



The Plant Doctor's LANDSCAPE TIPS

By David L. Roberts, Ph.D., *Senior Academic Specialist,
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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 re-leaf 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

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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.

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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.

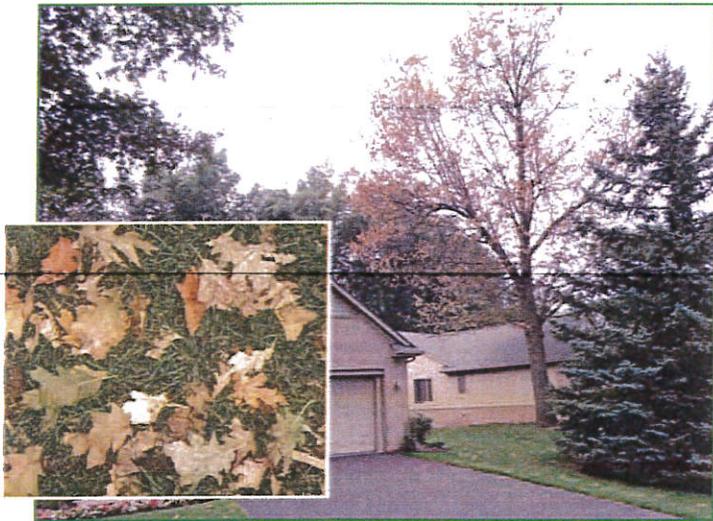


Photo 3: Symptoms of OW on red oaks includes rapid death. Usually, infected trees drop numerous leaves (Insert); in some cases, wilted tan-colored leaves may remain clinging to the tree . . . at least for a little while.



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

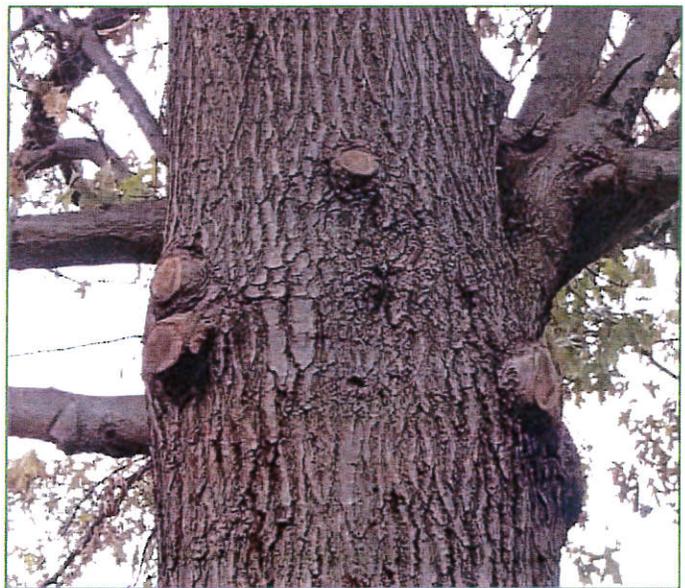


Photo 5: When field diagnosing OW, it is always advisable to look for recent wounding of oak trees. Recent wounds may explain the sudden decline or death of oak trees from sap beetle transmission of the fungus. The presence of wounds provides an additional step in confirmation.

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.



