

# Oak Wilt

Identification and Management

by

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# Discussion of Oak Wilt in Texas

- History
- Identification
- Biology
- Management





# What is Oak Wilt?

- Oak Wilt is a disease caused by a fungus: ***Ceratocystis fagacearum***
- This fungus causes a clogging of the water conducting vessels of infected oak trees, causing the trees to wilt and die...



# The Impact of Oak Wilt

- “Oak wilt is one of the most destructive tree diseases” (Young, 1949).
- “...this disease has the potential of becoming one of the worst diseases to attack the forests of the state.” (True and Gillespie, 1961).
- “Oak wilt is now one of the most serious forest diseases in the country” (Johns and Phelps, 1992).
- “*Ceratocystis fagacearum*, the cause of oak wilt, is a fungus with the potential to be one of the most destructive of all tree pathogens.” (Gibbs and French, 1980).

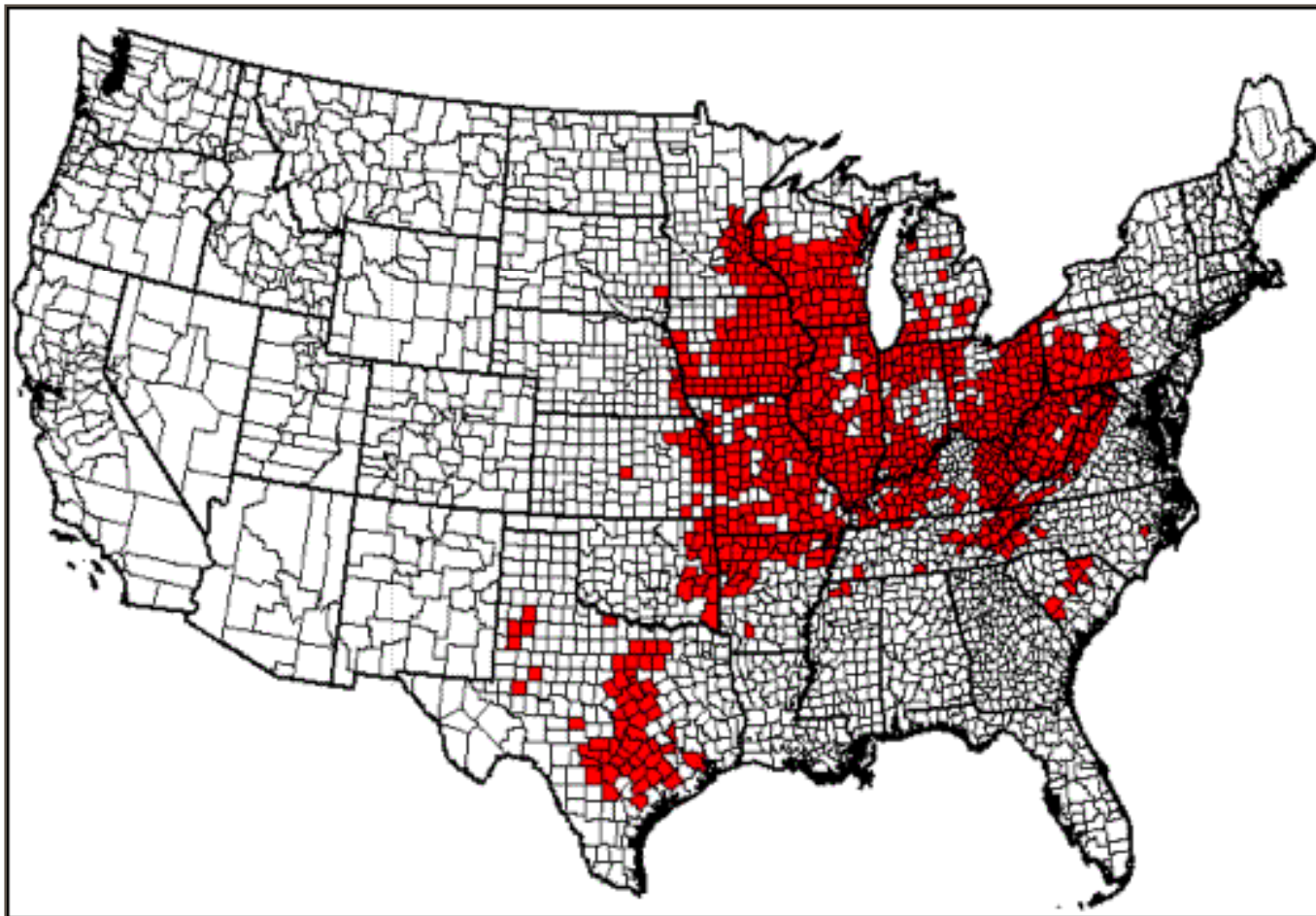


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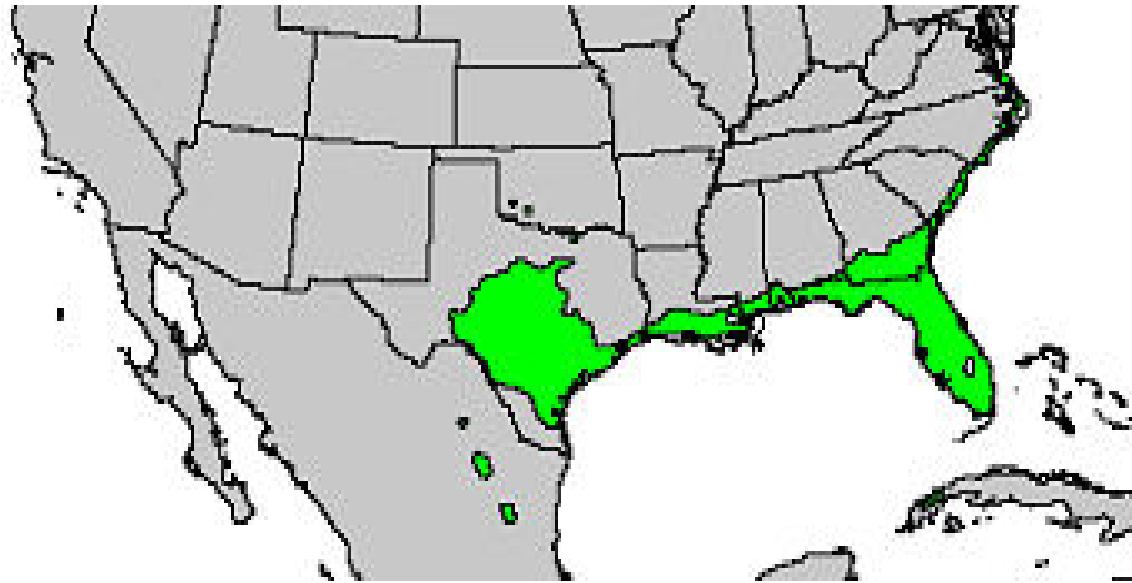


