

Oak Wilt Remediation by The Tier Tree Model

Part 1: Root Graft Disruption



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Dr. Roberts retired from Michigan State University in 2018 after committing four decades to advancing MSU's Land Grant Mission, originally signed into law by President Abraham Lincoln during the midst of the American Civil War. He has published hundreds of articles and has taught hundreds of lectures and workshops.

Dr. Roberts has researched many issues in Michigan's plant industry, including Oak Wilt, Dutch Elm Disease, Diplodia Tip Blight of Pines, along with a variety of cultural problems such as plant nutrition and herbicide toxicity. During his career, he has discovered a variety of new diseases and pests such as Phomopsis Canker of Spruce and the first bacterial wilt disease of turfgrasses in North America.

In the early 2000s, his research on Ash Decline in Southeast Michigan led to the discovery of the invasive Emerald Ash Borer in North America.

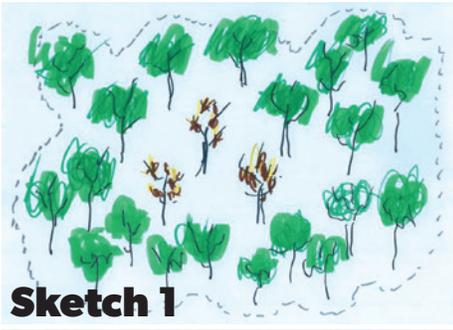
In his retirement, Dr. Roberts intends to remain active with the Arboriculture/Landscape/Nursery industries. Dr. Roberts is President, CEO and CBW (Chief Bottle Washer) of The Plant Doctor, LLC...aka The Tree Doctor.

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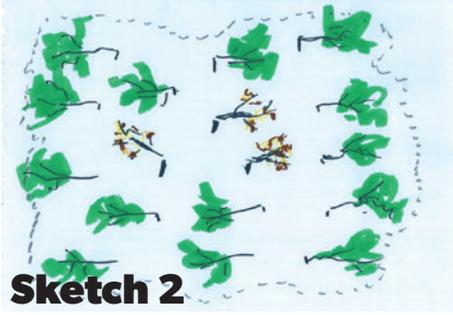
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INTRODUCTION

Oak Wilt, caused by the fungus, *Bretziella fagacearum*, is a lethal disease of *Quercus* sp. (Photo 1). There are two major families of oaks in Michigan: the Red Oak family and the White Oak family. Members of the Red Oak family (Northern Red Oak, Scarlet Oak, Black Oak, Pin Oak, etc.) are likely to be highly susceptible and die rather quickly from Oak Wilt (Photo 1 & Left Inset), while species within the White Oak family (White Oak, English Oak, Chestnut Oak, Swamp White Oak, etc.) tend to be more tolerant of, if not resistant to, the disease (Photo 1 & Right Inset). Nevertheless, species within the White Oak group occasionally die from Oak Wilt infection. For example, Bur Oak, a member of the White Oak group, can be seriously affected by the disease and is generally thought to be the most susceptible species within the White Oak group.



Sketch 1



Sketch 2

The Oak Wilt fungus is disseminated by two major modes: 1) “Overland”, by sap beetles and perhaps other insects, typically to fresh wounds on oak trees, and 2) “Underground”, through root grafts (root connections) between nearby oak trees, most commonly of the same species. Once detected, Oak Wilt can be extremely difficult and costly to manage.

Confusion on how best to manage Oak Wilt is rampant among arborists/landscapers and the public who want to contain and eradicate the disease from infested properties, and/or keep it from spreading. Most of the confusion seems to originate from various “experts” who provide their own version of management advice that is conflicting with others.

Over the last few years, the information about the existence and importance of Oak Wilt has skyrocketed, thanks in part to involvement by

P1 This Oak Wilt outbreak on a golf course in northern Michigan occurred after power line (right-of-way) clearance pruning in November several years ago and is proving difficult and expensive to remediate. Members of the highly susceptible Red Oak family have pointed leaf lobes (Left Inset) while members of the White Oak family have rounded lobes (Right Inset).

