



# The Plant Doctor's LANDSCAPE TIPS

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

## OAK WILT MYTHS AND MISCONCEPTIONS PART 4: THE BIOLOGY OF PRESSURE PADS

### INTRODUCTION

Oak Wilt has become a serious threat to Michigan trees as well as a serious political issue (Photo 1). Government representatives, arborists, scientists, industry, professional societies, and commodity interests (Forestry, Power/Energy Companies, Lumber, etc.) cannot always agree on various aspects about Oak Wilt that are helpful for our understanding of this devastating disease. Nor is there any reason why we all should agree. Disagreement is nothing new among scientists, arborists, government agencies, and other interests except that the manner of disagreement has become far less than collegial . . . and hence, political in regards to Oak Wilt. It has become increasingly clear to me over the years, especially with Federal Funds having been allocated to states to educate and control invasive species, that the non-native (exotic, introduced) fungus that causes Oak Wilt might initiate conflict among people because of the age-old interests involving power, influence, and money.



Photo 1

Photo 1: The tree in this photo died from the lethal disease Oak Wilt. Property owners are often confused about the diverse range of information they receive from Oak Wilt "experts", which include government sources, scientists, arborists, etc. With such a large tree (>36 inches) affected by Oak Wilt, how do we contain the disease and prevent it from spreading through the community via root grafts without destroying many healthy trees in neighborhood landscapes and emptying people's lifetime savings?

In this continuing series on Oak Wilt Myths and Misconceptions, I wanted to delve into the subject of "The Biology of Pressure Pads". Pressure Pads are essentially the "mushrooms" of the Oak Wilt fungus (Photos 2 & 3). The Michigan Oak Wilt Coalition was formed in 2015 and included representation by the aforementioned stakeholders. The Michigan Department of Natural Resources (DNR) is one stakeholder which has/is receiving federal funds, and which is apparently attempting to

Continued on page 18



Photo 2

Photo 2: Pressure Pads of the Oak Wilt fungus often form beneath the bark of infected trees within a few months after infection. For example, if an oak tree becomes infected via Overland Spread in the spring, Pressure Pads may form the following fall and even into the subsequent spring, sometimes on the same tree. Pressure Pads usually appear as dark oval objects as seen in this photo after the bark has been removed. Upon my advice, the property owner of this tree removed the bark to hasten decomposition of the Pressure Pads. She also sprayed the stump with a 10% bleach solution to hopefully destroy the fungus so that it could not be spread through vector (insect) transmission.

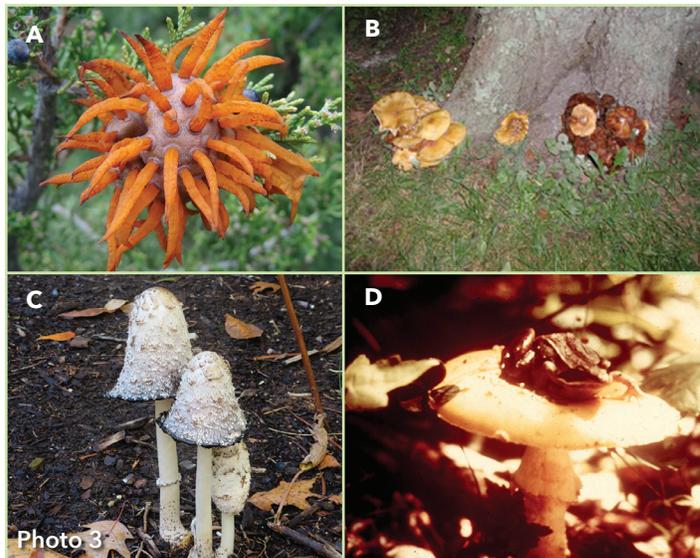


Photo 3

Photo 3: Pressure Pads of the Oak Wilt fungus are nothing more than reproductive structures (i.e. mushrooms) of various fungi we encounter naturally in forests and landscapes. Some examples of these reproductive structures include: a) Trellis Rust on juniper, b) Armillaria root rot on Oak, c) unidentified but interesting fungal "shrooms", and d) a "toadstool" .



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### OAK WILT MYTHS AND MISCONCEPTIONS PART 4: THE BIOLOGY OF PRESSURE PADS

Continued from page 17

wield considerable influence on all of us including the public. After the Oak Wilt Coalition was founded, the DNR submitted its "White Paper", which conveyed the DNR's policies on various matters involving Oak Wilt. In the White Paper, plus their public announcements over many years, the DNR claimed that it was safe to prune Oak Trees before April 15 and after July 15, meaning the Overland Spread of Oak Wilt cannot occur before April 15 and after July 15. Some of us did not believe this to be reasonable; so, we questioned it. I addressed the issue of Overland Spread in my article, "Oak Wilt Myths and Misconceptions Part 1: Risk of Overland Spread" published in *the Landsculptor*, June 2022, Pages 15-17. In that publication, I think I adequately resolved the issue of Overland Spread before April 15 and after July 15.

Of particular interest in their discussion on its White Paper, the DNR claimed that Oak Wilt Pressure Pads have not been observed before the end of April in any given year. If true, this would provide ample evidence that Overland Spread could not occur prior to April 15. Many of us who have worked on Oak Wilt for years found this claim to be inconsistent with what we have observed. My goal with this article is to share some of my research and experiences that will hopefully elucidate some facts about Pressure Pad development and their impact on Overland Spread at various times of the year.

