



The Plant Doctor's LANDSCAPE TIPS

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

THE MICHIGAN DNR'S MISUNDERSTANDINGS ABOUT SCIENCE AND OAK WILT

INTRODUCTION

Many Michiganders are confused by the various approaches advanced for the management of Oak Wilt in various situations (Photo 1). The Michigan Department of Natural Resources (DNR), the Oak Wilt Coalition (OWC), and the Oak Wilt Qualifications program (OWQ) promote as their "Official Recommendation" the Bruhn Model, originally designed with Root Graft Disruption (RGD=trenching, vibratory plowing, etc.) in mind; it is the most costly and destructive Oak Wilt remediation method used in Michigan. I often refer to the Bruhn Model as the DNR/Bruhn Model because of alterations to the procedure by the DNR. For example, around 2015 (or before), the DNR began using and promoting a girdle-herbicide procedure adapted from an Indigenous American (American Indian) Tribe in northern Minnesota (personal communication with Scott Lint, DNR). This procedure involves double girdling trees and drenching the girdling cuts with Triclopyr (Garlon 4) in lieu of RGD but respective of the Bruhn design. It is not unusual for the implementation of either DNR/Bruhn Models (RGD or girdle-herbicide) to result in the sacrifice of 10, 20, 30 healthy oak trees for every Oak Wilt-diseased tree.

In 1984, years before the creation of the Bruhn Model, I designed an Oak Wilt management method I called the Tier Tree Model (TTM). The Tier Tree Model was also initially based on RGD, but has subsequently morphed into other variations, especially with my creation of the Glyphosate/Stump Cup procedure beginning in



Photo 1: Oak Wilt is a difficult disease to control, especially in residential areas where utilities and landscapes are challenging, and tree preservation is of the utmost concern. An Oak Wilt-infected tree can be seen in the center top of this photo. Remediation by DNR and OWQ methods would usually lead to destruction of all trees within root graft range of the infected tree(s). My Tier Tree Model and Glyphosate/Stump Cup methods can usually save most healthy trees in situations like this one.

2008. My methods, in stark contrast to the DNR/OWQ-sanctioned procedures, often result in few to no sacrifice of healthy trees. My methods are therefore highly economical, non-destructive, and far more environmentally friendly than the DNR's recommendations. The DNR/OWQ neither recognizes nor supports my procedures.

A few months ago, a property owner contacted me about his frustration with Oak Wilt and its management; I thought it might be interesting to share his experiences, which, I suspect, are not unusual throughout Michigan.

DNR COMMUNICATIONS TO LEE

Lee was the President of a Homeowners Association (HOA). He had been fighting Oak Wilt for many years in his community, becoming very frustrated with the costly and destructive methods being advanced by the DNR and the OWQ program. He had decided to give up and planned to let Oak Wilt run its course . . . until he saw my *Landsculptor* articles on the internet. Lee contacted me and surmised that my methods, as disclosed in my publications, might provide viable solutions for controlling Oak Wilt in his HOA community. Lee asked me to deliver a two-hour lecture on Oak Wilt to his HOA and then help him with Oak Wilt management in his community next spring. Lee wondered why the DNR and OWQ were not publicizing my methods as alternatives to their costly and destructive procedures. I explained some of the "politics" associated with Oak Wilt and various entities but especially with the DNR and a couple collaborators from ISA-Michigan. Lee became agitated, expressing dismay at the DNR's integrity. You see, Lee had a career in Forestry including a few years stint with the DNR early in his career. Out of curiosity, Lee advanced one of my *Landsculptor* articles to the DNR for their input. The following are bullet points from an email sent to Lee by DNR Associate Simeon Wright. In this article, I responded to Wright's email.

DNR Wright: "The MI DNR does not currently recommend widespread operational use of herbicides in oak wilt management due to limited data on efficacy and our experience with mixed results in some situations. We have trials underway and hope additional trials and scientific studies can be implemented. One challenge is it takes several years of monitoring (at least 4-5) to have confidence in treatment success, oak wilt can move slowly through root systems, and many treatments will look good for a few years."