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

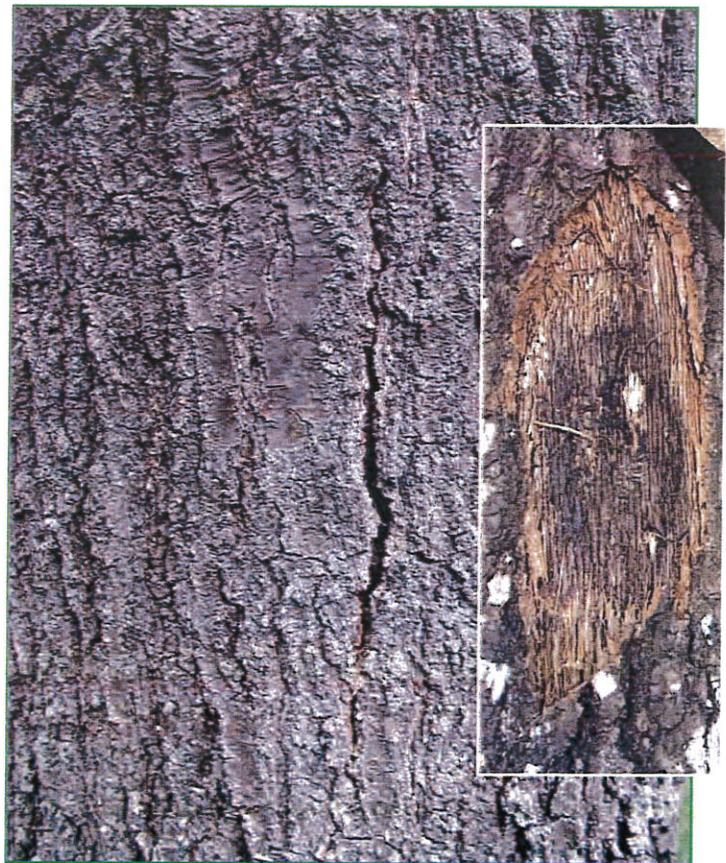


Photo 7: A crack in the bark of a red oak may signify the presence of an OW fungal mat or “pressure pad.” Pressure pads may also be present beneath bark showing no splits. Insert: Remnant of an old pressure pad is revealed once bark is removed.

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OAK WILT PART 2: HORROR STORIES

INTRODUCTION:

Oak wilt is probably the most costly disease that property owners face in their landscapes, woodlands and forests. The high costs of oak wilt are due to 1) tree and property value losses, 2) tree removal, stump grinding, replanting, etc. and 3) procedures such as trenching and trunk injections needed to contain and eradicate oak wilt from the property and/or to keep the disease from advancing into neighboring properties. As with many issues involving money, the ugly side of human nature sometimes emerges. Following are some Oak Wilt Horror Stories I've collected over the past couple of years. Even though these are "Horror Stories," we can benefit tremendously from these accounts so that we are not "doomed to repeat them." Please note that I use the term "arborist" rather loosely in the following scenarios.

#1 – SPRING PRUNING:

A married couple bought this home (Photo 1) near Grand Rapids approximately 12 years ago because of the abundance of trees on the property. During the spring of 2015, they contacted what they believed was a reputable arborist to prune their trees. Within one month of the pruning, most of the trees that were injured from pruning began losing their leaves. Oak wilt was confirmed; red oaks cannot recover once infected by the oak wilt fungus.

Comment: Pruning oaks during the spring months is the most common means for development of new oak wilt sites every year. Hence, Spring Pruning followed by serious Oak Wilt outbreaks is without doubt the Numero Uno Horror Story many residents in Michigan encounter every year. Many arborists know better but continue to perform this practice; some have been successfully sued by property owners.

#2 – DEAD WOODING:

The homeowner of this lake residence in Photo 2 knew about oak wilt and confronted the arborist who intended to prune her trees in May, 2015. The arborist replied that he was only taking out the "deadwood." He further related that he had more than 30 years' experience and knew what he was doing. Every tree he pruned contracted oak wilt; every tree not pruned was healthy at the time the photo was taken . . . but is now in danger of infection through root graft transmission of the disease.

Comment: I am often asked if it's OK to "deadwood" trees, even during the primary months of oak wilt transmission by sap beetles. My response has always been a resounding "NO!" When any pruning cut is made, we often don't know if we've exposed live tissue to which the sap beetle is attracted, so that the transfer of the deadly fungus can be achieved.

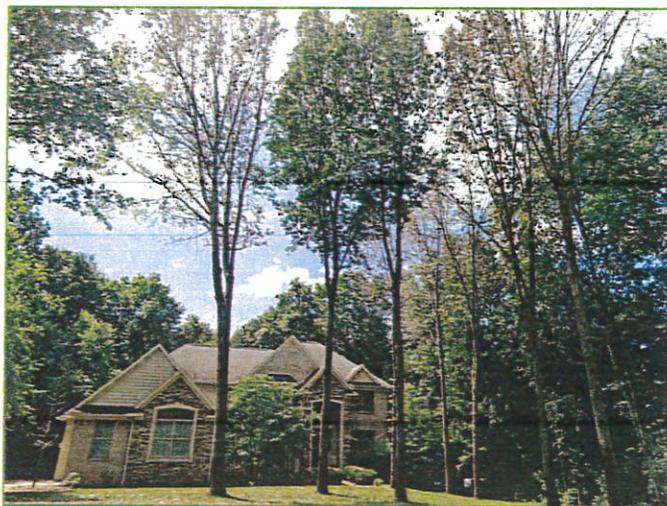


Photo 1: Many property owners suddenly wake up to the horror that all their trees are dying simply because they had their trees pruned approximately one month previously, usually during the spring.