Sketches 1 & 2:

The Forest Management Model was developed as a highly effective and economical Root Graft Disruption Model strictly for forest situations where trees are of relatively low value. A Root Graft Disruption trench (dotted-Sketch 1) is placed according to a table that considers trunk diameters (dbh) of diseased and healthy trees. Often another trench is placed farther out. Subsequently, all trees within the trench line are killed/sacrificed (Sketch 2). Stumps are usually treated with an herbicide.

F1 The Forest Management Model (FMM) is used in locations where trees are of low value and the most economical means of Oak Wilt management is needed; many healthy trees are often sacrificed. By comparison, The Tier Tree Model (TTM) is utilized in locations where trees are of highest value: landscapes, parks, preserves, arboretums, etc. Tree preservation is of utmost importance with the TTM.

Forest Management Model Dr. Bruhn

vs.

Tier Tree Model Dr. Roberts

<p><u>Forest Management Model</u> (FMM)</p> <p>For Forests & Woodlands</p> <p>Trees of Low Value \$ Low Budget \$ No Revisits (?) Root Graft Disruption</p>	<p><u>Tier Tree Model</u> (TTM)</p> <p>For Residential Landscapes</p> <p>Trees of High Value \$\$\$ Higher Budget \$\$\$ Revisits Acceptable Multiple Mngt Methods</p>
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various Green Industry organizations and State of Michigan Departments, such as the Michigan Department of Natural Resources (MDNR), which has devoted more resources towards publicity, detection and recommendations on management. Several years ago, The Michigan Oak Wilt Coalition was formed by many stakeholders to help Michiganders understand the disease. Also, an Oak Wilt Qualifier (OWQ) program was developed by the Arboriculture Society of Michigan, our state’s Chapter of the International Society of Arboriculture, to provide training to professional arborists (and landscapers) in the challenge of Oak Wilt management.

It is the opinion of this author that while the OWQ program has enhanced the knowledge of professionals in the field of forestry, specifically Oak Wilt management based on personal experiences in the field, certain techniques are not receiving the proper attention that they deserve. For example, the management of Oak Wilt in forest situations differs significantly from management of the disease in urban/suburban settings. Yet many “Experts” advance a one-size-fits-all strategy that can be highly destructive to different environments. In this article and the ensuing “Parts 2 & 3”, I hope to clarify and advance certain techniques that need to be considered in an overall, comprehensive Oak Wilt Remediation plan.

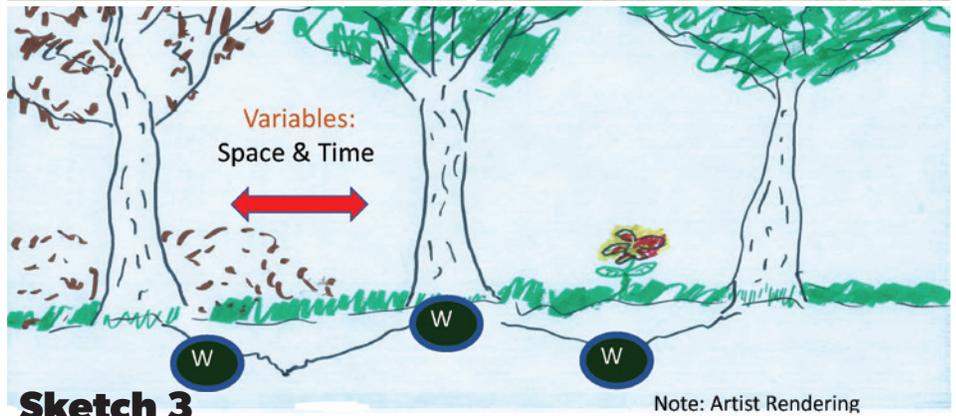
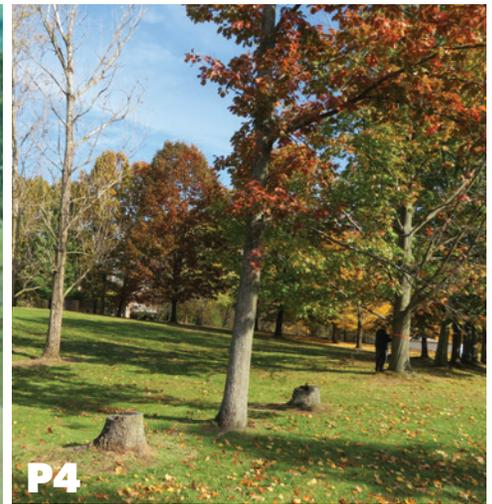
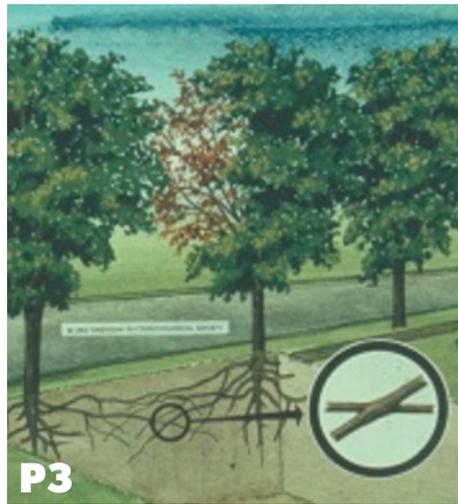
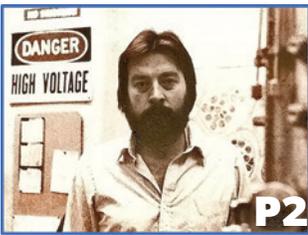
What is the Tier Tree Model?

