



The Plant Doctor's LANDSCAPE TIPS

By Dr. David L. Roberts, *The Plant Doctor LLC a.k.a. The Tree Doctor*

OAK WILT PART 7: "LOOK ALIKES" Distinguishing Oak Wilt from Other Oak Maladies

INTRODUCTION

Oak Wilt (OW), caused by the fungus *Bretziella fagacearum*, can be very difficult to diagnose and confirm (Photo 1). Even the best arborists are sometimes "stumped" when asked to examine a site where there are declining or dead oak trees. An accurate diagnosis of Oak Wilt is essential before remediation efforts are attempted because the management of Oak Wilt can be extremely costly. It is not unusual for implementation of Oak Wilt management techniques such as root graft disruption (trenching) and trunk injections to exceed many \$1000s, even \$10,000s. Confirmation is generally based on laboratory analysis (e.g. lab culture and/or DNA tests) or the presence of pressure pads (Photo 2 = reproductive structures) beneath the bark of infected trees in the field. The author has also occasionally used the pruning correlation as a confirmation of OW; nothing else behaves similarly (Photo 1).

Oak Wilt exhibits a variety of symptoms that may be mistaken for other issues affecting *Quercus* sp. Typical symptoms of Oak Wilt include: leaf drop (Photo 3), "scorch" (Photo 3 Inset), wilt, leaf retention, decline (slow in White oaks, rapid in red oaks), and death. A complicating consideration of these symptoms is the differential impact of Oak Wilt on members of the red oak family (northern red, black scarlet, pin, etc.), vs. members of the white oak family (white, swamp white, bur, etc.). Red oaks typically die very quickly when infected with the Oak Wilt fungus . . . usually within 1-2 months, certainly within one season. White oaks may decline slowly from Oak Wilt infections or they may even recover. Occasionally, the author has witnessed rapid death of white oaks due to Oak Wilt, but this observation is not common.

If nothing else, regardless of the potential for diagnosing Oak Wilt, a discussion of the following topics, which have often been mistaken for Oak Wilt, may serve as a diagnostic guide for some of the more common maladies affecting oak trees.

Environmental Scorch: Often mistaken for OW, environmental scorch, sometimes called "physiological scorch", is a non-lethal problem that, in some instances, may affect the entire tree (Photo 4) or in other situations may only affect specific limbs. Afflicted foliage typically exhibits reddish-brown discoloration between the veins of leaves (Photo 4 Inset). Environmental scorch is usually attributed to moisture and nutritional irregularities within the tree. Environmental scorch often appears on the same tree, even the same location on the tree, year after year.

Oak Anthracnose: Diseases known as anthracnose are caused by a group of various fungi (*Gnomonia* sp, *Collectotrichum* sp., etc.), which cause dead areas or blotches on the foliage of many

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Photo 1: Oak Wilt is a lethal disease of oak trees. In this photo, all dying oak trees were pruned during the spring; overland spread of the fungus to the freshly pruned wounds by sap beetles resulted in death to all the injured trees. The unpruned tree on the left died two years later from root graft transmission.



Photo 2: Although Oak Wilt infections may induce a variety of symptoms in oak trees, confirmation is generally accomplished by lab tests or the discovery of a pressure pad (=fungal mat=reproductive structure) beneath the bark of infected trees several months or the following season after infection.



Photo 3: Leaf fall is a very common symptom of Oak Wilt. Shedding leaves appear in a variety of colors ranging from tan to pale green to dark green. On occasions, Oak Wilt also induces a "scorch-like" symptom on foliage (Inset).



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Photo 4: "Environmental Scorch," a nonlethal physiological disorder, is often mistaken for Oak Wilt. Entire trees affected by scorch may exhibit a reddish-brown appearance from a distance. Close-up of leaves affected by scorch show interveinal necrosis (Inset). Note the difference between "environmental scorch" and "Oak Wilt scorch" (Photo 3 Inset).

plants and twig cankers on some species such as oak, sycamore and maple. Severe anthracnose in the spring may cause significant leaf drop . . . resulting in some cases as a misdiagnosis of Oak Wilt. Severely affected trees often re-foliate in early to mid-summer. Anthracnose attacks white oak more commonly than red; however, red oak members can also contract the disease (Photo 5).

