

OAK WILT

(Ceratocystis fagacearum)

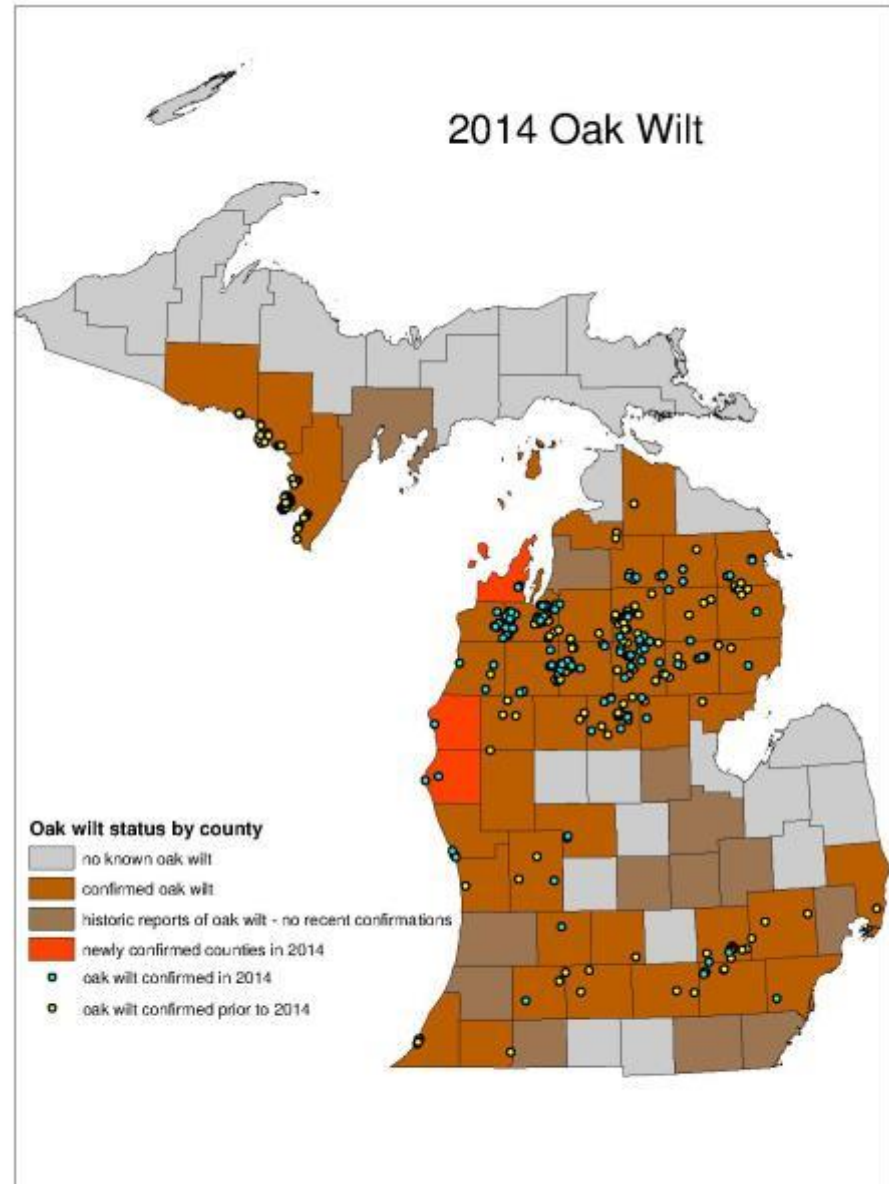


**Michigan Society of American Foresters
Fall Conference
September 25, 2015**

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OAK WILT

Number of new
infections centers
is **increasing**
rapidly!





