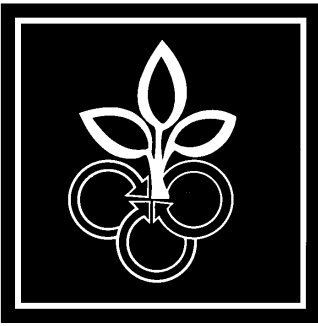


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Ornamental Diseases



Purdue University
Cooperative Extension Service

Dutch Elm Disease

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Despite the destructiveness of Dutch elm disease (DED) many American elms continue to survive, adding grace and beauty to the Indiana landscape. Knowledge of the disease and proper management practices will hopefully enable you to save your elm for another season, or possibly, even another generation.

Cause

DED is caused by a fungus (*Ophiostoma ulmi*) that is carried from diseased trees to healthy trees via two species of elm bark beetles: the smaller European elm bark beetle and the native elm bark beetle. Spores of the fungus are produced in the wood and bark of dead or dying trees; the beetles also inhabit dead or dying elm trees. When the beetles emerge from DED-infested trees, they carry spores of the fungus on their bodies and migrate to vigorous elms to feed. After feeding in healthy trees, the beetles then move to dying or dead elms where the females lay their eggs; thus, the disease is perpetuated through this linking of fungus and insect.

A second way the fungus can be spread is by root grafts. Roots of adjacent elms often make contact and grow together, thus allowing the fungus to travel from an infected tree to a healthy adjacent tree.

Symptoms

The disease results in wilting and yellowing of the foliage, followed by leaf death, defoliation and death of the affected branches. Wilting and yellowing of the leaves usually becomes visible about mid June and are most evident during July and August. Brown streaks develop under the bark in the sapwood of infected branches. This may be seen as a ring of discoloration when a diseased branch is cut or as dark streaks when the bark is peeled back from the infected branch (Figure 2).



Figure 1. Remove and dispose of all diseased trees, regardless of cause.

Management

The most important step in control of DED is good sanitation. If proper sanitation practices are not followed, other control measures are of little use.

(1) Sanitation. Remove and dispose of all diseased elms and all elms killed or seriously weakened regardless of cause. Elm wood may be chipped so none remains with sufficient bark to serve as brood wood for beetles. If chipping is not possible, diseased elm should be burned (where permitted) or buried in a landfill. It is also important to keep elm trees pruned so that large dead or weakened branches in otherwise healthy trees do not become beetle brood wood sites. Prune in the winter while trees are dormant. *Do not stockpile diseased wood for firewood!*

(2) Insect Control. The insecticide Methoxychlor is used to control the beetles that spread DED. Proper application and timing are essential to effectively reduce the population of elm bark beetles. Methoxychlor can be applied in early spring (March or April) when temperatures reach 40 degrees F or higher. Apply as close to bud swell as possible to insure residual protection through peak beetle activity. Note: Spraying alone, without a good sanitation program is of little value.

(3) Preventing Spread through Roots. Spread of DED through root grafts can be prevented by chemical soil fumigation with Vapam (*a restricted use chemical*), or by mechanical separation (cutting of roots by digging a narrow trench 18 to 24 inches deep between diseased and healthy elms). Simply removing infected trees promptly does not necessarily prevent spread of the disease to adjacent trees through connecting roots.

(4) Eradicant Pruning. Removing diseased branches, well below the point where sapwood discoloration is evident, may help rid the tree of infection. Such eradicant pruning must be done early. For trees that are showing 10-20% of the crown infected it is too late for such pruning. Prune back at least 10 feet into healthy wood, usually to a major limb. If further streaking is noticed in the pruned wood, cut back another 10 feet. Such pruning may seem rather drastic; however, many American elms have been saved by this pruning method. Carefully watch the tree for any signs of further wilting.

(5) Injection of Systemic Fungicides. The injection of systemic fungicides can be done on a preventative basis for selected high-value trees located in high disease risk areas, or they can be applied to help cure infected elms showing early stages of disease development (less than 5-10% of crown showing symptoms). Alamo and Arbotect 20-S are trade names of two systemic fungicides registered for control of DED. These fungicides are generally effective for 2 to 3 years, however trees should be evaluated for possible retreatment 12 months after treatment. Repeated injections are discouraged due to the physical damage (woodstain and decay) that results from the injection process. The pesticide labels recommend that the fungicides "be administered by trained arborists or others trained in injection techniques and in the identification of DED".

Systemic fungicides are most effective when used in conjunction with other management practices.



Figure 2. Brown discoloration just beneath the bark is typical of internal symptoms of Dutch elm disease.

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