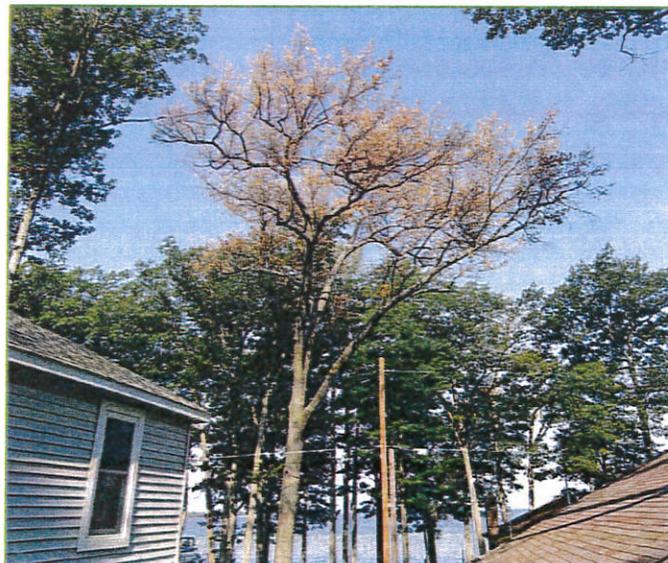


Photo 2: Many of the oak trees on this lake home are dying due to a practice known as "dead wooding," which the arborist insisted would not result in oak wilt infections. More than ten trees were killed, most not visible in this photo.

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#3 – SCAMMING THE ELDERLY:

The condominium owner on the left (Photo 3) convinced an elderly condo owner on the right that he needed to prune his tree because the branches would ruin his roof. The condo owner on the left was trying to defray his costs by splitting the



Photo 3: This tree contracted oak wilt when several small limbs were pruned from the tree because they supposedly threatened the roof of the nearby condo. In reality, a neighbor had convinced an elderly gentleman to prune this oak because he had wanted to defray his costs of removing two large oaks he had killed (oak wilt) behind his condo.



Photo 4: The lumbering industry is sometimes known for disreputable characters. Healthy trees such as these were strongly recommended for removal because oak wilt was only 10 miles away. The lumberman declared that preemptive removal would help to offset the \$4,000 removal cost for each tree if they died of oak wilt.

arborist's bill for removing two large oak trees behind his condo that had previously died of oak wilt due to his inappropriate pruning practices. Due to the pruning of several small branches, the elderly gentleman's tree subsequently contracted oak wilt. Note that none of the branches that were pruned from the elderly gentleman's tree pointed in the direction of his condo.

Comment: This incident took some investigative work by the author. Technically, because the condo association, not the condo owners, owns these trees adjacent to condos, any tree work must be approved by the Condominium Association Board. The neighbor on the left caused the death of three large oaks on condominium property as well as risked infection of many other nearby oaks. Justice sometimes prevails: the condo owner on the left (the scammer) was fined and was forced to assume all tree removal costs, tree replacement costs as well as finance the containment and eradication of oak wilt from the site.

#4 – THE ROBBER (LUMBER) BARON:

On the shores of Lake Michigan exists a parcel of land with many large, old oak trees (Photo 4) that have been in the care and ownership of the same family for well over 100 years. The property owner was contacted by a lumberman who claimed that oak wilt was within 10 miles of the property. The lumberman strongly recommended that the large healthy red oaks should be preemptively removed so that the lumber value would offset the \$4,000 cost of removing each tree if they contracted oak wilt.

Comment: Oak wilt might not be a problem at this site for many decades, if ever, provided trees are not wounded by pruning or storms. Other practical measures can be employed to counter oak wilt at this property. Furthermore, trees killed by the oak wilt fungus can be milled for lumber provided they are harvested within a reasonable period of time. We can expect an increase by some individuals to use a deadly issue such as oak wilt for personal gain.

