The Plant Doctor's LANDSCAPE TIPS

By David L. Roberts, Ph.D., *Senior Academic Specialist, College of Agriculture and Natural Resources, Michigan State University*

OAK WILT PART 1: SYMPTOMS & DIAGNOSIS

INTRODUCTION:

Oak Wilt (OW), caused by the fungus Ceratocystis fagacearum, is a lethal disease of Quercus (Oak) species in North America. Oak wilt and its causal agent were first described in Wisconsin in the early 1940s; however, symptoms of what was probably oak wilt were noted in the late 1800s, even if the cause was unknown at that time. Much of the current thinking among scientists is that there is a strong possibility that the fungus was introduced, even if the introduction occurred in the 1700-1800s.

Oak wilt has been known in Michigan for several decades (Photo 1). The author noted with some alarm the lethality of oak wilt more than 25 years ago; however, ringing the alarm and raising public awareness has been very difficult. The challenge of oak wilt is that while the disease is "locally devastating," affecting a landowner here and a landowner there, it is not as broad ranging as other introduced epidemic maladies such as Emerald Ash Borer and Dutch Elm Disease. However, Oak Wilt is gaining momentum in Michigan's forests, woodlots and landscapes.

SYMPTOMS OF OAK WILT:

When diagnosing oak wilt, it is important to understand the symptoms of the disease on oak trees. Symptoms may develop on oaks any time during the growing season, depending on time and method of infection. The disease behaves differently on various species of oaks and, hence, it is beneficial to identify the oaks affected by the malady. Oaks can be divided into two major families: red oaks and white oaks (Photo 2). Members of the red oak family include Northern Red Oak, Pin Oak, Black Oak and Shumard Oak, and so forth. Members of the White Oak family include White Oak, Swamp White Oak and Burr Oak, among others.

Red Oak Family: Red oak family members usually die very quickly (often within 1-2 months) after coming in contact with the OW fungus. Symptoms of rapid death usually include rapid defoliation (Photo 3); leaves fall from trees with green, pale green and tannish coloration. Occasionally, leaves may become tan and hang onto trees (Photo 3). Infected red oaks also often exhibit brownish streaks in the sapwood beneath the bark. Unlike other foliar problems (diseases such as anthracnose or pest defoliators), red oak family members affected by OW do not refoliate later in the season or next season.

White Oak Family: White oak family members infected with the OW fungus exhibit less defined symptoms. Often only a few branches on a white oak tree show symptoms; leaves often turn

Continued on page 16

Photo 1: One of the earliest photos of Oak Wilt taken by the author more than 25 years ago near Ann Arbor. In very typical fashion, new homeowners wanted to help their trees by implementing tree health care practices (fertilization, watering, etc.), including hiring an arborist to prune the trees. Within a month after pruning, all injured trees began to die.

Photo 2: Oaks can generally be classified into two large families. Red oaks (left), characterized by leaves with pointed leaf tip lobes, are highly susceptible to oak wilt and usually die very quickly (this leaf exhibits OW symptoms). White oaks (right), characterized by leaves with rounded leaf lobes, are not as drastically affected by oak wilt and may recover.

The Plant Doctor's LANDSCAPE TIPS

OAK WILT PART 1: SYMPTOMS & DIAGNOSIS

Continued from page 15

tan and remain clinging to branches. The tips of leaves may first turn tan with the discoloration continuing to the leaf bases. Chronic infections of OW on white oak may appear similar to general "decline" (Photo 4), but infected trees usually do not die quickly. White oaks may either recover in subsequent years or continue to decline, sometimes to death. Symptoms of OW on white oak may be confused with other problems such as anthracnose or Two-Lined Chestnut Borer.

Photo 3: Symptoms of OW on red oaks includes rapid death. Usually, infected trees drop numerous leaves (Insert); in some cases, wilted tan-colored leaves may remain clinging to the tree . . . at least for a little while.