Michigan Oak Resource

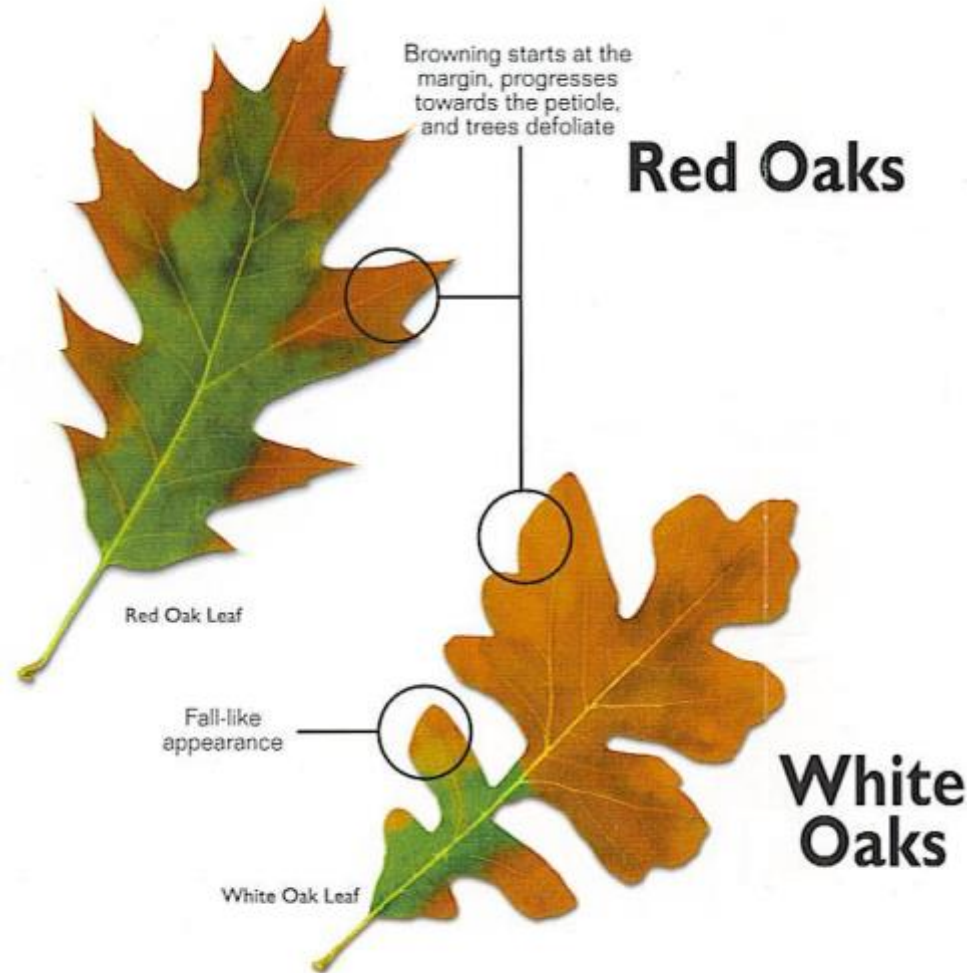


- **149 million Red Oaks**
>5 inches in diameter
 - **68 million >11” Diameter**
 - **11.9 Billion bf on 3.9 Million acres**
 - **USFS Forest Inventory and Analysis**
 - **Does NOT include urban/suburban trees**

Oak Wilt

- **DEADLY**—Red Oak Family
 - Northern Red
 - Pin & Northern Pin
 - Black
 - Scarlet
- **Slow Kill**—White Oak Family
 - White
 - Swamp White
 - Bur
 - Chinkapin
 - English

- Pointed v. Rounded Lobes



OAK WILT: 2 Modes of spread



- OVERLAND Transmission

- Insect Vectors

- ✦ 6 Nitidulidae Beetle species

- ✦ 2 Primary species: *Carpophylus sayi* (spring) and *Colopterus truncatus* (sp & fall mats)

- Oak Bark Beetle; Less so

- Diseased trees to healthy trees



Illustration: Robert O'Brien
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Spore Mats and Sap Beetle

Overland
Transmission

Attracted to
Scent(s)

Fresh Wounds
Arrive in
minutes!

Primary
means
establishing of
new infection
centers



Beetles Attracted to Wounds: Land clearing



Beetles Attracted to Wounds: Utility Clearing



Beetles Attracted to Wounds: Pruning, Climbing Spurs



Beetles Attracted to Wounds: Maintenance Activities



Beetles Attracted to Wounds: Storm Damage



Wounding?