#5 – THE SPIKER:

An arborist who pruned the oaks at this residence (Photo 5A) clearly knew about oak wilt; he treated every pruning cut with paint (Photo 5B) to prevent transmission of the deadly fungus to the wound by the sap beetles. Regrettably, every tree that was pruned contracted oak wilt. Why?

Comment: The arborist failed to comprehend that the wounds created by his spiking up the tree with his shoe irons (Photo 5C) was also sufficient to attract sap beetles and the lethal Oak Wilt fungus. Spiking live trees for pruning purposes is not an acceptable practice.



Photos 5A: The arborist who pruned the oaks on this site took great pains to treat every wound (Photo 5B) with paint to thwart infection by the oak wilt fungus. He apparently didn't understand that his spiking (Photo 5C) up the tree would cause sufficient-sized wounds for oak wilt transmission by sap beetles.

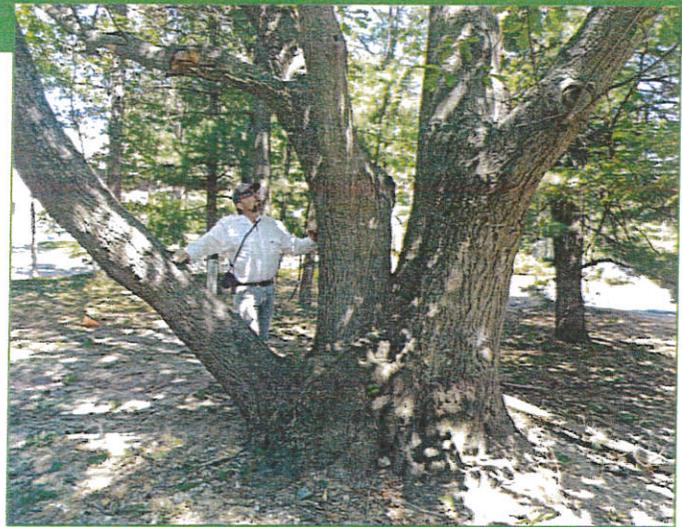


Photo 6: If neighbors are not already feuding, oak wilt can stir very strong emotions. In this photo, one neighbor is trying to prevent oak wilt on his large oak trees from root graft transmission from diseased trees (background) owned by a neighbor, who doesn't care.



Photos 5B

#6 – THE HATFIELDS AND THE MCCOYS = BAD NEIGHBORS:

It is well known in our society that neighbors often don't get along. At a location near Traverse City (Photo 6) a homeowner's trees along the property line contracted oak wilt but the homeowner simply removed them as they died, not caring whether he lost his trees. His neighbor's trees were threatened with oak wilt via root graft transmission. Trenching was not possible due to proximity of the trees to the property line. So far, the neighbor who wants to save his trees has been doing so successfully at great expense for the past eight years by trunk injections of propiconazole alone, despite the continued "disease pressure."

Comment: The oak wilt fungus and sap beetles that transmit the fungus do not recognize two artificial human delineations: property lines and calendar dates (when to start or stop pruning). Failure of property owners to contain issues (such as oak wilt) to their property can sometimes become contentious if not litigious. If neighbors are not already at odds with each other, oak wilt can encourage them to become the feuding Hatfields and McCoys.



Photos 5C

#7 – PROFITEERING:

It is not unheard of that an arborist, who prunes trees at the wrong time of year, causing the deaths of many oak trees, also wins the lowest bid for their removal.

Comment: Well, only in America . . . 🇺🇸

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OAK WILT PART 3: MANAGEMENT STRATEGIES