Dr. Roberts Comments: According to my understanding from multiple sources, the DNR has been promoting the Garlon 4/ Double Girdle method administered via the Bruhn Model in lieu of trenching (RGD) through the OWQ program and to multiple Michigan Associations and Societies as well as the public for years. In fact, Wright teaches this method in the OWQ program. Wright did not mention my own research as summarized in my article advanced by Lee to the DNR (Wright), that I have shown repeatedly that Garlon 4 has no verifiable impact upon the health of oak trees and Oak Wilt.

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DNR Wright: "Our current trials have utilized triclopyr ester products (ie Garlon 4) due to a high success rate reported over several years in trials by multiple groups. A recently published study by USDA FS and WI DNR (attached) in a refereed journal demonstrated an 88% success rate after four years with small infection pockets."

Dr. Roberts' Response: Wright, possibly in his zeal for optimistic results regarding Garlon 4, wrongly cited data in the referenced refereed journal article where Garlon 4 achieved 81% success rate, not 88% success as Wright claimed, with small pockets (four trees or less) of Oak Wilt (Table #1). In his correspondence, Wright fails to mention the serious failures in Oak Wilt management when pockets of five or more trees are involved and where the success rate drops to 29% (Table 1). Is Wright inferring to Lee that the Garlon 4/Double Girdle method might be advisable for residential areas with small pockets of Oak Wilt? Another serious omission by Wright in his email to Lee was that in the Bronson et.al. study, an average of around 10 healthy trees were sacrificed for every oak tree infected by Oak Wilt (=40 healthy trees sacrificed for four infected trees). The sacrifice of so many healthy trees is why Lee almost gave up on controlling Oak Wilt in his residential community prior to discovering my *Landscape Sculptor* articles.

Note: The refereed journal publication reference that Wright cites is as follows:

"Evaluating effectiveness of girdle-herbicide containment of below-ground spread of oak wilt (*Bretziella fagacearum*)" Bronson et.al. *Forest Ecology and Management* 2023, Pages 1-8.

DNR Wright: "Triclopyr has been trialed in part because it has not been reported to move through connected root systems, damaging adjacent trees. This is a potential concern for some other herbicides."

Wisconsin Research Results using Garlon 4/Double Girdle with Bruhn Model* (April 2023)	
#Trees w Oak Wilt	% Oak Wilt Control
<4 Infected Trees	81%
≥ 5 Infected Trees	29%
Average	55%
*42 Independent Sites 2270 Treated Trees (248 Diseased, 2022 Healthy) Monitored 4 Years after Treatment	

Table 1: Oak Wilt control results from the refereed journal publication (Bronson et. al.) provided by DNR Associate Wright are summarized. Approximately 10 healthy trees were sacrificed for every diseased tree, ensuring that even with four or less trees and 81% success rate that the Garlon 4/Double Girdle procedure promoted by the DNR would not be acceptable for most residential situations. In my opinion, this Refereed publication is not a stellar example of research that the Michigan DNR should be citing.

Dr. Roberts' Response: This statement by Wright is nonsensical. How can we stop Oak Wilt transmission through root grafts if we're concerned about herbicide translocation through roots and root grafts? Later in his email (below), Wright wrote, "root death is critical for efficacy in oak wilt management . . .", contradicting his concern about damaging adjacent trees from systemic herbicides in roots and root grafts. After using Glyphosate for the remediation of Oak Wilt for many years, I am not concerned about "damaging adjacent trees" (generally minimal) especially compared to the destruction wrought by the DNR's and its associates' when recommendation of the brutal Bruhn Model results in the destruction of multiple tiers of healthy oaks surrounding an Oak Wilt epicenter.

DNR Wright: "Your linked article describes a triclopyr treatment involving a girdle only 1/2 way around the circumference of the tree. Other treatment details such as treatment rate are unclear. Successful trials have typically utilized two complete girdles around the circumference of the tree and through the outer rings of sapwood under the bark."

