

Managing Oak Wilt Disease in South Carolina

By the Bartlett Lab Staff
Directed by Kelby Fite, PhD

Oak wilt is a lethal disease that affects many native oak species in North America. It is caused by the fungus, *Bretziella fagacearum*, which colonizes the vascular system of susceptible oak species causing wilting, branch dieback and death of affected trees. Oak wilt disease is prominent in Eastern North America, particularly in areas of Texas and the upper Midwest, and occurs sporadically in the mid-Atlantic region and Ontario, Canada. However, since 1969, outbreaks of oak wilt disease have been documented in South Carolina, with diagnoses from ten counties including Aiken, Barnwell, Chesterfield, Darlington, Edgefield, Kershaw, Lancaster, Lee, Lexington, and Richland (Figure 1). Of these, most oak mortality has occurred in Aiken County.

Susceptibility

Species in the red oak group are highly susceptible to oak wilt disease and account for most of the disease incidence in South Carolina. These include water oak (*Quercus nigra*), southern red oak (*Q. falcata*), Darlington oak (*Q. hemisphaerica*, and willow oak (*Q. phellos*). The disease can also affect southern live oak (*Q. virginiana*), especially where they grow near infested red oak group species. Species in the white oak group exhibit moderate to high tolerance to oak wilt and have not yet been diagnosed with oak wilt disease in South Carolina.

Symptoms

In the red oak group, 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 to months after the onset of symptoms, although recovery occasionally occurs.

In live oak, however, leaves exhibit yellowing and necrosis along the veins, followed by leaf drop (Figure 2). The xylem of infected oak trunks and branches appears discolored (brown to black) and

Figure 1: South Carolina counties of the Sandhill region where oak wilt has been detected

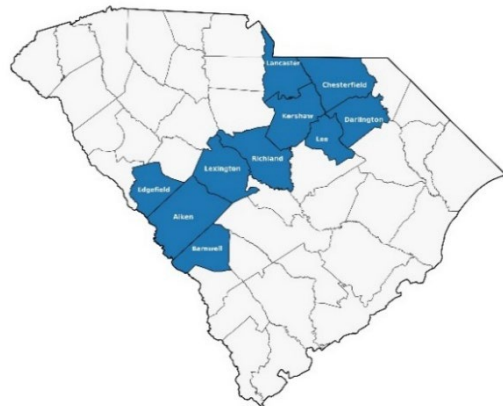


Figure 2: Vein discoloration and leaf drop are key foliar symptoms in live oak group species



exhibits streaking when the outer bark and cambium are removed (Figure 3). In the white oak group, 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.

Figure 3: Vascular staining typical of oak wilt infection in red oak trunk (outer black ring)



Disease Transmission

Long distance spread: Beetles are primarily responsible for transmitting the oak wilt fungus over long distances to establish new infection centers. Although rarely observed in the Southeast, the oak wilt fungus can produce spore mats beneath the bark on diseased red oaks in the spring following the year that they died. As these spore mats mature (Figure 4), 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 carry spores of the oak wilt fungus when they visit the mats. Nitidulid beetles then transmit the fungus when they feed on sap from wounds on healthy oak trees, such as from pruning and storm damage.

Most new infections from Nitidulids occur in spring through early summer. This is when wounds on healthy oaks are most susceptible to infection and when spore mats form on dead oaks (in regions where mats develop). New infections can potentially also occur in late summer, but this is considered a lower risk period and requires

further study.

Oak bark beetles (Scolytids) may 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.

Figure 4: A confirmed oak wilt spent spore mat found under cracked bark of a water oak in SC



Local Spread: Once new infections occur, localized spread takes place through root grafts (roots of two plants that fuse and grow together) that form belowground. Root grafts can occur between oaks growing within 100 feet of one another and are responsible for rapid expansion of the infection center, especially in sandy or gravelly soils compared to clay soils. Root grafts seldom occur between oaks of different species groups. Most of what is known about oak wilt transmission comes from Texas and the upper Midwest. The epidemiology of oak wilt in South Carolina has not been well studied and may involve different climate and vector factors. The sandy soils of the “Carolina Sandhills” region likely play a role.

Disease Diagnostics

Proper diagnosis of oak wilt is critical as other problems can look similar but have different implications for severity and management actions. Oak wilt may be confirmed through laboratory work from diseased branches (Figure 5). 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

Figure 5: Close up of vascular streaking of a live branch with bark shaved

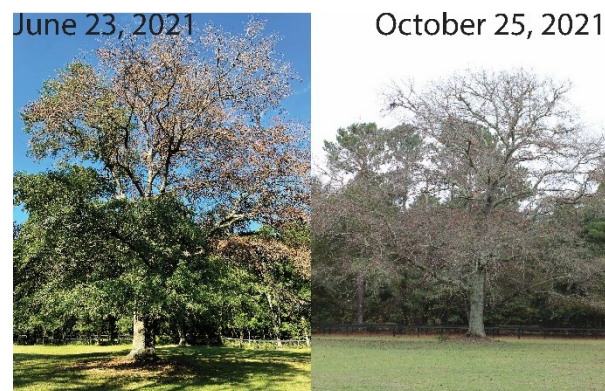


packed in ice/cold packs and overnighted to the Bartlett Diagnostic Clinic. Following a positive detection, a survey of nearby oak trees may be required.

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. Frequent scouting is highly recommended because oaks can die rapidly once infected (Figure 6).

Figure 6: Rapid death of an oak near Aiken due to an outbreak of oak wilt disease



Sanitation: Infected trees in the red oak group should be removed and destroyed by chipping,

burning or burial. Tree removal should be conducted before the spring following their death to avoid further disease transmission. Diseased wood should not be stored as firewood through the winter, nor should logs and firewood from red oaks be transported away from areas where oak wilt is active.

Pruning & Wounding: Pruning for oaks should be scheduled for October through February. Oaks should not be pruned or wounded from approximately March through July to prevent possible transmission by Nitidulid beetles and other vectors. If oaks are wounded during this time, ongoing research suggests that an application of black aerosolized paint (acetone, latex, or asphalt-based) can help reduce the possibility of disease transmission. In areas where oak wilt occurs, activities that cause oak tree-wounding should be avoided in the spring and summer, such as clearing and thinning for construction, power line work, and harvesting timber.

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. Primary trenches should be installed approximately 100 feet from the diseased tree and at least three feet deep using a vibratory plow, trencher or backhoe. 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 appropriate herbicides to kill the roots. If symptom-free trees are not removed, treatment with a systemic fungicide, if available, provides another disease prevention strategy.

Fungicide Treatments: Certain systemic fungicides are registered for root flare injection to prevent oak wilt disease. These fungicides can also aid in recovery of diseased white oaks but are not effective as a therapeutic treatment in diseased red oaks. Please contact your Bartlett Arborist Representative to learn more about management strategies.