#### THE BIOLOGY OF PRESSURE PADS

To digress and review a bit, the Oak Wilt fungus accomplishes dissemination by two major methods: 1) Overland and 2) Underground. Underground transmission of the deadly fungus occurs between diseased and healthy trees that are close

enough in proximity to be root-grafted. Root grafts between trees implies trees can share water, nutrients, photosynthetic products . . . and, yes, diseases. Because Oak Wilt fungus propagules (spores, hyphae, etc.) are systemic within a diseased tree, these propagules can be readily transmitted through root grafts from diseased trees to nearby healthy trees.

For Overland Spread to occur, an insect, typically sap beetles, must pick up propagules (spores) of the fungus from a Pressure Pad (Photo 4) and transmit them to a fresh wound on an oak tree. As previously related, a Pressure Pad (aka Fungal Mat) is the structure the Oak Wilt fungus forms as a way of propagating new generations of itself, much like all living things on Planet Earth, engage in various forms of reproduction to maintain survival of the species and promote future generations. The fungal propagules



**Photo 4:** When Pressure Pads form, they initially produce abundant gray spores and hyphae/mycelium (fungal body). Sap beetles, other critters, and microorganisms "consume" the Oak Wilt fungus as a food source. In this photo, a small black sap beetle is seen in the upper middle right of the Pressure Pad; this beetle can easily be covered in Oak Wilt spores when it may fly to a fresh wound on a healthy oak tree to sip another favored food (sap), thus spreading the spores to a fresh wound.  
(Photo Credit: Matt Bainbridge)

Photo 4

(spores, hyphae) are picked up and transported haphazardly from the Pressure Pad on a diseased Oak tree to a wounded healthy tree as much as several miles away, a long distance spread of the Oak Wilt fungus compared to spread of the disease agent through roots in relatively close proximity.

Perhaps the primary questions we need to consider given the subject of this article are: 1) When are Pressure Pads produced, and 2) When/how long are Pressure Pads capable of harboring viable, infectious spores that can be transmitted via Overland Spread to infect a healthy oak tree? These questions are relatively easy to answer. In fact, a former DNR employee went against the dogma and proclaimed that he had confirmed the existence of Pressure Pads year-round. With nearly 40 years' experience in Oak Wilt research, I concur with the former DNR employee. Several examples of the stages of Pressure Pad development/occurrence in nature are summarized in Photos 5A-5D. While these photos only present four stages of Pressure Pad development and occurrence, there is likely a continuum of the various stages.

*Continued on page 20*



Photo 5A



Photo 5B



Photo 5C



Photo 5D

**Photos 5A, 5B, 5C & 5D:** Various stages of the Oak Wilt Pressure Pad development and occurrence are exhibited in these photos. In searching for a Pressure Pad on a dying oak tree, I encountered a smattering of barely visible gray spores (5A, arrow), which undoubtedly signifies the precursor of a Pressure Pad in November; the precursor is likely to continue development into the winter and following spring as a Pressure Pad. Photo 5B is an example of a typical Pressure Pad found in November and appeared similarly in January; nothing is better for the survival and viability of fungal structures than the cold temperatures of winter. Photo 5C is an older Pressure Pad with diminishing numbers of gray spores and mycelium; this Pressure Pad may or may not be viable and infectious. Photo 5D represents "imprints" or "remnants" of Pressure Pads that killed this oak tree several years previously; such remnants can no longer serve as a source of Oak Wilt for Overland Spread. Whether Pressure Pads are infectious or not, they certainly may serve to help confirm Oak Wilt.



## The Plant Doctor's LANDSCAPE TIPS

### OAK WILT MYTHS AND MISCONCEPTIONS PART 4: THE BIOLOGY OF PRESSURE PADS

Continued from page 19

#### CONCLUSIONS

Many arborists and scientists have confirmed that Pressure Pads may form on trees in the fall following an Overland Spread incident the previous spring. Many arborists and scientists have confirmed that Pressure Pads are present during the winter and early spring. Cold temperatures of winter preserve Pressure Pads; warm temperatures hasten the decomposition and viability of Pressure Pads by promoting arthropod and microbial degradation of the fungal structure. The survival of viable infectious Oak Wilt propagules becomes problematic when various microbes and insects/arthropods use Pressure Pads as a food source during the warming periods of spring and summer (Photo 6). Freshly formed Pressure Pads exhibit a gray, fuzzy appearance, which indicates the abundance of viable spores and hyphae (fungal body) of the Oak Wilt pathogen. As Pressure Pads age, they become darker in coloration, indicating fewer viable propagules.

In my opinion, as discussed in this article, I think the notion that Pressure Pads have not been seen before the end of April has been debunked. I think it is also important to convey that it should not be a requirement that we must agree on every



**Photo 6:** These Pressure Pads are unusually large and were uncovered by the author in May. Based on their appearance, they likely formed well before April, perhaps even initiated during the previous fall. While cold weather preserves Pressure Pads, warmer weather stimulates rather rapid decomposition. Note tiny larvae consuming the Oak Wilt fungus in the Inset photo. These larvae could originate from many insect species but may very well be larvae of the sap beetle.

aspect of Oak Wilt as some folks would have us do. But it is vital that we relate the various hypotheses to all stakeholders and the public so that they may make as informed decisions as possible. 🌿

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