OAK WILT Spread



- **UNDERGROUND Transmission – Root Grafts**
 - Up to 80% of new infections*
 - **Can** occur between Red and White oak families
 - **Soil type influence**
 - ✦ Sandy = More grafts, deeper, and greater distance between trees
 - Stumps can be infected



*Prevention is KEY

Oak Wilt Infection Center



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Bugwood.org, 4215059

PREVENTION is Paramount



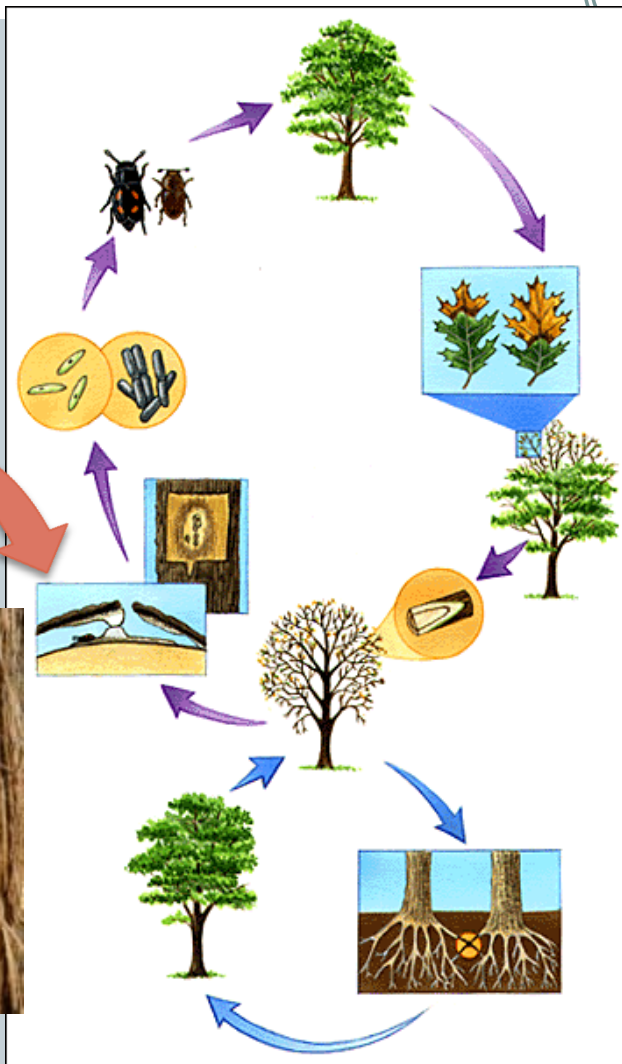
- Do NOT prune or injure Oaks during growing season
 - APRIL (bud break) – JULY 15: **HIGH RISK**
 - ✦ Disease reproducing (pressure pads/spore mats)
 - ✦ Several beetles active
 - ✦ Earlywood developing in tree

PREVENTION is Paramount



- Do NOT prune or injure Oaks during growing season
 - **JULY 15 – OCTOBER: LOWER RISK**
 - ✦ Latewood has smaller xylem vessels
 - ✦ Unusual for spore mats to be present, **but possible**
 - ✦ Some beetle species still active
 - **DECEMBER - FEBRUARY: NO RISK**
 - ✦ Time for oak-related work
 - **Calendar dates are problematic!**

OAK WILT CYCLE



- Spring = Spore mats + Beetle
- New infection
- Oak wilts-
 - Leaves *drop*
 - Xylem may be streaked
- Oak is DEAD
- Pathogen through root grafts
- Spore mats produced following Spring*
- Beetles vector + Root graft transmission occurs



Spore mats form on fire wood, too!



Oak Wilt

Subtle off-green color shift, wilt.

Leaves DROP
in summer.

Often begins in
upper canopy
and moves
downward.