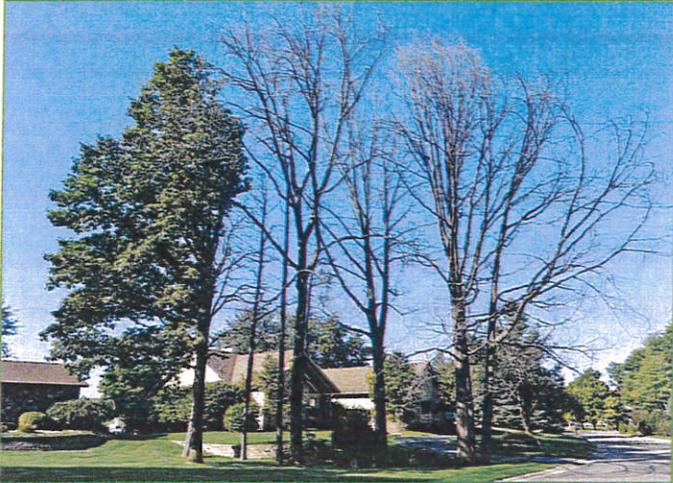


Photo 1A: The dead trees in this photo died *the previous year* from oak wilt after an unscrupulous “arborist” pruned them in the spring. The homeowner, not believing that simply pruning trees could result in their death, left them standing for more than a year after their death, in hopes that they might recover. Note that the neighbor’s lone unpruned tree is still alive over one year after the death of the adjacent trees.



Photo 1B: The Oak Wilt-infected trees in Photo 1A are finally removed two years after they died. Note that the fungus finally transferred via root grafts to the neighbor’s lone oak tree. Prompt removal of the dead trees would likely have resulted in a more rapid transfer of the fungus to the neighbor’s living oak tree. The neighbor with the lone, initially unaffected tree elected not to implement Oak Wilt remedial actions to save his tree, perhaps due to cost or a belief that it would not be affected.

INTRODUCTION:

Oak Wilt (OW), caused by the fungus *Ceratocystis fagacearum*, is an increasingly important issue of concern to our industry, and the forests and landscapes in Michigan (Photos 1A & 1B). Oak Wilt is one of the costliest diseases in the landscape (Figure 1), largely due to challenging efforts to try to contain and eradicate the deadly disease once established in the landscape. It is of the utmost importance that we learn how to avoid oak wilt, and how to contain and eradicate oak wilt from landscapes when present.

THEORY OF OAK WILT MANAGEMENT:

Because much is known about the biology, infection cycle and spread of Oak Wilt (see “Oak Wilt Part 1: Symptoms and Diagnosis,” *The Landsculptor*, May 2015), we can use this knowledge to hopefully address Oak Wilt issues from a variety of approaches. Of considerable importance is our understanding that the lethal oak wilt fungus can only infect oak trees by two methods: 1) sap beetle transmission of the fungus to wounds, and 2) transmission through root grafts between trees. In theory, preventing either of these two infection methods will help us avoid new oak wilt outbreaks and manage existing ones. Obviously, avoiding OW infections is the least costly of all the management options. Once a tree becomes infected by the OW fungus, however, other more invasive and costly options need to be employed.

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FIGURE 1: THE COSTS OF OAK WILT

- **Property Value/Tree Value Losses:** Trees represent a significant contribution to the value of property, the reason people often prefer to buy or build homes in wooded areas. At a minimum, the tree value (and potential) loss should be assessed.
- **Tree Removal Costs:** Removing infected/dead trees, stump grinding, properly disposing of wood, and replanting etc. can be very expensive, especially in the vicinity of homes and utilities.
- **Oak Wilt Containment/Eradication:** While the above losses and costs may seem substantial, the methods needed to contain and eradicate oak wilt from a property can be even more costly. The fungus will likely move underground to infect other oaks on the affected property and neighbors’ properties if not contained and eradicated.



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AVOIDANCE OF OAK WILT:

As the least costly management method, avoidance of Oak Wilt can be accomplished by pruning oak trees during periods when sap beetles and the oak wilt fungus are dormant (during cold periods), by prompt repair of trees injured by storms during the spring and summer, and by avoiding the movement of contaminated wood into communities or properties.

Avoidance through Pruning Practices:

The vast majority of the new OW outbreaks the author encounters every year are due to improper pruning and other tree care procedures. Hence, probably the most important aspect of OW management is avoidance, which necessitates pruning trees, if needed, at the proper time. In Figure 2, the risks of oak wilt from tree injury (pruning or storm damage, etc.) during certain time periods of year are summarized. "When to prune" is one of the more controversial aspects of OW management. The spring months are especially high risk; some "experts" recommend pruning after July 15. While OW transmission to wounds by sap beetles decreases during mid-late

summer and fall, the risk does not diminish to zero. Two factors influence the desire for zero risk: the author has documented that pressure pads sometimes form during the fall following tree death, and several cases of fall pruning have resulted in OW tree death the following spring. Given the value of oak trees and the costs to contain and eradicate OW in residential landscapes, the author advises that we be able to recommend "zero risk," which is more of a matter of temperature than calendar dates.