Some of the conflict related above involves Root Graft Disruption (RGD), a procedure that has traditionally been the go-to method for Oak Wilt containment and eradication. RGD is also known by various other names such as vibratory plowing or trenching. The confusion about RGD arises from the promotion of the Forest Management Model (FMM), aka “The

Bruhn Model”, developed by Dr. Johann Bruhn at Michigan Tech around 1992-93. To many “Experts”, the FMM is the *only* RGD model and has been advanced in natural forests and urban/residential areas alike (Sketches #1 and #2), sometimes to the great detriment of property owners. The FMM was designed *strictly* for forest situations with trees of relatively low value (Figure 1). The FMM was intended as the most economical technique for Oak Wilt management in natural forests and where a high degree of assurance of containment/eradication is achieved by sacrificing many healthy trees, without revisits and without further economical inputs except perhaps for monitoring the effectiveness of the efforts.

In comparing natural forest oak trees to landscape oak trees consider the following. Red Oaks in a forest/logging operation are currently worth far less (perhaps several hundred each) than White Oaks. By contrast, in a residential landscape, a Red Oak and/or a White Oak are *far more valuable* than their forest brethren. Depending on size and location, a large oak (red or white) in a residential landscape may be worth \$10,000, \$20,000 or even more individually. By design, the FMM often sacrifices many healthy trees, which may be fine for some property owners in a forest setting but unacceptable in a landscape. Unfortunately, for some experts, the *only* RGD is the FMM (Bruhn), which they also advance in residential/landscape areas because this is the only model they have been taught or understand.

History of The Tier Tree Model: In 1984, I became Director of MSU’s Plant & Pest Diagnostic Clinic (Photo 2), previously known as The Plant Diagnostic Clinic. In addition to diagnosing and providing management advice for every possible *plant* problem in Michigan



(Nurseries, Christmas Trees, Potatoes, traditional row crops such as Corn, Wheat and Soybeans, Fruit Crops, Homeowners' house plants... you get the picture), I also had to diagnose and provide advice on Oak Wilt, a totally new disease to me that hadn't been taught in any of my advanced Plant Pathology courses during my graduate studies. It is important to note here that Bruhn's FMM would not be developed until the 1990s. Having become very experienced with Dutch Elm Disease (DED), I simply adapted the management techniques of DED to Oak Wilt because both diseases had some similarities: overland spread by insects, root graft transmission, and vascular wilts by fungal pathogens, etc. An important management technique for DED was RGD, which generally involved trenching between trees in a "tier" pattern (Photo 3). At that time and through the ensuing years, I simply referred to this technique as the DED Model or DED Trenching Model; it was later to become known as the (Dr. Dave's?) Tier Tree Model (TTM). I arrived at the TTM quite independently from other scientists and have employed it very successfully for 35+ years. Frankly, I have never utilized the FMM largely because of its sacrificial destructiveness, which often involves destroying many healthy, non-infected trees. As far as I know, at least until recently, I am the only person in Michigan who has developed and promoted the Tier Tree Model, especially for private properties, urban environments and other locations (i.e. parks, nature preserves, etc.) where trees can be far more valuable than similar-sized trees in forest situations. (Figure 1). The Tier Tree Model is based upon a long-standing observation that the Oak Wilt fungus, similar to the DED fungus, moves