New Infection July 30, 2015

Brighton, MI



Oak Wilt Foliage on ground July 30, 2015



New Infection July 30, 2015 – Brighton, MI



New Infection – 6 Weeks Later



July 30, 2015



September 16, 2015



September 2015

Canopy of oak
infected by oak wilt
fungus July 2015



Managing Oak Wilt must be Multi-faceted



- Early Detection & Confirmation
- Lab samples
 - Symptomatic, green tissue, 1/2-1" x 6-8" long
 - Plastic bag
 - Keep cool until delivered
 - ✦ Ship with Ice packs
 - MSU Diagnostic Lab
 - To report a suspected oak wilt site, email DNR-FRD-Forest-Health@michigan.gov
 - [Or call 517-284-5895](tel:517-284-5895)



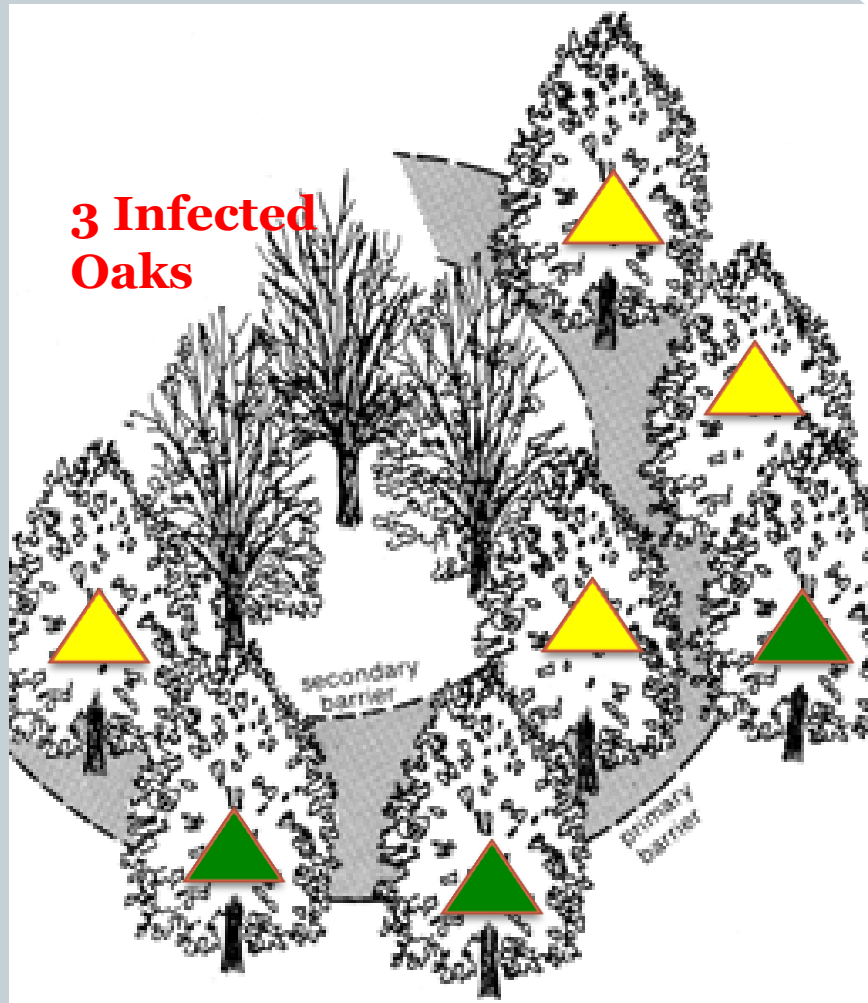
Managing Oak Wilt must be Multi-faceted




- Root Graft Disruption - Isolate infected tree(s)
 - Trenching 5' deep
 - Placing trench line(s) critical to success
 - Primary and Secondary Barrier Lines
 - ✦ **Bruhn Model:** J. Bruhn, published with R. Heyd in *Northern Journal of Applied Forestry* 1992
 - ✦ Using combined diameters,
 - ✦ Distance between trees, and
 - ✦ Soil type = 95% confidence regarding infection
 - ✦ Appropriate for large tracts of land



Root Graft Disruption Lines: Where's the pathogen?



- Disrupt root grafts between infected & healthy
- Primary line is furthest out – most effective
- Secondary line helpful, but trees may be infected but *non-symptomatic* 
- Management of trees inside primary line varies
 - Remove
 - Propiconazole injections
- Trenching difficult at residential sites

Root Graft Disruption - Trenching



Vibratory plow gets 5' deep.



MDNR is also stump pulling with excavator.

Pneumatic air tools are being used in urban settings to avoid infrastructure issues.