Avoidance through Prompt Storm Repair:

Similar to pruning, the OW fungus can be transmitted by sap beetles to wounds created on trees during storms. Emergency storm repair can be accomplished by promptly (within hours to a couple days) cutting out the injured branch or branches, and immediately painting the new wound with a sealant to prevent visitations by sap beetles. Recall that because fresh wounds are attractive to sap beetles for about 5–7 days, we are not generally worried about storm damage during the winter months when sap beetles are dormant.

ROOT GRAFT DISRUPTION:

As with Dutch Elm Disease, severing root grafts can help prevent the spread of the Oak Wilt fungus through roots to other nearby oak trees. Root grafts may be severed with vibratory plows, trenchers, backhoes, mini-excavators, etc. Once a trench is made, the soil can be backfilled immediately. Two principles may influence the efficacy of root graft disruption: time and space. By "time" it is assumed that the longer the period of delay in implementing the severing of roots between potential root-grafted trees, the greater the chance that the fungus has moved beyond the root graft junction into the healthy tree's roots. It is also important to understand that injuring and exposing roots can also attract sap beetles, similar to branches. By "space," it is assumed that the greater the distance between trees, the less likely that root grafts have occurred and/or, the more time it will take the fungus to move between trees. We must keep in mind

that tree roots may extend laterally 1.5 to 2X the height of the tree. Recommended depth of trenching is usually at least 4 feet in heavy clay soils and 5–6 feet in sandy soils. Following are brief discussions of two major models used for root graft disruption; they are used for different situations but may, at times, be combined for specific situations.

The Forest Management Model (FMM) for Forests and Woodlands:

This approach to root graft disruption is often used in woodland or forest situations where tree value is comparatively low, budgets to contain and eradicate OW are low, and efficacy demands are high to preclude the need for revisits to correct further OW issues. Briefly, the FMM, based on Johann Bruhn's 1990s research in Menominee, Michigan, attempts to define risks of spread through root grafts and where trench lines need to be installed to minimize the risk of root transmission (Table 1, Sketch #1). Primary and secondary trench lines may be installed to maximize OW containment and eradication. Once the trench lines have been installed, all trees (including healthy trees) within the trenched areas need to be destroyed (Sketch #2 and Photo 2). This destruction includes treating stumps with herbicide to prevent re-sprouting and, hence, possible survival of the Oak Wilt fungus. Once all trees have been destroyed within the trenched area, the OW fungus will theoretically die out. While the FMM has been demonstrated to be highly effective and relatively low in cost in forest situations, it is, however, highly destructive because many healthy trees are usually sacrificed to contain and eradicate OW from the site.

The Tier Tree Model (TTM) for Residential Landscapes:

The TTM is employed where trees are of significant value and where as many trees as possible are desired to be saved from destruction by OW. With the TTM, trench lines are installed much closer to infected trees (Sketch #3 & Photo 3) than in the FMM. Often primary lines are installed between OW-infected trees and adjacent, apparently

FIGURE 2:

A general summary of the risk of contracting oak wilt from pruning or storm injury during certain times of year. Note: Pests and diseases do not recognize artificial human calendars (nor property boundaries). When the climatic temperatures are cold, pests and diseases are dormant and pose little risk to trees that are injured.

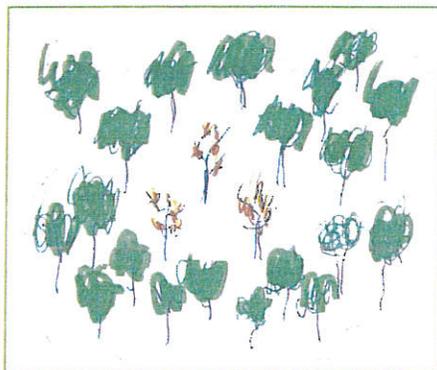
Note: Sap Beetles that transmit Oak Wilt can become active when temperatures reach 45-50 F and above.