fairly slowly "Underground" (compared to "Overland" spread of "miles") through root grafts in the trees' root systems. The Oak Wilt fungus translocates approximately one tier of trees per year (Sketch 3), but this one-tier movement in the tree's root system occasionally encounters a kerfuffle (Photo 4).

Scientific evidence suggests that the Oak Wilt fungus may move through a tree's root system, and/or through root grafts between trees, approximately 18 feet or so per year in heavier (clayish) soils and as much as 40+ feet per year in lighter sandy soils. Even though these measurements may occasionally be helpful as guidelines, they do not necessarily hold true (Photo 5).

When I provide recommendations on Oak Wilt Management, I almost always suggest the Tier Tree Model (TTM). While in the spirit of education with a comprehensive approach I will also recognize the FMM and other techniques. I feel it is vitally important that all individuals who profess to be experts in Oak Wilt remediation advance all available options so that property owners can make informed decisions for their personal situation. For me, the TTM has evolved into something far more complex and comprehensive than just RGD (trenching). In my research and experience, the Tier Tree Model currently involves the following three methods that singly or collectively might be utilized to contain and eradicate Oak Wilt, the ultimate objective of Oak Wilt Remediation.

P2 In 1984, I (the author) became Director of MSU's Plant and Pest Diagnostic Clinic from which I was charged with diagnosing any plant problem submitted from Michigan. I had to become a quick study in the identification/diagnosis of Oak Wilt and its management, years before the Forest Management Model was developed.

P3 This old 35 mm photo/slide from the American Phytopathological Society was used to teach Dutch Elm Disease remediation by trenching between trees in a "tier" pattern. I simply adopted this procedure to Oak Wilt management. Initially I called it the DED Model but later it became known as the Tier Tree Model (TTM).

P4 The Oak Wilt fungus typically transmits through root grafts in the root system one tier of trees per year. There are occasional exceptions to this "rule". In this photo, Oak Wilt began at the far left on a distant tree and over several years advanced down this row of trees towards the right of the picture. For some reason, the disease skipped the "apparently healthy" tree visible on the right side of the photo...at least for now. (Please disregard the leafless Poplars in the background, which defoliated due to fall senescence.)

Sketch 3: This schematic shows the movement of the Oak Wilt fungus (Circle W) underground via such variables as space and time. As a general rule, with some exceptions, the fungus typically moves one tier of trees per year.

P5 Even though I may suggest that the OW fungus typically moves underground through root grafts one tier of trees per year, the fungus failed to move six feet in two years from the pruned and infected trees (appearing without foliage and dead) to the single unpruned tree on the left. I have noted on many occasions that the Oak Wilt fungus tends to transmit more quickly when diseased trees are moved before remediation efforts are implemented. This is the reason I recommend that remediation procedures be completed prior to removal.



