Dutch elm disease

The fungus *Ophiostoma ulmi* (sexual stage) causes this vascular wilt disease. The native elm bark beetle (*Hylurgopinus rufipes*) and smaller European elm bark beetle (*Scolytus multistriatus*) play important roles as carriers (vectors) of the disease.

Host Plants:

North American elms are more or less susceptible to Dutch elm disease (DED). Generally, DED readily infects American elm (*Ulmus americana*), while two other native elms irregularly seen in New England, rock elm (*U. thomasii*) and slippery elm (*U. rubra*); vary from susceptible to somewhat resistant.

Description:

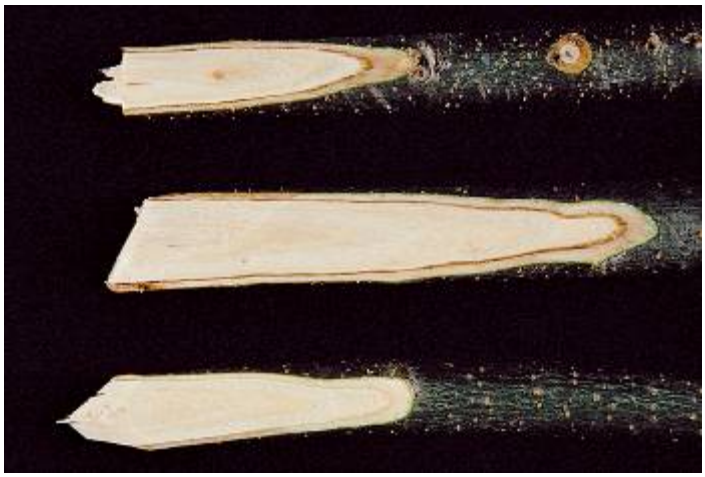
The first symptoms usually noted on infected trees are branches with leaves that turn yellow, wilt, and turn brown (flag). The typical pattern is for one branch to show the above symptoms, followed by adjacent branches and then a major portion if not the entire tree collapses and dies.

European elm bark beetle feeding at twig crotch

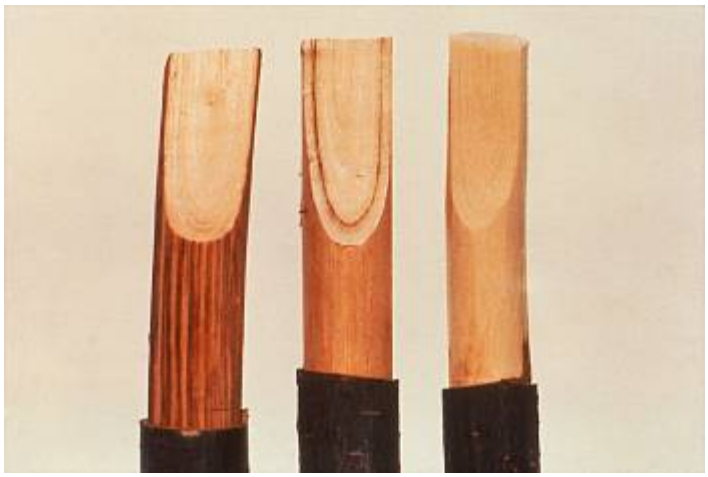
Flagging branches on infected tree

Photos: (left) P Svihra and (right) R. J. Campana, *Diseases of Woody Ornamentals and Trees*. APS Press.

Peel back or cut away the bark on affected branches and look for lengthways-parallel, brown bands or streaks in the outer rings of sapwood. Also, look at the branch in cross-section and cut into rings that are brown to check for brown streaking. Unstained wood put on as the season progressed may have overlain sapwood infected earlier the same season or late in the previous year.



Brown streaks in sapwood (top and middle)
Healthy branch (bottom)



Infected springwood (left)
Same covered by healthy summerwood (middle),
Healthy wood (right)

Photos: (left) R. K. Jones and (right) APS, *Diseases of Woody Ornamentals and Trees*. APS Press.

Disease Cycle:
Elm bark beetles transport and root connections (grafts) transmit *Ophiostoma ulmi* spores into healthy elms to initiate new DED infections. The overland spread of DED depends on the activity of its insect vectors, the native and lesser European elm bark beetles. Elm bark beetles breed under the bark of dead or dying elms. When their eggs hatch the larvae feed on inner bark and sapwood forming tunnels or galleries. The fungus develops fruiting structures topped with sticky spores in the beetle galleries of elms infected with DED. Spores coat the bodies of adult beetles when they emerge from these elm trees or logs. As active adults the native elm bark beetles chew through the bark of healthy elm branches to feed in the inner bark or to create sites in which they spend the winter. The adults of the lesser European elm bark beetle feed in twig crotches of health elms. Both beetles carry DED spores into or near severed wood vessels as they feed, where the spores germinate and infect the tree. A second way the fungus spreads from an infected tree to an adjacent healthy tree is via root grafts. Water conducted through the connected roots carries DED spores along with it. Once the DED fungus is in the tree it slowly moves within the vascular system of the branch or stem. Blockage of water transport through the vessels leads to leaf discoloration, wilt, and the eventual death of the branch or stem beyond that site. DED may progress rapidly killing the tree that season, or it may gradually cause branch dieback for several years.

Management Strategies:
Monitor trees for discolored, wilted branches on a regular schedule during the growing season; for example, scout in mid-June, mid-July and mid-August. Remove branches showing very early wilt symptoms (<5% of the crown). To eliminate DED from these trees prune the flagging branch so that 8-10 feet of symptomless sapwood exists between the portion of the branch with wilt symptoms and the cut that removed the branch. Protect specimen trees from infection with prophylactic injections of fungicides at 1-3 year intervals. Remove severely infected elms and chip or debark all debris that is more than 1 inch in diameter. Sanitation activities like this reduce inoculum and remove elm bark beetle brood sites, which slows the spread of DED.

Daniel H. Gillman, Plant Pathologist
UMass Extension Landscape, Nursery & Urban Forestry Program
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