Dr. Roberts' Response: Wright is referencing my *Landscape Sculptor* article submitted by Lee to Wright. Either Wright doesn't understand research, or he is attempting to divert Lee's attention away from my "extraordinary" field research. As my research and publications convey, I purposely administer "half girdles" to trees to determine the impact of herbicides on tree health. Trees that are half-girdled do not die but leaf-out the following year without any signs of distress. A very simple and easy to understand concept is that applying herbicides to half-girdled trees should disclose the impact of the applied herbicide on the health of trees without killing trees by complete girdling alone. My replicated research has definitively shown that Glyphosate kills trees when applied to half girdles while Garlon 4 exhibited no verifiable adverse impacts on healthy oak trees (Photos 2A & 2B). Even the foliage on Garlon 4 treated trees was not distorted from this growth-regulator herbicide. Regarding "treatment rate", even a low label rate of 1 teaspoon per 12" dbh of Glyphosate killed oak trees whereas dozens of teaspoons of Garlon 4 (drenches of Garlon 4 to girdling cuts, Photo 2A Inset) had no impact upon the health of oak trees.

DNR Wright: "There is very little published research in refereed journals on the use of glyphosate in managing oak wilt and I'm not aware of any published data on efficacy at legal label rates (root death is critical for efficacy in oak wilt management and not as easy to assess, the above ground portion of the tree will often die well before root death occurs, potentially years later). In general data on oak root death is lacking for both glyphosate and triclopyr ester."

Dr. Roberts' Response: While I'll discuss Wright's misunderstanding of science and refereed publications below, he apparently doesn't understand that Garlon 4 has no verifiable impact on oak trees as it is applied in the double girdle method. Glyphosate is "well known" to kill roots of plants, as marketed by various manufacturers. Furthermore, it is not necessary to determine "root death" if we can establish that a herbicide is effective in stopping



Photo 2A

Photo 2A: In my research, Garlon 4 drenches to half girdles (Inset) on oak trees did not impact the health of oak trees and explains why several arborists and I witnessed failures in DNR treatments on public land. As a growth regulator herbicide, Garlon 4 drenches to girdle cuts did not even cause the foliage to become cupped or distorted.



Photo 2B

Photo 2B: For comparison with Garlon 4, I treated half-girdled oak trees with Glyposate. The treated oak trees were dead when I collected the data from this replicated trial the following year. In subsequent trials, I demonstrated that even the low rate of one teaspoon of Glyposate (Inset) per 12" dbh was sufficient to kill oak trees, thus easily proving the superiority of Glyposate over Garlon 4.

root graft transmission of Oak Wilt between trees. Determining "root death" is rather "academic" in the face of successful control of Oak Wilt via girdling/herbicide procedures as my Glyposate research has shown.

DNR Wright: "We are looking into additional trials with glyphosate and other herbicides. There may be products that work better than triclopyr. We hope to have highly effective herbicide treatment methods for oak wilt management in the future".

Dr. Roberts' Response: I suspect Wright's statement, "There may be products that work better than triclopyr" is an admission that he knows Triclopyr is not the best herbicide for Oak Wilt management but is afraid to concede that Glyposate is far better. A Wisconsin group other than the one Wright has referenced with the "refereed publication" (Bronson et.al.) warned in a "refereed publication" from 2010 that Triclopyr, Imazapyr, and 2, 4-D will

not control Oak Wilt, and, in fact, recommended not using these herbicides because they will not kill roots quickly enough to stop the transfer of the Oak Wilt fungus in roots and root grafts between oak trees (Figure 1).