P6A



P7A



P6B



P7B



P6C



P6D

- 1) **Root Graft Disruption (RGD):** Disrupting potential root grafts between nearby trees can prevent underground transmission of the Oak Wilt fungus if performed in a timely manner. In my opinion, trenches or vibratory plows need to sever roots to a depth of at least five feet in heavier soils such as clay and loam and at least six feet in sandy to sandy loam soils. Note that my recommendation is not necessarily consistent with some experts' guidelines; I have witnessed roots below five feet deep in several trenching operations. If using equipment other than a vibratory plow, such as a backhoe (Photo 6A), mini-excavator (Photo 6B), or chain-style trencher (Photo 6C), the soil can be filled back into the trench immediately. **Of course, the First Step in RGD/Trenching is to call MISS DIG, 811 or 800-482-7171 (Photo 6D).**
- 2) **Tree Injections:** Apparently healthy trees adjacent to Oak Wilt-infected trees can be protected from root graft transmission by injections of propiconazole (fungicide) at high rates. Injection equipment/procedures may vary from micro to macro injections using a variety of implements. I strongly advise the high injection rate of 20ml per inch dbh ("diameter at breast height" = 4.5

feet) trunk height from the ground for protection of "healthy" members of the Red Oak family. Although 10ml of propiconazole is an optional rate on the label for most injection systems, I have witnessed failure with this lower rate from all tree injection systems. Tree injections need to be repeated every other year for at least 6-8 years (three or four total treatments). Traditional recommendations suggest that Red Oaks exhibiting symptoms of Oak Wilt generally cannot be saved. However, some arborists and I are achieving positive results with even higher rates of propiconazole on infected Red Oaks. We'll keep you posted.

- 3) **Stump Cup/Glyphosate:** In the past 8-10 years, I have been experimenting with a procedure using concentrated glyphosate (30-40%) applied to a "stump cup". This technique is by far the easiest and most cost-effective method of Oak Wilt remediation. The primary drawback with this technique is that it may cause significant collateral damage to other oak trees within root graft range of glyphosate-

P6 Various implements can be used to accomplish root graft disruption: vibratory plow, backhoe (6A), mini-excavator (6B) and chain-style trencher (6C). If investing in RGD, it is vitally important to make sure the proper depth of at least 5-6 feet is achieved depending on soil type. Otherwise, this costly disruptive endeavor may be for naught. Unbeknownst to Rebecca Finneran of MSU Extension in Kent County, when I snapped this photo of her many years ago, she would become my TTM model for "MISS DIG" (6D).

P7 The "Single Tree Removal" (STR) technique involves cutting down trees infected by overland spread of Oak Wilt followed by excavating out the stump (7A & 7B). In forest situations, the stump is subsequently inverted back into its original hole. Experts within the Michigan Department of Natural Resources (MDNR) find this technique successful. While the STR might be a beneficial technique for Forest situations, it may be impractical for urban/residential areas. (Photo Credits: Scott Lint, MDNR)

**Sketch 4****P8****P9**

Sketch 4: In an urban/residential setting (compared to forest situations, Sketches #1 and #2), properties and homes are often very close together. According to the Tier Tree Model, trench lines are installed in tiers of trees, with the primary trench between diseased and healthy trees and the secondary trench between healthy trees (dotted lines) using the foundations and basements of homes as “natural barriers” to root graft transmission of the fungus. Usually only one or two tiers of RGD are needed. However, depending on the age of the Oak Wilt infection at the site, tertiary or more trench lines can be installed for greater assurance of containment and eradication.

P8 At this site in SE Michigan, the trees highlighted by yellow arrows had been pruned in the spring and died in the summer. I wasn’t contacted for assistance until late in the year. Because the Oak Wilt fungus had infected the two trees by overland spread and because remediation was within the same year, I suggested trench lines (white) be installed on two sides of the property: one trench extending from the foundation of the house (right: using the foundation as a root barrier) into a wetland to the right; the second trench installed along the drive (left). Even though the distance between the diseased trees and the next tier of healthy trees was significant, perhaps more closely aligned with the FMM, I still refer to this as the Tier Tree Model.

P9 A backhoe was employed to trench the property in Photo 7A. In this photo of the trench along the drive, a few of the roots of trees were within the top foot or two of soil. However, many of the roots were around 4-5 feet deep (Inset).

**P8**

treated trees. Hence, extreme caution must be taken if considering this technique, because of the potential harm to healthy trees that might be desired for preservation. I’ll discuss this method in Part 3 of Oak Wilt Remediation by the Tier Tree Model.

