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Paul C. Pecknold

Walter R. Stevenson

Donald H. Scott

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Oak Wilt

Paul C. Pecknold, Walter R. Stevenson and Donald H. Scott,
Extension Plant Pathologists

Oak wilt is a serious, widespread disease of oak trees in Indiana. It occurs mainly in the south central and northwestern parts of the state, and is especially common in the Kankakee River Basin area. It has been reported in other sections but only as scattered, isolated cases. While no complete control for oak wilt yet exists, its devastating spread can be curtailed through appropriate preventative measures.

Symptoms

Red, 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 wilt. These initial symptoms usually occur in June but can appear as early as May. Leaf symptoms include a slight curling and paling of color; often irregular areas on the leaf will have a water-soaked appearance. Symptoms of the disease will progress downward and inward in the tree crown so that the entire tree will soon have bronzed, wilted

Figure 1. Typical situation of oak wilt spread from tree to tree through connecting roots.
leaves. Defoliation may begin at any time after symptoms appear and by late summer the infected tree may be bare of leaves. Along with these external symptoms there will often be an internal browning or streaking of the current season's sapwood.

White, Bur Oaks: These oaks are much more resistant to oak wilt and the disease progresses more slowly and symptom appearance is of a more "gradual" nature. 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 die-back will give the tree a stag headed appearance which becomes more noticeable each year as the infection spreads.

Cause

A fungus, *Ceratocystis fagacearum*, is the cause of oak wilt. The fungus enters the tree by root grafts between healthy and diseased trees or through fresh wounds. 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.

Spread

Knowledge of how oak wilt spreads is important since the control of oak wilt depends upon preventing its spread. There are two methods by which 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. The root graft, therefore, links the two trees, providing a direct avenue for the fungus to move from the diseased oak to the healthy oak. Root grafts between oaks of the red-black oak group usually occur within 20 feet or less, but may be found at distances up to 50 feet. Root grafts are much less common between trees in the white-bur group, and never occur between the two oak groups.

Sap feeding 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. The latter method of transmission is often called "long distance" or "overland" spread, and transmission by root-grafting is "local" spread.

Prevention

Once a tree becomes infected with oak wilt there is no cure or control. 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.

Wound Prevention and Treatment: Fresh wounds represent one way the fungus enters healthy trees; therefore, caution should be used when working in the vicinity of oaks to avoid wounding. 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.

Figure 2. Root graft.
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; chose the method best suited to your particular situation. Cut or kill roots midway between the diseased and healthy tree. 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 the 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 tree. 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.

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, girdle the tree at its base by cutting deeply into the heartwood. 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, their removal is not required; in fact the removal of white oaks apparently results in the fungus moving more quickly to surrounding trees.

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 another branch or tree.

Other Problems of Oak

Oak trees are subject to numerous other disease and insect problems. They are also prone to injury resulting from soil compaction, grade changes, root restriction, etc. (See BP-2-15). Often these other problems are mistaken for oak wilt, causing unnecessary concern and/or the use of improper control measures.

Anthracnose is a common disease of white oak and is often confused with oak wilt (See BP-2-2). Generally, these two diseases can be differentiated by observing what area of the tree is affected; anthracnose commonly affects the lower leaves; oak wilt usually affects the upper part of the tree first.

The location and pattern of disease occurrence can also provide clues to the probability of oak wilt being present. In a forested area or wood lot, if the red and black oaks are killed in a circular pattern while white and bur oaks remain seemingly
unaffected, oak wilt should be strongly suspected. If, on the other hand, there is a single declining tree located in an urban area, the probability of oak wilt is less.

The reason is that, fortunately, there are no highly efficient vectors (carriers) for oak wilt and therefore the probability of its being carried to oaks in urban areas is slight.

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