrils of orange-yellow spores in wet weather. There is no cure for chestnut blight. Once the pathogen appears in one area and spreads to most areas, all American chestnut trees are at high risk; therefore, do not plant them. Other species should only be grown under preferred growing conditions; Stressful sites will put them at risk.

CONCLUSION

Choose disease-resistant varieties to limit the growth of the pathogen *Cryphonectria parasitica*. Although the search for downy mildew-resistant American chestnut trees has been going on for nearly a century, there are currently no downy mildew-resistant American chestnut trees on the market. Nut growers should avoid American chestnuts. Instead, choose the Chinese hybrid chestnut (*Castanea mollissima*). Because Chinese chestnut trees are said to be the most resistant to chestnut blight; however, the blight resistance of individual Chinese chestnut species may vary.

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