These three techniques are applied in a Tier Tree Model design, which designates that treatments (whether RGD, Tree Injections and/or Glyphosate/Stump Cup) be considered according to successive tiers from Oak Wilt-infected trees. Root Graft Disruption (RGD) is the subject of the present article.

What is Single Tree Removal (STR)?

STR, also known as Root Plate Excavation, is a technique used by some individuals to prevent the spread of Oak Wilt through root grafts from a tree infected by overland transmission. I have never used this technique but in the spirit of promoting all available options, I wanted to briefly relate its principles herein. If an oak tree is infected by overland transmission of the fungus to a wounded branch, the fungus gradually infiltrates the vascular system of the tree over time (Sketch #3). If the tree is cut down and the stump is excavated out of the ground before the fungus advances into the entire root structure of the tree (Photos 7A & 7B), then, theoretically, the advancement of Oak Wilt through root grafts can be prevented to nearby trees. This procedure must be completed within months after an oak becomes infected; according to experts who are proponents of, and who claim success with this technique, Oak Wilt-infected trees can be removed as late as October or November of the same year after a spring or early summer infection. While this technique may be particularly viable for forest situations with trees of low value and where other remediation efforts can be implemented in case of failure, I’m a little leery about using it in a residential area where failure to extract all of the infected roots might result in catastrophic spread of the Oak Wilt fungus to nearby extremely valuable trees. In consideration of this technique, the TTM is essentially a variation of STR (or visa versa) but with much greater assurance of success

because more potentially infected roots are isolated to prevent root graft transmission (Sketch 4 and Photo 12B).

Realistic Examples of Root Graft Disruption (RGD) using the Tier Tree Model

The Tier Tree Model (TTM) is designed with tiers of trees in mind (Sketches 3 & 4). There are a variety of nuances that may need to be determined when implementing the TTM, for example, age of the Oak Wilt site. If Oak Wilt was detected *this year*, an RGD trench or vibratory plow line that is placed between the diseased and healthy trees *this year* will usually suffice and be highly effective; implementation of RGD within months after infection is where the TTM really shines. For added insurance, a secondary RGD trench can be placed in the next tier, in other words between the next two healthy tiers of trees out from the infected trees (Sketch 4). Another nuance that is very important because the TTM will be used in residential/urban sites is the location of utilities.

If the site is more than a year old or several years old, then the trench lines may need to be adjusted outward farther from the original infected trees and placed according to the trees showing the most recent symptoms of Oak Wilt. Perhaps two, three or even four tiers of trenches can be completed for additional confidence. While the number of trenches that could be utilized in the TTM might appear daunting, the trench lines are much closer to the original infection site and tend to be much shorter in linear length than the two trench lines typically used with the Forest Management Model. In the author’s experience, two trench lines are usually sufficient. However, another trench line or two can increase insurance of containment and eradication of Oak Wilt. Following are several successful examples of implementation of the TTM.

Example 1: I was asked to provide recommendations at this site near Brighton rather late in the year several years ago. Two Red Oaks (Photo 8, yellow arrows) had been pruned in the spring and died in the summer. I proposed single trench lines

**Sketch 5****P10A****P10B****P11**

be installed according to the white drawn lines in Photo 8. Although the distances between the diseased trees and the next tier of healthy trees was greater than is typically encountered in residential landscapes, perhaps more similar to the FMM, I still considered this to be the TTM because the next tier of (healthy) trees is utilized. Trenches alone, with no other remediation technique, were installed in December. Oak Wilt remediation at this site was a complete success. Of particular interest at the site was the variability of depth of the roots. In one trench (Photo 8, right), most of the roots were within the top two feet of the soil. In the other trench (Photo 8, left along the drive), many roots were measured to be around five feet deep (Photo 9 and Inset).

