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Tree Diseases

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Oak Wilt

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Oak wilt is a serious, widespread disease of oak trees in Indiana, especially red and black oaks. There is no cure. However, proper care of oaks and knowledge of the appropriate preventive measures can keep oak wilt from spreading from diseased to healthy oaks through fresh wounds or through graft connections.

Symptoms

Red and Black Oaks

Oaks of this group, which includes red, black, pin, shingle, and many other oak species, are much more susceptible to oak wilt than are white or bur oaks. Infection of red or black oaks in early summer will generally result in tree death by late summer. The first symptoms of oak wilt occur in the top portion of the tree where leaves become bronze-brown in coloration and then wilt. These initial symptoms usually occur in June, but can appear as early as May. Wilted leaves have the bronze or dull tan tissue beginning at the leaf tip and edges. The bronze tissue progresses toward the leaf base, which is green. The separation between bronze and green tissue may be abrupt. Leaves that drop may be either totally green or the bronze and green described above. The streaking of the sapwood, typical of wilt diseases, can be found in the twigs. To find the brown streaks, remove the bark and examine the sapwood surface. The brown streaks may not be present in all trees; thus it is best to examine an actively wilting and defoliating tree. Defoliation may begin at any time after symptoms appear, and by late summer the infected tree may be bare of leaves.



Figure 1. Typical situation of oak wilt spread from tree to tree through connecting roots.



Figure 2. Root graft

White and Bur Oaks

These oaks are much more resistant to oak wilt and the disease progresses more slowly; thus, symptom appearance is of a more "gradual" nature. They often remain healthy after surrounding black and red oaks have been killed. (This factor helps diagnose the disease.) Often, only single, scattered limbs will show symptoms and the disease will progress downward for only a short distance in one growing season. Leaf fall is generally not pronounced, and an infected tree may survive several years before its eventual death. This gradual dieback will result in dead limbs throughout the crown of the tree and become more noticeable each year as the infection spreads.

Other Problems of Oak

Oak wilt may be confused with other disorders. For example, oak trees are very prone to injury resulting from soil compaction, grade changes, root restriction, etc. (See BP-37, *Tree Decline*). Often these other problems are mistaken for oak wilt, causing unnecessary concern and/or the use of improper control measures. Also, many older oaks are killed by an apparent complex of factors involving drought, insect borers (especially the twolined chestnut borer), and root decay. Thus, identifying oak wilt often requires expert assistance. Contact your local Extension office for help in submitting samples to the Purdue Plant Pest Diagnostic Clinic. Select several 4- to 8-inch sections from freshly wilting branches (not dead ones) about finger-width in diameter. Wrap in dry paper toweling, place in plastic bag, and keep cool and dry. Mail early in the week so there is little time for deterioration.

Cause

A fungus, *Ceratocystis fagacearum*, is the cause of oak wilt. The fungus enters the tree through fresh wounds or by root grafts connecting healthy and diseased trees. Once inside the tree the fungus permeates the vascular system, causing the water-conducting units of the plant to become plugged. Water and nutrient flow is disrupted, causing the oak to wilt.

Knowledge of how oak wilt spreads is important since **the control of oak wilt depends upon preventing its spread**. There are two ways the oak wilt fungus moves from a diseased to a healthy tree -- root grafts and sap feeding beetles.

Root grafts occur when roots of nearby trees grow into one another, forming a connecting bridge between the two trees. Root grafts often unite red and black oaks growing within 50 ft of one another. Root grafts are much less common between trees in the white-bur group, and never occur between the two oak groups.

Sap feeding beetles, especially "picnic beetles" can pick up spores of the fungus on their bodies or mouth parts during feeding. The beetle may then carry the spores to fresh wounds on healthy trees. This often starts the first infection in new areas.

Control

Once a tree becomes infected with oak wilt there is no cure. The only way to stop the disease from occurring is to prevent its spread from diseased to healthy oaks. The following suggestions will help in the prevention of oak wilt

(1)Wound Prevention and Treatment. Fresh wounds represent one way the fungus enters healthy trees; therefore, caution should be used to avoid wounding when working in the vicinity of oaks. If wounding does occur, immediately treat the wound with an appropriate tree wound dressing. Pruning of oaks should be done in the winter if feasible and **only** after mid-summer. **Do not** prune in spring and early summer when insect activity is high.

(2)Root Grafts, Their Prevention and Disruption. The only way to prevent root grafts is to plant oak trees more than 50 feet apart. When trees are already planted within 50 feet of each other *all* possible root grafts should be disrupted between healthy and infected trees, or trees suspected of being infected. Root grafts can be disrupted either mechanically or chemically; choose the method best suited to your particular situation. Cut or kill roots midway

between the diseased and healthy trees. If possible, the zone of disrupted roots should be made well beyond the spread of branches. If sidewalks or other obstacles are in the way, extend the zone of disrupted root grafts along and on the other side of the obstruction so that all root grafts are removed where possible. Oak trees that are within 50 feet of a tree infected with oak wilt may not show symptoms of the disease, but may be infected; it is, therefore, best to also disrupt root grafts between such *suspect* trees and neighboring oaks. Remember--root grafts do not occur between red-black oak and white-bur oak group.

Mechanical Disruption. Roots may be cut by digging a narrow trench or by passing a root cutting blade through the soil between the healthy and infected trees. Whichever method is used, it is important that all roots be severed to a depth of 3 to 4 feet. If buried pipes, power lines, telephone cables, sidewalks, or other obstructions are present which interfere with digging or cutting, it would be best to use chemicals to disrupt suspect root grafts.

Chemical Disruption. The simplest method of disrupting root grafts is with chemicals. Certain chemicals used to kill roots are hazardous to both human and plant life and can be used only by professional applicators such as arborists or licensed nursery operators. Contact a professional applicator if you wish to disrupt roots with chemicals.

(3)Tree Removal. Once a tree is infected with oak wilt, a fungal mat is often produced beneath the bark. This fungal mat is often the source from which sap beetles pick up spores and thereby spread the disease. To help prevent such fungal mat formation, completely girdle diseased red oaks and black oaks through the outer sapwood as soon as possible. It is best not to remove the tree until winter if surrounding trees may be wounded in the removal process. Fungal mats are produced only rarely on white oaks; therefore, girdling is not necessary. Diseased trees can be used for firewood or harvested for lumber in areas where oak wilt is already present. However, process the wood as soon as possible. Firewood should be split; stacked off the ground in a single tier in a dry, open area; and protected from moisture to hasten drying.

Sanitary Pruning. For trees in the white and bur oak group, sanitary pruning of infected limbs might save the tree. At the first indication of oak wilt, remove the infected branch. Make your cut as close to the main trunk as possible to avoid leaving infected wood behind. Treat the wounds promptly and fertilize the tree to increase vigor. Clean and disinfect the cutting tools before trimming each branch or another tree.

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