Managing Oak Wilt must be Multi-faceted



- Remove infected tree(s) **AFTER** trenching
- Properly handle wood
 - Saw into boards; Debark & dry thoroughly
 - Chip for boiler fuel
 - Tarp tightly
- Trees left behind – Protect high value trees
 - Macro-infusion of propiconazole.
 - Repeat in 2 years, for 3 applications
 - Fungistat activity only
 - Monitor site



What if.....How to prevent Oak wilt?



- **Storm damage**
 - Make clean cut; Remove limb
 - Seal wound Immediately
 - Beetles attracted, arrive in minutes!
- **Protect High Value Trees; Maintain Canopy Cover**
 - Macro-injection of propiconazole
 - *Preventative* for Red oaks only- No symptoms
 - Preventative & Therapeutic for White oaks

Review of Oak Wilt Management Tips



- Avoid pruning or wounding
 - Know the Risk Periods
- Confirm the pathogen ID
- Work with experienced arborist to determine treatment options
 - Root graft disruption and location of barrier lines
 - Fungicide treatments (provide only 2 yr protection, repeat)





**Preventing
Oak wilt is the
best strategy!**



- Symptomatic trees require special disposal
- Manage infected wood – 1 year
 - Stack and Tarp to ground
 - Chip, Burn, De-bark at time of removal
 - Saw Mill
- Do NOT move firewood
- Monitor site for at least 3 years; Re-treatment may be necessary

References



- “How To Identify, Prevent and Control Oak Wilt,” USDA NA-FR-01-11
- “Oak Wilt Management – What are the options?” J.C. Carlson & A.J. Martin, Lake State Woodlands Series, U of WI Extension
- “Oak Wilt in MI’s Forest Resource,” author Bill Cook, MSU E-3169
- “2014 Forest Health Highlights”, MDNR annual publication

- **‘Oak Wilt Consortium’** - under development
 - ✦ Arboriculture of Michigan (ASM)
 - ✦ Multiple Tree-related industries, government agencies, universities, organizations
 - ✦ Website to serve as a One-Stop-Shop for MI Oak Wilt info
 - ✦ Consensus on message, resources, management



What
questions do
you have?

THANK YOU

Julie Stachecki
Site Specific,
Inc.





Oak Wilt

Infection centers start with a single tree.





Oak Wilt

Residential site in Livingston county.

Multiple years of symptoms.

No treatments.

Wood kept on-site.

Evidence of spore mats
- pressure pads.





Oak Wilt

Trees continue to die.

Photo from summer 2014. Tree produced pressure pads same year in the fall.

Trees in neighboring yards are now dieing.



Oaks and Issues



- **Oak Decline**
 - Environmental issues
 - Multiple stresses over time;
May survive
- **Two-lined Chestnut Borer**
 - Often secondary; D-exit
 - Upper, outer edge of canopy
 - Leaves retained



Oaks and Issues



- Anthracnose – typically white oaks
 - Wet springs
 - Foliage- random injury pattern



- Bacterial Leaf Scorch
 - Late season symptoms

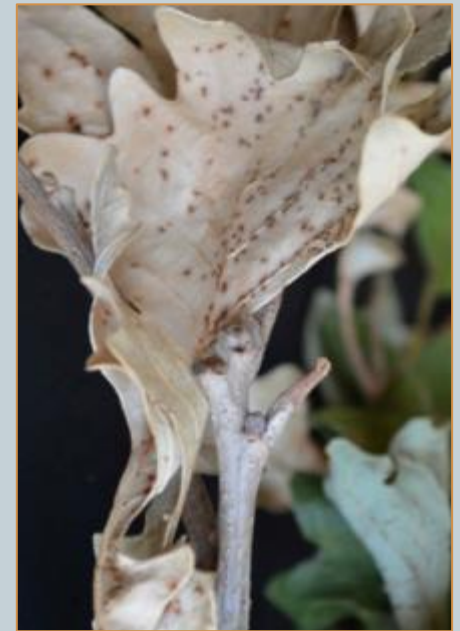


Oak Issues



- **BOB - Bur Oak Blight**

- Necrosis starts on veins becomes wedge-shape
- Some leaves hang on through winter
- Petioles - prior year



Oak (and other tree) Issues



- Herbicide injury - Contact or systemic exposure