Cynipid Wasp Gall: For some unknown reason or natural phenomenon, oaks contract hundreds of different galls, usually caused by insects/arthropods. One fairly common insect gall that has occasionally been mistaken for Oak Wilt is the cynipid wasp gall (Photo 6). Affected foliage may shed from trees in the mid-late summer through fall . . . about the same time that trees affected by Oak Wilt also shed leaves. Other oak galls may also cause leaf shedding.

Two-Lined Chestnut Borer (TLCB): A native relative of the native Bronze Birch Borer and the exotic (introduced) Emerald Ash Borer, the TLCB is quite common in Michigan and neighboring states (Photo 7). The insect (Photo 7 Insets, left, adult and larva) is generally

attracted to stressed trees first, but in the author's opinion, epicenters of TLCB can put "pressure" on less stressed trees just as the EAB does. Like the EAB, the TLCB attacks the upper portions of the tree first and gradually moves downward. When the tree is practically dead, D-shaped emergence holes and tunneling (Photo 7 Insets, right) beneath the bark is classic TLCB at ground level (otherwise, early infestations need to be confirmed by checking the upper branches). The TLCB can attack red oak and white oak family members. It is less likely that TLCB infestations on red oaks will be mistaken for Oak Wilt due to the disparity in the time frame for decline and death (fast for Oak Wilt, slow for TLCB). Possibly, TLCB attack on white oak members could be mistaken for Oak Wilt because both problems may cause a gradual decline in these trees.

Twig Girdlers and Borers: There are insects that can cause twig girdling on oak trees and others that may bore into small branches. The end result of such attack by these pests is a gradual decline and conspicuous death of twigs and branches.

Branch Cankers: As with various pests, there are a variety of fungal diseases that may cause branch cankers on oak trees. According to the scientific literature, the number of fungi that may cause branch cankers are too numerous to consider in this publication. A couple common fungal incitants on oak include *Botryosphaeria* sp and *Valsa* sp. Regardless of the specific causal factor, fungal cankers kill twigs and branches reminiscent of decline from TLCB and other maladies.

Trunk Problems: There are a myriad of trunk issues that can stress oaks or cause them to decline or eventually die. It is important to distinguish among the possible candidates whether it be a fungal infection (Photo 8), pest problem or other physical injury, etc.

Armillaria Root Rot: There are a variety of root rots that can affect oak trees.



Photo 5: Anthracnose is a fungal-incited disease that may affect foliage and, in some species of trees, twigs. Anthracnose is not lethal but may initiate copious leaf shedding typical of Oak Wilt and, hence, may be confused with the lethal Oak Wilt.



Photo 6: Cynipid Wasp Gall, like many leaf galls, may precipitate leaf shedding later in the summer and fall, typical of the time period that Oak Wilt may also initiate leaf fall. Tiny spherical insect galls are originally formed in the center of each of the white leaf spots.



Photo 7: Two-lined Chestnut Borer (TLCB) attack on oak trees starts at the top. The insect (adult top left inset - Photo from Dr. Bob Haack, larva bottom left inset) is related to the invasive Emerald Ash Borer. Like the EAB, the TLCB larvae tunnel in the cambium beneath the bark (top right inset), and the adult emerges through D-shaped holes created by this flat-headed beetle when it bores its way out of the tree (lower right inset).

Armillaria is one of the more common ones (Photos 9A & 9B). Various species and strains of Armillaria may be very aggressive on oak trees while other strains are much less pathogenic. Because root rot fungi attack roots and the lower trunks (root collar areas) of trees, these diseases typically result initially in growth reduction and associated stresses (fewer leaves, smaller foliage), general decline and, possibly, eventual death. Root rots may predispose trees to other issues. For example, there is a correlation between Armillaria root rot and the TLCB – the root rot stresses the tree followed by attack by the TLCB, which is attracted to stressed trees.