DISCUSSION AND CONCLUSIONS

In my opinion, the DNR's approach to Oak Wilt and science appears to involve some level of misunderstanding, which may result in confusion or miscommunication. This could include the dissemination of inaccurate information and actions that seem to diverge from the best interests of Michigan Arboriculture and the public good. Mr. Wright began his email to Lee by writing, "The DNR Forest Health Program is primarily focused on managing oak wilt in natural forest settings, where perspectives and goals are different from urban and managed landscape settings". While that may be a fair statement on its face, the DNR and its collaborators have not necessarily followed that mantra. Wright advanced data to Lee from a refereed journal (Bronson et. al.) to seemingly promote the Garlon 4/Double Girdle method because it exhibited 88% (actually 81%) success rate in controlling Oak Wilt in small pockets. Wright did not disclose in his communication that on average 10 healthy trees were destroyed in the study for every Oak Wilt-diseased tree; "mass murder" of healthy oak trees is an entirely unacceptable recommendation for Lee's HOA and other residential areas in Michigan. Again, Wright could not offer Lee any reasonable Oak Wilt remediation procedures for residential situations other than the DNR/Bruhn Model even though Wright teaches arborists in the OWQ program. This is a clear indication of OWQ deficiencies.

The DNR began using the Garlon 4/Double Girdle technique in 2015 (or earlier) without any vetting or refereed science, subsequently offering it as a viable alternative to the equally costly and destructive DNR/Bruhn RGD Model. Because of the DNR's insistence on refereed science, it seems that they relied on the first available refereed publication regarding Triclopyr, which was not until April 2023. In my critique of the Refereed Publication (Bronson et. al.) that Wright and his DNR compatriots cite, it important to understand that refereed articles are sometimes flawed. For example, the results of the research as summarized in Table 1 are not anything to write home about. In fact, the results of the Bronson et. al. research do not justify the use of this procedure in any circumstance: it's almost inconceivable that 81% successful control of Oak Wilt with four or less trees falls to 29% with five or more trees; the difference between four and five infected trees takes some creative statistical analysis and does not make much practical sense. In addition to the sacrifice of so many healthy trees in this study, especially with five or more infected trees to achieve only 29% control of Oak Wilt, a serious flaw in this study was that the research was only allowed to run for four years. We know that the Oak Wilt fungus can survive in roots for at least four to five years. If the study had been allowed to proceed for another year or two, the results of the study could only get worse, not better. Another serious flaw is that there were no "untreated controls" which are usually required for most peer-reviewed (refereed) research. By that I mean there were no comparisons between girdle plus Garlon 4 treatments and girdle only treatments. Based on my innovative research with half girdles of oak trees and treatment with Garlon 4 (no impact on tree health), I strongly suspect there would be no significant differences between the two treatments. And finally, at least for my comments in the present publication,

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the conclusions reached by the Wisconsin researchers are not borne out by the data (Table 1):

"This study shows that the girdle and herbicide (GH) methodology is an efficient way to contain oak wilt." -Bronson et. al. 2023

Wright and the DNR's promotion of this refereed publication is not supportive of our goal of eliminating Oak Wilt from residential areas without significant costs and destruction of urban forests.

It is important for us to consider whether the Department of Natural Resources

(DNR) may be overstepping its legislative authority by pressuring individuals and organizations in ways that include withholding grant funds or other forms of retaliation for not complying with DNR mandates. Simply put, this approach may undermine the principles of open scientific inquiry and the free exchange of ideas. The rejection of my research, based on the DNR's insistence on specific forms of peer-reviewed science, raises serious questions about the legitimacy and fairness of these practices. Most scientists deliver yearly updates at professional society events long before they would ever publish