Example 2: At this residential landscape near Grand Rapids, Michigan, which is typical of many sites around Michigan, most oak trees in the front yard of the landscape were pruned in May (Sketch 5 and Photo 10A), and exhibited typical leaf drop and throes of death within 1-2 months after the pruning. An anomaly did occur in this landscape; the two trees in the center of the front yard were also injured by pruning but somehow escaped infection (Photo 10A)! Because the two apparently healthy trees were not showing symptoms at the time of the remediation efforts (fall) and because they were too close to the diseased trees for trenching/RGD, the arborist, property owner and I agreed that these two trees could be injected with the high rate of propiconazole fungicide (trunk injections were performed every two years). An additional remediation effort to protect Oak Wilt from spreading to adjoining neighbors' properties involved using a Tier Tree Model/RGD/Trench Line along the property boundary on both sides of the property. Because diseased trees were directly adjacent (within feet) of the neighbors' property boundaries and neighbors' healthy oak trees in both directions, implementation of the RGD according to the Forest Management Model would have prescribed the sacrifice/destruction of many of the neighbors' trees on their properties. The Tier Tree Model didn't require removal of any healthy trees to prevent Oak Wilt transmission, whether on the Oak Wilt-affected landscape or on the neighbors' properties! Photo 10B shows the site about five years after the Oak Wilt infection by overland transmission to pruning cuts. This landscape has been completely stabilized with no further evidence of Oak Wilt, either on the affected site or the neighbors' properties.

Example 3: At this landscape near Onkama, Michigan, the Tier Tree Model was utilized with two trench lines, a primary and secondary (Photo 11). The primary line (my terminology) was placed between the

Oak Wilt-diseased trees and the adjacent healthy tier of trees. For added assurance, partly because remediation efforts were initiated several years after the Oak Wilt infections occurred from overland spread to pruning cuts, a secondary trench was placed between the next tier of healthy trees (Photo 11). As a further measure to bid good riddance to Oak Wilt and to increase the odds of salvation of as many trees as possible, the property owner specified tree injections. Remediation of Oak Wilt at this location has been very successful six years after the initial infection.

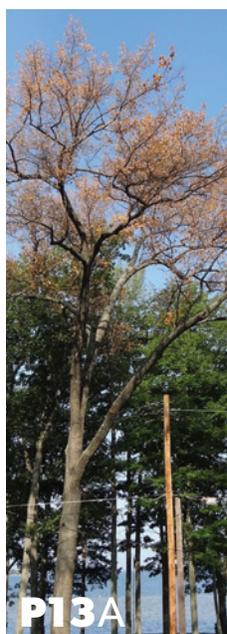
A major challenge with using RGD and the Tier Tree Model design (or Bruhn/FMM model), especially in urban landscapes, is the presence of buried utilities (Photo 12A). RGD/Trenching in the vicinity of utilities may prove extremely difficult and risky. Avoiding utilities is yet another advantage of using the Tier Tree Model in lieu of the FMM model in residential landscapes (Photo 12B). In some situations, the obstacle of utilities can be overcome by resorting to high speed compressed air (examples: Air Spade & Air Knife) in the vicinity of utilities. Also, when trenching in highly maintained landscapes, irrigation

Sketch 5: In urban/residential areas, one property owner sometimes has his/her trees in the landscape trimmed. If Oak Wilt develops, the disease directly threatens the neighbors' trees on both adjacent properties (left and right). Please see Photo 10A for the real-world example of this sketch.

P10A The Red Oaks on this landscape near Grand Rapids were pruned in the spring and exhibited symptoms of decline/death within weeks. Rather uncommon with most Oak Wilt sites, the two trees (center) apparently escaped infection despite being trimmed. Diseased trees were within feet of property lines and the neighbors' oaks. Using the Tier Tree Model, single trenches were placed near the property boundaries on both sides of the property. Because diseased trees were so close to the two escaped "apparently healthy trees" (center), no trench lines were installed between them; rather these two escaped "healthy trees" have been injected every two years. If the FMM had been used at this site, all of the landscape trees on this property along with many oaks on the adjacent properties would've had to be destroyed....unnecessarily.

P10B This is the same landscape as in Photo 10A, five years after many of the trees on the property were affected by Oak Wilt. The site has been successfully remediated using two methods with the Tier Tree Model: Root Graft Disruption (Trenching) and Tree Injections. Please note that property is now "For Sale".