# Range of Oak Wilt in U.S.





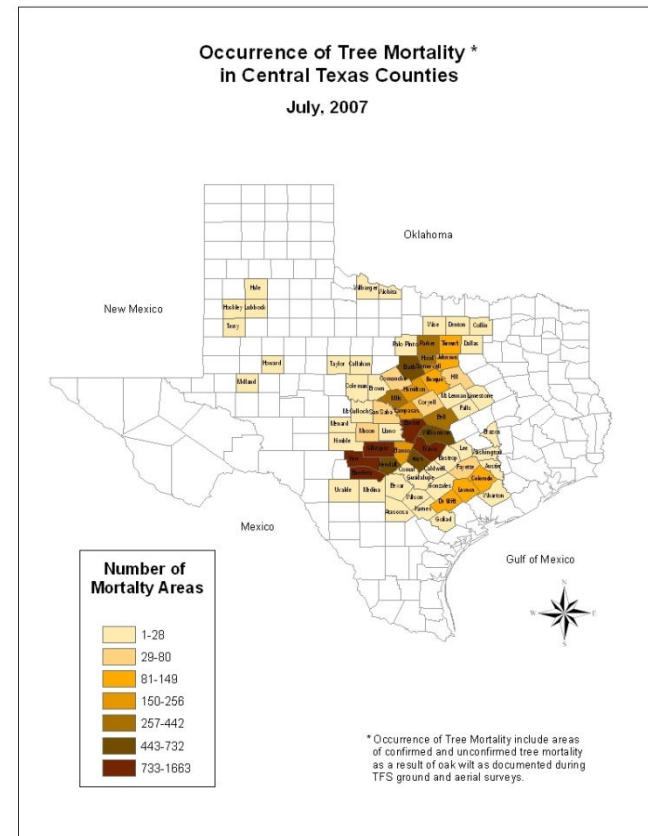
# Distribution of Live Oak





# Range of Oak Wilt in Texas

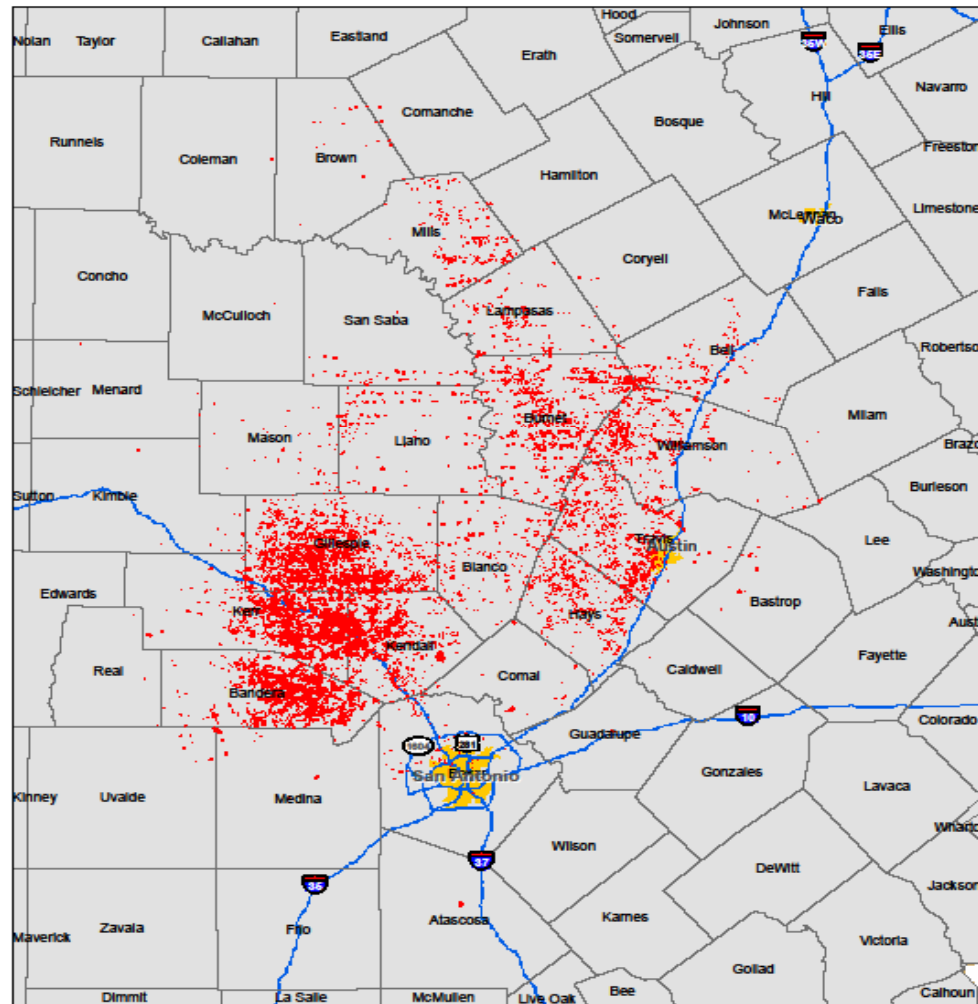
- Oak Wilt was officially identified in Dallas in 1961.
- Since that date, the fungus has been identified in over 72 counties of Central and West Texas.