| | | |
|-----------------|---|--------------|
| April 1-July 15 | → | High Risk!!! |
| July 15-October | → | Lower Risk |
| Dec-February | → | No Risk |

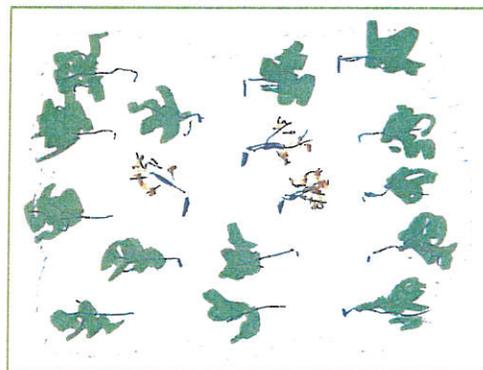
TABLE 1: Forest Management Model: The placement of trench lines in relation to Oak Wilt-affected trees and apparently healthy trees. Combine the diameters (dbh= diameter at breast height) of diseased and nearby healthy trees. Distances for the trench line are in feet from the diseased tree(s) and are listed below the soil type.

| Combined dbh of diseased & healthy trees (inches) | 95 % Trench Sandy Soil | 98 % Trench Sandy Soil | 95 % Trench Loamy Soil | 98 % Trench Loamy Soil |
|---------------------------------------------------|------------------------|------------------------|------------------------|------------------------|
| 20 | 39 | 51 | 31 | 41 |
| 22 | 43 | 56 | 34 | 45 |
| 24 | 47 | 61 | 37 | 49 |
| 26 | 50 | 66 | 40 | 53 |
| 28 | 54 | 72 | 43 | 57 |
| 30 | 58 | 77 | 46 | 61 |
| 32 | 62 | 82 | 49 | 65 |
| 34 | 66 | 87 | 53 | 69 |
| 36 | 70 | 92 | 56 | 73 |
| 38 | 74 | 97 | 59 | 77 |
| 40 | 78 | 102 | 62 | 81 |
| 42 | 82 | 107 | 65 | 85 |
| 44 | 85 | 112 | 68 | 89 |
| 46 | 89 | 117 | 71 | 94 |
| 48 | 93 | 123 | 74 | 98 |

Note: The 95% Trench and 98% Trench (Root Graft Disruption) represent *Confidence* that the trench line will actually contain Oak Wilt to within the trenched area; they may be considered as primary and secondary trench lines. (This is an abbreviated Table.)



Sketch #1: This “Artist Rendering” of the Forest Management Model shows that trench lines (dotted) are installed quite a distance from oak wilt-infected trees to provide the greatest possibility of containing the oak wilt fungus within the trenched area.



Sketch #2: This “Artist Rendering” of the Forest Management Model reveals that all trees within the trench lines must be cut down and sacrificed to prevent further spread of the oak wilt fungus. Stumps are treated with herbicide to prevent resprouting. Presumably, if all goes according to plan, the Oak Wilt fungus will die out.

healthy trees; obviously, the risks of OW transmission increase with lengthy delays in trench line installation and with closer distances to infected trees. Secondary trench lines are typically installed between the first and second “tier” of trees out, between apparently healthy trees. Tertiary trench lines may also be installed. The efficacy of the TTM can be enhanced with supplemental trunk injections of propiconazole (see below) in high value landscapes. The author has developed and fine-tuned the TTM for more than 25 years ... with great success.

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Photo #2: View of the destructiveness of the Forest Management Model (FMM) utilized in one of Michigan’s State Parks to contain and hopefully eradicate Oak Wilt from the site. The trees in the photo were live, healthy trees that need to be sacrificed according to the FMM. This extensive destruction is usually unacceptable for residential landscapes and communities.



Sketch #3: This “Artist Rendering” of the Tier Tree Model (TTM) demonstrates that in situations where tree values are high, such as in landscapes, it is undesirable to sacrifice many healthy trees. Hence, the trench lines (dotted) are installed much closer to infected trees. Note that residential foundations/basements, serving as “natural barriers,” may augment the trenching efforts. The TTM has been used with great success by the author over the last 25+ years. Trunk injections with propiconazole may enhance trenching procedures or may be implemented in lieu of trenching ... depending on the situation. Each Oak Wilt site is unique and requires consideration of best management practices by an experienced professional.



