

## Dutch elm disease

widespread fungoid killer of elms (*Ulmus* species) and certain other trees, first described in the Netherlands. Spread by bark beetles, the disease has decimated elm populations throughout much of Europe and North America.

Dutch elm disease is caused by three species of ascomycete fungi in the genus *Ophiostoma*. One of these, *O. ulmi* (also known as *Ceratocystis ulmi*), was probably introduced into Europe from Asia during World War I. The disease was first identified in the United States in 1930. A federal eradication campaign in the late 1930s and early '40s sharply reduced the numbers of infected elms but could not stop the disease's spread into regions wherever the very susceptible American elm (*Ulmus americana*) grows. In the late 1940s, another virulent species, *O. novo-ulmi*, was described in Europe and the United States, and heavy elm losses continued. This species was introduced to Auckland, New Zealand, in 1989, where it was nearly eradicated with aggressive control measures; the country suffered a major outbreak in 2013 due to a decline in funding for these efforts. The third species, *O. himal-ulmi*, was discovered in 1993 and is endemic to the Himalayas.

Spread of the fungus normally occurs by the smaller European elm bark beetle (*Scolytus multistriatus*), less commonly by the American elm bark beetle (*Hylurgopinus rufipes*). Female beetles seek out dead or weakened elm wood to excavate an egg-laying gallery between the bark and the wood. If the fungus is present, tremendous numbers of fungal spores (conidia) are produced in the galleries. When young adult beetles emerge through the bark, many carry the spores on and in their bodies. The infection of healthy elms occurs when beetles feed in the leaf axils and young twig crotches of healthy trees. Some spores are dislodged and get into these trees' water-conducting vessels (xylem), in which they reproduce rapidly by yeastlike budding. The weakened elm is quickly colonized by hordes of beetles, and the cycle is repeated. The fungus can also spread up to 15 metres (50 feet) from diseased to healthy trees by natural root grafts.

The leaves on one or more branches of a stricken tree suddenly wilt, turn dull green to yellow or brown, curl, and may drop early. Young, rapidly growing elms may die in one to two months; older or less vigorous trees sometimes take two years or more to succumb. A brown to black discoloration occurs in the white sapwood of wilting branches just under the bark. Because symptoms are easily confused with other diseases, especially elm phloem necrosis and diebacks, positive diagnosis is only possible through laboratory culturing.

The control of Dutch elm disease largely involves the exclusion of beetles. All dead, weak, or dying elm wood with tight bark should be burned, debarked, or buried before elms leaf out in early spring. A single, annual dormant spray that coats all bark surfaces with long-lasting insecticide (e.g., methoxychlor) can kill many beetles before they deposit fungus spores. Claims of fungal control have been made for certain fungicides that are injected into the sapwood. Such measures appear to be more protective than curative. Although other species of elms, as well as species of the related *Zelkova* and *Planera*, are susceptible in varying degrees, the smooth leaf (*Ulmus carpinifolia*), Chinese (*U. parvifolia*), and Siberian (*U. pumila*) elms have shown good resistance, and experiments with hybrids of American and Asiatic elms have met with much success.

### Cite

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school.eb.com/levels/high/article/Dutch-elm-disease/31610. Accessed 16 Dec. 2019.