their findings in a refereed journal. Even graduate students present their research at conferences even though they may never formally publish their works. Whenever I deliver a lecture or write a publication, I am subjecting my research to peer review from arborists, scientists, and government associates who can accept, reject or challenge my endeavors. Rather than dismissing or suppressing my research, the DNR and their associates should consider engaging with it and attempting to disprove it! I'd be curious to see their approach. My Tier Tree Model, designed in 1984, is highly successful at eradicating Oak Wilt by various procedures without many if any sacrifice of healthy trees. And I believe my development of the Glyphosate/Stump Cup technique, often without sacrifice of any healthy oaks, is a major scientific breakthrough, especially for residential areas where utilities and landscapes are problematic and where tree preservation is of primary concern. My methods would work equally well in forest situations, and, perhaps, in addition to the inefficacy of their Garlon 4 treatments, this is one of the factors that may raise concerns for the DNR. One of my main messages in this article is that many entities and people, including arborists and others in the plant industry, are not exposed to all the options they should be allowed to experience . . . including arborists who have completed the OWQ program. It seems that there may be concerns about whether some OWQ arborists are fully equipped with the most accurate information, especially given the limited access to critical research and resources that the DNR/OWQ has yet to make available. This research could play a key role in helping the public better manage Oak Wilt outbreaks on their properties and within their communities, as Lee is working to do. It's encouraging, however, to see that organizations like the Michigan Green Industry Association are open to participation from all perspectives. 🌱

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Lake States Woodlands

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Trees at risk

Thousands of oaks in woodland and urban settings die from oak wilt every year. Widespread in Wisconsin, Minnesota and Michigan, the disease is caused by the fungus *Ceratocystis fagacearum*. Figure 1 shows the extent of oak wilt in Michigan, Minnesota and Wisconsin.

Trees from the white and red oak groups, both found commonly in the Lake States, are susceptible to oak wilt. Because trees in the red oak group fall prey to the disease most often, this publication focuses on the red oak group.

Oak wilt management— what are the options?

Biology and spread of oak wilt

Mats of fungus, known as "pressure pads," develop under the bark of trees that have died from oak wilt. Mats form most often in spring, approximately 9-10 months after a tree dies from oak wilt. These mats force the bark to crack open. The fungus produces a sweet odor that attracts sap-feeding beetles such as Nitidulids. The beetles pick up fungal spores by crawling on the mats. Then they fly to healthy oaks to feed on sap flowing from fresh wounds, thus infecting new trees.

As fungus invades a tree's water conducting system, the leaves turn dull green, bronze or tan, and wilt from the top of the tree downward. Leaves fall rapidly after wilting. Infected trees are bare in 4-6 weeks.

Underground spread of oak wilt from infected to healthy trees occurs through root grafts. Most root grafts form between oaks of the same species; red oak roots graft more commonly than do white oak roots, and grafts between red and white oaks are very rare.



In April, May and June, fungal mats ("pressure pads") grow under the bark of trees that wilted the previous summer. Mats are sometimes present in late summer or fall.



Fungal mats force the bark to crack open. The mats' odor attracts sap-feeding beetles which spread the disease to healthy trees.

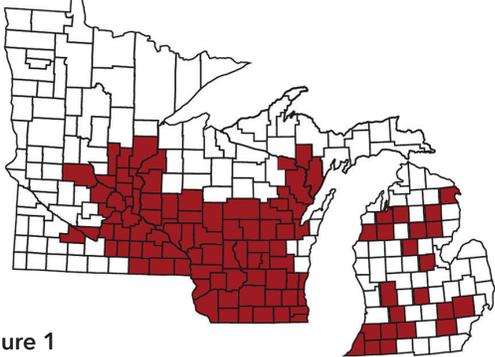


Figure 1. This map shows the distribution of oak wilt in Michigan, Minnesota and Wisconsin in 2000. Map produced by the USDA Forest Service, Northeastern Area-Forest Health Monitoring GIS Group.



The fungus invades the tree's water-carrying system, causing leaves to wilt and fall. Wilting occurs most often in July and August, and occasionally in spring or fall.

Figure 1

Figure 1: The Michigan DNR adopted the Garlon 4/Double Girdle procedure around 2015 without vetting and without refereed overview. However, other researchers in Wisconsin had warned in this featured refereed publication from 2010 that Triclopyr (Garlon 4), Imazapyr, and 2,4-D do not kill the roots of oak trees quickly enough to stop Oak Wilt. The authors recommended not using these herbicides for Oak Wilt management.