Photo 3: Primary and secondary trench lines are being installed in this residential landscape with a mini-excavator. In using the Tier Tree Model, note how close the trench lines are being installed between infected trees (left, just out of photo) and healthy trees compared to the FMM. Backed up with trunk injections of propiconazole, no further Oak Wilt outbreaks occurred on any of the trees on this property during the subsequent four years.



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PROPICONAZOLE TRUNK INJECTIONS:

Propiconazole is a fungicide that has been proven to be an effective treatment for Oak Wilt. At high rates, the fungicide has been shown to “cure” members of the white oak family. At high rates, the fungicide has also prevented the transmission of the OW fungus through root grafts (Photo 4, including red oaks). Because it is believed that the OW fungus can survive for 3-4 years in the roots of infected trees, nearby healthy trees that are likely root grafted to the diseased trees need to be trunk-injected with high rates of propiconazole for at least six years. Due to potential damage from injection procedures and other ancillary issues, the author does not recommend routine, preventative treatments of oak trees in landscapes where OW does not exist.

OAK WILT WOOD MANAGEMENT:

The OW fungus is not a good survivor in oak trees killed by the disease. As with many diseases and pests, the movement of OW-infected wood can spread the disease to new locations, predominantly during the first year after death of the tree. Methods to minimize the survival and transport of the OW fungus in wood can be accomplished in several ways. Chipping or debarking the wood hastens rapid destruction of the OW fungus; the chips and/or bark are acceptable as landscape mulch. Trees that have been killed by OW are perfectly fine for milling into lumber. Wood from OW-trees is also fine for firewood (Photo 5); however, firewood should be covered (tarpred) during the spring and summer months to prevent visitations by sap beetles, which may subsequently transmit the fungus from pressure pads in the firewood to newly wounded trees. The wood only needs to be covered during the fall following tree death and then the following spring and summer of the following year (about a year) because the OW fungus is rather quickly displaced by other organisms. Immediate burning, burying, etc. are other options.



Photo 4: At the same location as in Photo 3, no trench lines were placed between Oak Wilt-infected trees (foreground, stump ground areas) and the trees in the distance. High rates of propiconazole alone applied as trunk injections have saved these red oaks (background) from root graft infection.

ORDER OF IMPLEMENTATION OF OW MANAGEMENT STRATEGIES:

Even though OW may kill trees quickly, the fungus apparently does not move through root grafts very quickly—only approximately one tier of trees per year (hence, the Tier Tree Model) see Photos 1A & 1B. It has also been observed that removing infected trees (except for immediate removal of infected trees **and stumps** at the **very first symptom expression** of OW infection) **before** implementation of other procedures can actually hasten the spread of OW to nearby trees. Following is the protocol the author has used for great results:

1. Install Trench Lines to Sever Root Grafts...and/or
2. Trunk-Inject Trees with Propiconazole (allow time for dissemination of the fungicide throughout tree)
3.
4. Go On Vacation: See the wonders of this Great Lakes State. Yes, Michigan!!
5.
6. Take family to several of Michigan's wonderful County Fairs and Festivals.
7.
8. Remove Oak Wilt-Infected Trees in Late Fall or Winter

Oak Wilt Management Summary: The sudden appearance of Oak Wilt in a landscape is usually the result of improper pruning practices and/or storm injury during the months conducive to spread of the lethal fungus by sap beetles. Avoidance of OW is the most cost-effective strategy for managing OW. Hence, it is very prudent for Counties, Townships, Neighborhoods and various Associations to advance the word about Oak Wilt and to adopt policies to prevent its introduction and spread within these communities. Once oak wilt is established in a residential landscape or neighborhood, efforts to contain and eradicate the disease can be daunting and costly. The proper installation of trenches to sever potential root grafts and/or the utilization of propiconazole trunk injections takes extensive experience. Please feel free to contact the author for assistance at 248.320.7124 or robertsd@msu.edu. 📧

The author, MSU and MGA do not endorse any particular products. If using pesticides, be sure to read and follow label directions.



Photo 5: This property owner decided to burn his Oak Wilt-infected firewood (“green,” undried) in his outdoor wood burner the winter after his trees were killed by Oak Wilt—this is a very acceptable practice.