

## Plant Pathology Fact Sheet

# Dutch Elm Disease

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Dutch elm disease is caused by the vascular wilt fungus, *Ophiostoma ulmi* (formerly, *Ceratocystis ulmi*). This fungus is vectored (i.e. 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. It is also spread from plant to plant through root grafts between adjacent trees.

### Symptoms

Dutch elm disease results in a wilting and yellowing of the foliage. This is followed by leaf death, defoliation and death of the affected branches. Affected trees develop a brown discoloration in the water conducting vessels (xylem) of the wood. 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 infected branches. As the disease progresses, major limbs die and eventually the entire tree is killed.

### Disease Management

The task of disease control can be very difficult unless community-wide surveys, sanitation and removal programs are used. Nevertheless, there are some steps that a



DUTCH ELM DISEASE SYMPTOMS ON AN AMERICAN ELM

homeowner can consider to try to save a valuable elm from destruction by Dutch elm disease. Key factors to keep in mind when considering measures for disease control are: How valuable is the tree? What is the probability of preventing or curing the disease?

### SANITATION

The chances of a valuable elm being kept

free of the disease are improved if all nearby dead and dying elm trees are removed and buried or burned as soon as possible. Eliminate, if possible, all potential elm bark



VASCULAR DISCOLORATION (STREAKING) UNDER THE BARK

beetle breeding material within 1,000 feet of the trees to be protected. This material will include elm branches that are infected, weak, dead, or recently cut. This will also mean destroying or debarking stumps and elm logs which are being kept for firewood. Sanitation reduces the fungus population as well as that of the bark beetles which vector the disease. Good sanitation is most important within and immediately adjacent to trees that are to be protected. Without sanitation, the other measures suggested here are of little use.

#### ROOT GRAFT BREAKAGE

Roots of adjacent trees frequently become grafted to one another. The Dutch elm disease fungus can spread from a diseased tree to an adjacent healthy tree via these root grafts. Potential root grafts can be severed by digging a narrow trench 18 to 24 inches deep midway between the infected and healthy trees. Injecting Vapam into the soil will accomplish the same thing. Apply Vapam to the soil in 3/4" X 18" holes, 6 inches apart midway between the diseased and healthy trees. Use a rate of 1/4 cup of dilute solution (1 part Vapam to 3 parts water) per linear foot. Seal by tamping. Read and follow the instructions on the Vapam label very carefully!

#### THERAPEUTIC PRUNING

In some cases the disease can be pruned out of the tree if there are only a few infections and they are detected early. At the first sign of a symptomatic twig, the infected branch should be removed and destroyed. Prune back at least 10 feet into healthy wood, usually to a major limb. If internal discoloration or streaking is noticed in the pruned wood, cut back another 10 feet. Trees that are showing dead leaves and branches in more than 10-20% of the crown are probably so thoroughly infected that the entire tree should be removed and destroyed.

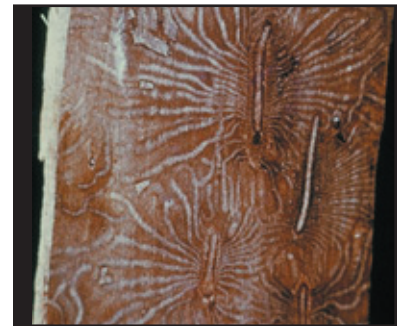
#### INSECT

##### CONTROL

Control of elm bark beetles is important in preventing the spread of the fungus to healthy trees.

Normally

this is done in the spring as the leaves are expanding because that is the time when high numbers of the fungus-carrying beetles emerge, although these insects can emerge almost any time during the growing season. Good coverage of the insecticide over the entire tree is important to achieve effective insect control. Methoxychlor can be applied in early spring (March or April) for bark beetle control.



ELM BARK BEETLE FEEDING GALLERIES UNDER THE BARK

#### FUNGICIDE INJECTIONS

Injecting elm trees with fungicides for Dutch elm disease control can be a waste of money in many locations in Kentucky because we do not have urban areas with community-wide Dutch elm disease control programs. Injections usually fail where sanitation, pruning and insect control are not practiced. In addition, injection is physically damaging

to the tree, because it results in wounds where discoloration and decay can occur. The major fungicide products available for injection are Alamo, Arbotec 20-S, Lignasan, Fungisol and Phyton 27. Injection should be done at the base of the tree on the root flares or into excavated root flares. Summer is the best time to make injections since the chemical will be taken up more efficiently at that time. Retreatment of already infected trees may be necessary. Homeowners should enlist the aid of an arborist who has been trained to inject for Dutch elm disease control.

### TREE REPLACEMENT

When this disease is not detected early enough or when the above control measures fail, for whatever reason, the best advice we can give is to begin replanting substitutes for threatened American elms. In general, native elms are susceptible to Dutch elm disease; elms of European origin vary in their susceptibility; elms of Asiatic origin are resistant.

The following are tolerant or resistant: Siberian elm (*Ulmus pumila*), Chinese elm (*U. parvifolia*), Scots elm (*U. glabra*), Buisman elm (*U. hollandica* cv. 'Christine Buisman'), Groeneveld elm (*U. hollandica* cv. 'Groeneveld'). Hybrid clones which are tolerant or resistant include: 'Dynasty', 'Jacan', 'Homestead', 'Pioneer', 'Regal', 'Thompson', 'Sapporo Autumn Gold', and 'Urban Elm'. An American elm selection, 'American Liberty', is also considered tolerant. Recent American elm selections such as 'Princeton', 'Trenton', and 'Valley Forge' are considered resistant.

(Revised 12-04)

*Photo credit:*

*Xylem discoloration under the bark, pg. 2  
by R. Scott Cameron, International Paper,  
courtesy of [www.forestryimages.org](http://www.forestryimages.org)*