P11 At this nice landscape with many oaks near Onkama, MI, the Tier Tree Model employing Root Graft Disruption is shown in vivid image. Note the two trenches in "tiers" of trees. The primary trench (left) separates the diseased trees (left and out of view of photo) from the next tier of symptomless, apparently healthy trees (left, in view of photo). The secondary trench (right) was placed between two tiers of healthy (symptomless) trees.



systems will usually be damaged and need repair. In some situations, such as when trees are closely spaced, it may be best to utilize tree injections in lieu of RGD.

Critical Root Zone (CRZ): When implementing RGD for Oak Wilt management, it is very important to bear in mind the CRZ, regardless of species of trees, which may vary somewhat according to the species of tree. The CRZ is generally measured according to trunk diameter in inches at breast height (dbh=4.5 feet above grade) and distance from the trunk in feet; for every inch dbh there is one foot of CRZ. For example, the CRZ of a 12-inch dbh tree is a 12-foot radius measured radially from the trunk. Invasion of this CRZ by trenching equipment could damage important roots and place the tree under excessive stress leading to decline and perhaps death.

Tier Tree Model (TTM) Failures

Sometimes the TTM fails; the failure is usually due to improper implementation. At a

landscape near Houghton Lake, the property owners lost many trees to Oak Wilt due to “deadwooding” by an arborist who claimed he knew what he was doing after many years in the business (Photo 13A). To not be totally discouraged the property owners made lemonade out of lemons by having this large tree carved by a professional (Photo 13B). Unfortunately, after RGD trenches were installed according to the TTM, the Oak Wilt continued to advance in subsequent years into other areas of their landscape and the neighbors’ landscapes. I had provided advice on this Houghton Lake landscape afflicted with Oak Wilt, but I was not present for the actual trenching effort. Several years later, with continuing root graft transmission of Oak Wilt, I asked the property owner if she had taken photographs the day that the trenching was performed (several years previously). She provided Photo 14, demonstrating my suspicions that the trencher didn’t disrupt root grafts nearly deep enough in this sandy soil. 🍃

P12A One of the major challenges in Oak Wilt Management by Root Graft Disruption in urban areas is the presence of utilities. The single tree near the front door of this house (arrow) near Grand Rapids was trimmed by the property owner for better mower clearance; the tree contracted Oak Wilt by overland transmission. Our initial design for trench lines (yellow) seemed reasonable to protect oak trees in either direction (right or left), with long lines near the drive to prevent “end runs” around the trenches. Once utilities were disclosed by the property owner (blue lines), trenching would have been very challenging but doable with sufficient time, effort and expense. We went back to the drawing board (see Photo 12B).

P12B If the Tier Tree Model is a viable remediation method, the simple trench line from the tree to the foundation of the house (left) around the tree to the foundation of the house (right) should be effective. Completed the same year as infection (2019), the site will be monitored for several years to ensure that the TTM is performing satisfactorily.

P13A Oak Wilt killed many trees at this site near Houghton Lake Michigan after an “arborist”, who claimed he’d been an arborist for 30 years and knew what he was doing, “deadwooded” Gail’s trees. Every deadwooded tree on the property became infected with the Oak Wilt fungus by overland transmission. The largest and most valuable Red Oak affected by Oak Wilt is this very large tree in the center of the picture. Incidentally when the trees began dying, the “arborist” disappeared and could not be reached.

P13B Despite being wrought with sadness by the loss of so many trees, Gail and her husband made the most out of their loss; they had the large tree in 13A carved into a beautiful American Bald Eagle.

P14 The Tier Tree Model was advised by me at this Houghton Lake site (Photos 13A & 13B), utilizing both Root Graft Disruption and Tree Injections. Unfortunately, I could not be present for their implementation but trusted a respected arborist to have the procedures implemented correctly. Several years later, as the Oak Wilt continued to move to other trees on this property and subsequently to trees on neighboring properties, I was perplexed by the TTM failure. I queried Gail about any photos she may have of the trenching operation performed several years back. She produced this photo demonstrating that the trench depth was not nearly deep enough in this sandy soil to prevent Oak Wilt transmission through root grafts.