Photo 4: OW-infected white oaks exhibit different symptoms than those of OW-infected red oaks. Typically only a few branches show wilted, tan, curled-up leaves. Chronic infections may appear similar to "decline," which can be induced by a variety of issues.

DIAGNOSIS OF OAK WILT:

An accurate diagnosis of OW is vital because containing and managing the disease can be quite costly. Following are some tips that may prove useful for confirming the presence of OW.

Lab Tests: A positive lab test is proof positive for OW. However, because lab tests are not always reliable, a negative lab test does not disprove OW. Samples collected for lab tests must be collected fresh from active OW-infected trees and shipped quickly to the lab. Lab tests are sometimes inaccurate because the OW fungus is usually quickly displaced in trees by other microbes.

Field Diagnosis-Leaf Fall: As discussed above, the dramatic symptoms of OW on Red Oak family members is conspicuous leaf fall, usually during the late spring and summer (Photo 3), depending on time of infection. White oak family members usually do not exhibit rapid leaf fall or not nearly to the extent that red oaks do.

Field Diagnosis-Recent Tree Injury: OW spread occurs above ground by transmission of the fungus to fresh wounds by sap beetles; fresh wounds may have been created either by pruning or storm injury (Photo 5). Because wounds are only attractive to beetles for 5-7 days after the wounding event, the wounds would have had to been created during the warm season, especially during the spring. One of the most common reasons for

Photo 5: When field diagnosing OW, it is always advisable to look for recent wounding of oak trees. Recent wounds may explain the sudden decline or death of oak trees from sap beetle transmission of the fungus. The presence of wounds provides an additional step in confirmation.

new oak wilt infections is due to unknowledgeable or uncaring individuals who wound oak trees during the primary months of OW spread by sap beetles.

Field Diagnosis-Progressive Spread: Other than above ground spread to wounds, the only other method of OW transmission is through root grafts between nearby trees. Red oaks in particular are prone to form root grafts, thus sharing sap, diseases, etc. OW tends to spread approximately one tier of trees per year through an oak community. Hence, landowners may have noticed an oak that died three years ago, two more nearby trees died two years ago, and four more trees died last year. This manner of spread results in an "epicenter" of OW (Photo 6).

Field Diagnosis-Pressure Pads: Fungal mats (pressure pads) typically form beneath the bark on red oaks during the fall following infection or the following spring. For example, on a tree that became infected and died during 2014, pressure pads may form during the fall of 2014 but more likely during the spring of 2015 (Photos 7 & Insert). The presence of pressure pads is a definite confirmation. However, there is generally a desire to diagnose OW promptly, when initial symptoms are occurring, and not wait until the following season (s) when pressure pads may develop.

Field Diagnosis-Elimination of other Causes: It is wise to eliminate other potential maladies that may be confused with OW. Defoliation caused by diseases and pests may be confused with OW. Other pests and diseases such as Armillaria root rot and the Two-Lined Chestnut Borer may cause decline symptoms that can mimic OW. And, there are always other less common culprits of oak death such as gas leaks and herbicide toxicity.

In summary, the presence of OW fungal mats or a positive lab test is confirmation of OW. However, these two criteria are not always available. Hence, a very accurate field diagnosis can often be attained by an experienced individual when considering the other above field diagnostic patterns. Not much can be confused with the rapid death of a red oak following pruning of that tree during the spring.

For more information, please feel free to email David Roberts at robertsd@msu.edu or contact a professional plant health care provider. The author, MSU and MGIA do not endorse any particular products. If using pesticides, be sure to read and follow label directions.

Development of Landscape Tips was sponsored by MSU and MGIA.

MICHIGAN GREEN INDUSTRY ASSOCIATION

MICHIGAN STATE UNIVERSITY

Photo 6: A progressive pattern of spread of OW through root grafts is typical of OW, resulting in an "epicenter."

Photo 7: A crack in the bark of a red oak may signify the presence of an OW fungal mat or "pressure pad." Pressure pads may also be present beneath bark showing no splits. Insert: Remnant of an old pressure pad is revealed once bark is removed.