

Managing Oak Wilt Disease

By The Bartlett Lab Staff
Directed by Kelby Fite, PhD

Oak wilt is a lethal disease that affects all native oak species in the eastern half of the United States. The disease is caused by the fungus, *Ceratocystis fagacearum*, which colonizes the vascular system of many oak species causing wilting, branch dieback and death of affected trees (Figure 1).

Symptoms

Species in the red oak group are highly susceptible to oak wilt disease. Symptoms first appear as bronzing and wilting of the leaves in the upper canopy. Leaves then turn brown along the margins and often appear water soaked. This is followed by shedding of most of the leaves, many of which drop when they are still green. Trees can die within a few weeks after the onset of symptoms although recovery occasionally occurs.

Species within the white oak group exhibit some resistance to oak wilt. Affected portions of the crown display leaf bronzing, browning, wilting and defoliation. The disease progresses slowly through the crown. Branch dieback and decline may occur over a period of years. Recovery of affected trees occurs more frequently than in the red oak group.

Brown streaks may be present beneath the bark on wilting branches (Figure 2).

Table 1: Red and white oak groups (*Quercus* spp.)

Red oak group
Red oak, <i>Q. rubra</i>
Black oak, <i>Q. velutina</i>
Spanish oak, <i>Q. falcata</i>
Pin oak, <i>Q. palustris</i>
Blackjack, <i>Q. marylandica</i>
White oak group
White oak, <i>Q. alba</i>
Bur oak, <i>Q. macrocarpa</i>
Swamp white oak, <i>Q. bicolor</i>
Chestnut oak, <i>Q. prinus</i>

Figure 1: Decline and defoliation caused by oak wilt



Figure 2: Brown streaks within sapwood of oak wilt affected branches



Disease Transmission

Insects are responsible for transmitting the oak wilt fungus over long distances to establish new infection centers. Once a new infection is established, the fungus moves rapidly from tree to tree through root grafts that occur between oaks of the same species group.

Long distance spread: The oak wilt fungus produces spore mats beneath the bark on diseased oaks in the spring following the year that they died. As these spore mats mature, they exert pressure on the bark tissues, which provides an opening for insects to access the fungal pathogen. The mats emit a fruity odor that attracts certain species of sap beetles (Nitidulids). These beetles become contaminated with spores of the oak wilt fungus when they visit the mats. Nitidulids then transmit the fungus when they feed on sap from wounds on healthy oak trees.

Most new infections from Nitidulids occur in mid-April through June when spore mats form on dead oaks and wounds on healthy oaks are most receptive to infection. New infections can also occur from July through September, but this is considered a low risk period.

Oak bark beetles can also vector the oak wilt fungus. These insects breed in the inner bark and sapwood of dying and recently killed oaks. Bark beetles transmit the fungus when broods emerge from infested diseased trees and bore into healthy oaks.

Local Spread: Once new infections occur, localized spread takes place through root grafts that form

between oaks within the species group. Root grafts can occur between oaks growing within 100 feet of one another and are responsible for rapid expansion of the infection center. Root grafts seldom occur between oaks of different species groups.

Disease Diagnosis

Oak wilt may be confirmed through laboratory cultures from diseased branches. Branch samples should be collected from portions of the crown exhibiting early stages of wilt. Since the oak wilt fungus is sensitive to heat, samples should be packed in ice (“cold packs”) and overnighted to the Bartlett Diagnostic Clinic. Since the isolation/confirmation of the disease through cultures is not always successful and requires 10 to 14 days of incubation, the Bartlett Diagnostic Clinic runs a concurrent molecular test to help in diagnosis.

Disease Management

Identify Infection Centers: Surveys to identify the extent of the disease and to identify new infection centers are the first steps to disease management. Aerial surveys can be utilized to identify suspected infection centers. Confirmation of the infection centers must then be undertaken by a ground survey.

In urban and suburban landscapes, educating homeowners about identification and management of oak wilt will aid in early detection and treatment of the disease. Information can be disseminated through bulletins in water or electric bills, newspaper articles and websites.

Cultural Practices

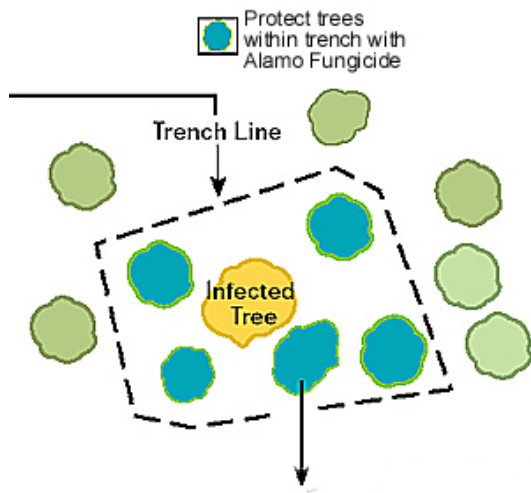
Sanitation: Infected trees in the red oak group should be removed and destroyed by chipping, burning or burial. Red oak species that have died from oak wilt should be removed before the spring following their death to avoid possible disease transmission. Diseased wood should not be stored as firewood through the

winter. Because spore mats do not form on species in the white oak group so immediate removal and destruction of diseased white oaks is not necessary.

Pruning/Wounding: Maintenance pruning for oaks should be scheduled for October through March. Oaks should not be pruned or wounded from April through September to prevent possible transmission by Nitidulid beetles. If oaks are wounded during this time, a thin coating of asphalt based tree paint should be applied to reduce the possibility of disease transmission.

Root Graft Prevention: Trenches should be installed between diseased and healthy trees of the same oak species group to help reduce root graft transmission of the oak wilt fungus (Figure 3). Primary trenches should be installed approximately 100 feet from the diseased tree using a vibratory plow, trencher or backhoe. Trenches should be installed to a depth of at least three feet. Secondary trenches can be installed immediately between the diseased and healthy trees to further reduce the potential for spread. If secondary trenches are not installed, removal of symptom-free oaks within the primary trench line should be considered. Stumps should be treated with

Figure 3: Diagram showing installation of trenches in relation to diseased trees. Courtesy of Rainbow Treecare Scientific Advancements



appropriate herbicides to kill the roots. If symptom-free trees are not removed, treatment with a systemic fungicide is the other option.

A soil fumigant, Metam-Sodium (Vapam®) was once registered for application to the soil to sever root grafts to prevent oak wilt. This product is no longer registered by the United States EPA for this use. No chemical treatment is currently available to sever root grafts.

Chemotherapy: Fungicide products are registered for root flare injection to prevent oak wilt disease.

Fungicide treatments can also aid in recovery of diseased white oaks but is not effective as a therapeutic treatment in diseased red oaks.

Oaks growing between diseased trees and the primary trench should be treated with fungicide injections. High value oaks just beyond the primary trench should also be treated.

Symptom-free oaks that are challenged by the oak wilt pathogen from root grafts should be treated at least twice at two-year intervals. Apply additional treatments at two-year intervals as long as oak wilt remains active on the site.



Founded in 1926, The Bartlett Tree Research Laboratories is the research wing of Bartlett Tree Experts. Scientists here develop guidelines for all of the Company's services. The Lab also houses a state-of-the-art plant diagnostic clinic and provides vital technical support to Bartlett arborists and field staff for the benefit of our clients.