Heat/Drought Stress: Like many species of trees, oaks can be affected by environmental factors such as heat stress, drought, winter injury, etc. An example of this phenomenon was shared by a highly experienced arborist who initially thought the red oak in Photo 10 was affected by Oak Wilt during June, 2018. Note that the tree is shedding leaves typical of Oak Wilt. The tree had been pruned in the spring of 2017 . . . but did not die in 2017, an important clue that Oak Wilt was not involved because red oaks infected by the Oak Wilt fungus generally die very quickly. Another clue that Oak Wilt was not involved is that branches pruned in 2017 developed nice callus tissues (Photo 10 inset left); oaks affected by Oak Wilt do not develop callus. Yet another clue is that during/after leaf drop, new foliage began emerging from each of the branch ends (Photo 10 inset right), which doesn't occur with trees affected by Oak Wilt. The shedding of leaves, typical of Oak Wilt but which was not Oak Wilt, apparently followed a period of extreme drought and heat earlier than normal in the summer season.

Herbicide Toxicity: Oaks, like all species of trees, may be affected by herbicide applications. Herbicide toxicity on trees may result in symptoms ranging from minor to extreme, including death. An “epidemic” of herbicide toxicity on oaks may currently be rivaling the incidence of Oak Wilt in Michigan. Over the last decade

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Photo 8: Oaks are commonly infected by Laetiporus sulphureus (formerly Polyporus sulphureus) and other decay fungi. Decay fungi may cause stem/trunk/heart rot and eventually lead to decline and/or structural failure, sometimes exacerbated by other problems.



Photo 9A



Photo 9B

Photos 9A and 9B: Armillaria root rot, one of the most common root and collar rots on oak trees, may be aggressive or not. Signs of Armillaria root rot may be ascertained by the presence of the “honey mushrooms” near the base of the tree (9A) and by rhizomorphs (root-like structures) beneath the bark (9B).



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or so, many new products containing Glyphosate and Imazapyr have been flooding the market, both for homeowner and commercial users. Both of these chemicals are being manufactured by various corporations because patents have run out on both chemicals. An example of herbicide toxicity is shown in Photo 11; such examples are not uncommon throughout Michigan. Again, another highly experienced arborist was not comfortable with a diagnosis of Oak Wilt on the two red oaks straddling the drive even though the rapid "death" was typical of Oak Wilt. Further investigation revealed that a turf company had applied a product containing Glyphosate and Imazapyr to the driveway for long term weed suppression. It is not unusual to

witness differential toxicity of various tree species to herbicides; red oak is extremely sensitive to Imazapyr while white oak is not (Photo 11).

"Combinations" of Causal Factors: It is probably rare to find just one issue affecting oak trees. For example, an oak may have anthracnose, twig girdlers and cynipid wasp gall all on the same tree. An oak with those various problems or with a TLCB infestation is nonetheless still susceptible to Oak Wilt. When diagnosing Oak Wilt and other oak maladies, it is wise to consider a multiplicity of factors that may be affecting the health of the subject tree.

OAK MALADY MANAGEMENT

Obviously, a thorough and accurate diagnosis is recommended before

implementing Oak Wilt management measures . . . largely because the management of Oak Wilt is quite costly and disruptive. It would be very prudent to carefully examine the patient oak for all types of issues. Often, many of the issues other than Oak Wilt are minor even though they may appear serious. Diagnosis can be achieved through lab tests, careful examination, and by investigation of the important associated factors. What are the symptoms? Are the symptoms typical of Oak Wilt or Anthracnose or the Cynipid Wasp Gall? Was an herbicide applied in the vicinity of the subject oak? In some cases, a treatment might be applied for the most likely causal factor (Photo 12). In other situations, such as an herbicide misapplication, it might be best to wait and see. 

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Photo 10: This tree began shedding leaves after a very hot, dry period in the late spring/early summer. The symptoms are similar to those induced by Oak Wilt. Clues that the problem with the tree was not affected by Oak Wilt include the development of callus tissue after pruning (inset left) and the development of new shoots/foliage on branch apices (inset right).



Photo 11: Imazapyr herbicide applied to this gravel driveway for long term weed suppression by a commercial applicator resulted in the death of these two red oaks straddling the driveway. Red oaks are especially sensitive to Imazapyr while white oaks are not (center left of photo, background).



Photo 12: Strongly suspicious of TLCB, but without actually confirming the insect by examining branches at the top of this large oak tree, a trunk injection of emamectin benzoate resulted in a strong flush of recovery growth the following year . . . likely confirming TLCB and not Oak Wilt.