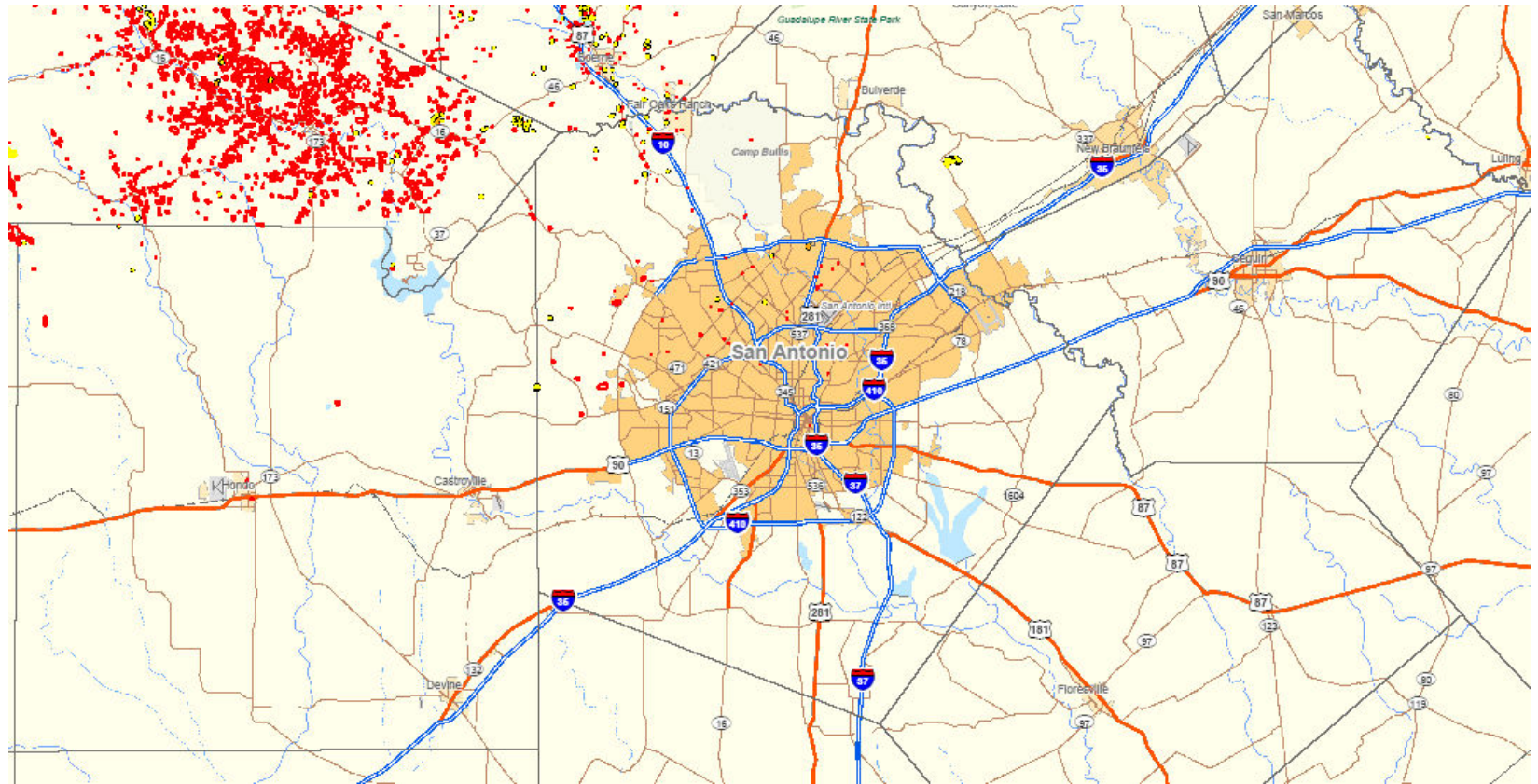


## Mortality Centers





# Bexar County



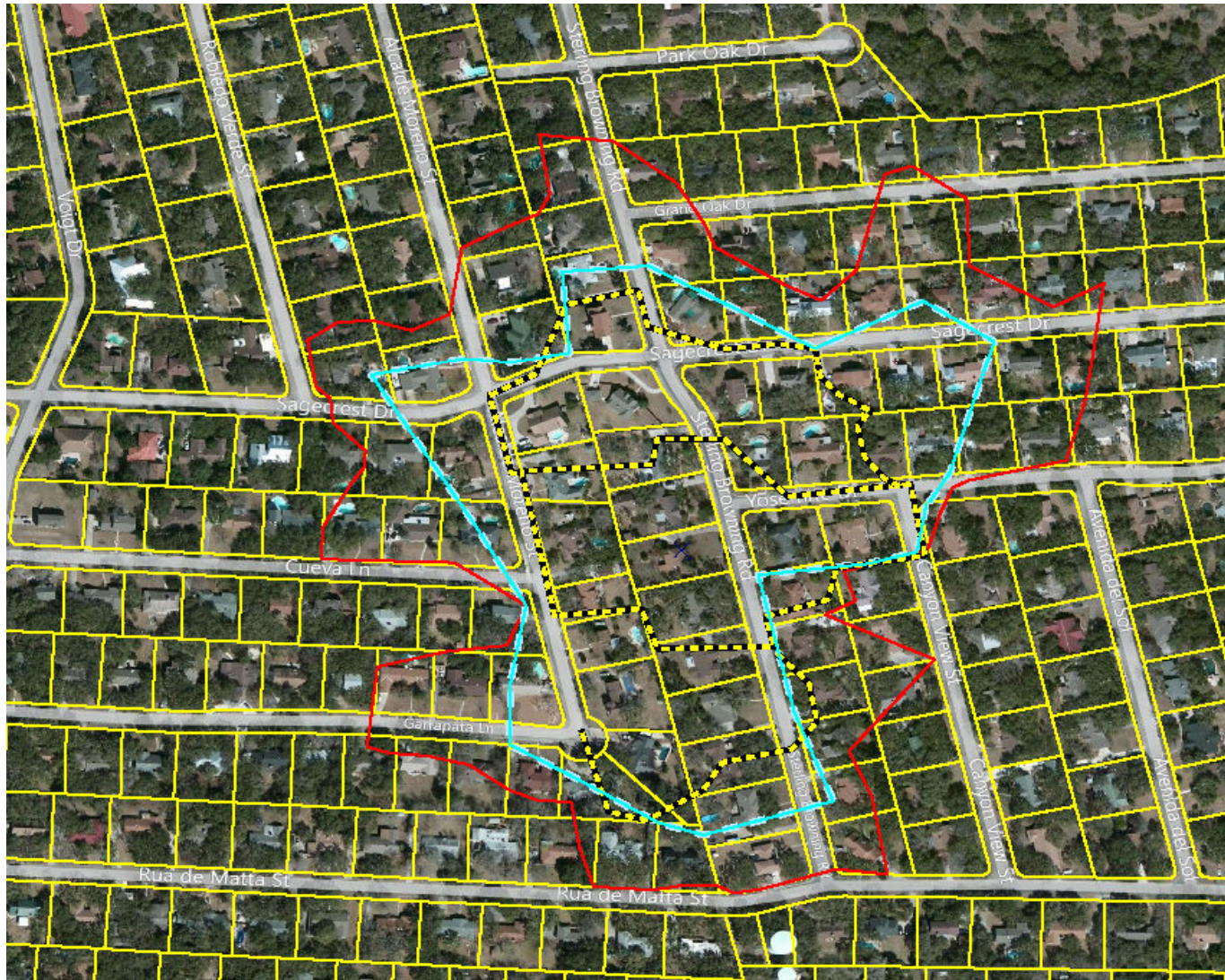


# Oak Wilt in Hollywood Park 2010





# Oak Wilt Hollywood Park - 2012





# Oak Wilt Symptoms

- Infected trees can display some distinctive symptoms that can indicate oak wilt.
  - Large areas of dead and dying oak trees. This is called a “pattern of mortality”.
  - Live Oaks: Can develop a characteristic leaf pattern called Veinal Necrosis.
  - Red Oaks: Display portions of dead and dying branches that quickly engulf the entire tree. Known as “flagging” or “flaring”. Produce fungal mats under the bark.



# Pattern of Mortality

Live Oak Center



Red Oak Center





# Foliar Symptoms

## Live Oak Symptoms



## Red Oak Symptoms





# Veinal Necrosis







# Veinal necrosis





# Marginal necrosis





# Pattern in Individual Trees

Diseased Live Oak



Diseased Red Oak





# Flagging Red Oaks





# What Oaks are Susceptible?

- Live Oaks and oak trees in the RED OAK group are most susceptible to oak wilt.
  - Live Oak
  - Spanish Oak
  - Blackjack Oak
  - Shumard Oak
  - Water Oak
  - Texas Red Oak



# The Red Oaks



**Blackjack**



**Spanish**



**Shumard**





# What Oaks are Less Susceptible?

- Oak Trees in the WHITE OAK group are least susceptible to oak wilt.
  - Bur Oak
  - Post Oak
  - Chinquapin Oak
  - Monterrey Oak
  - Lacey Oak





**Post Oak**

**Susceptible Live Oak**



**AUG 13 2003**





# Oak Wilt Disease Transmission

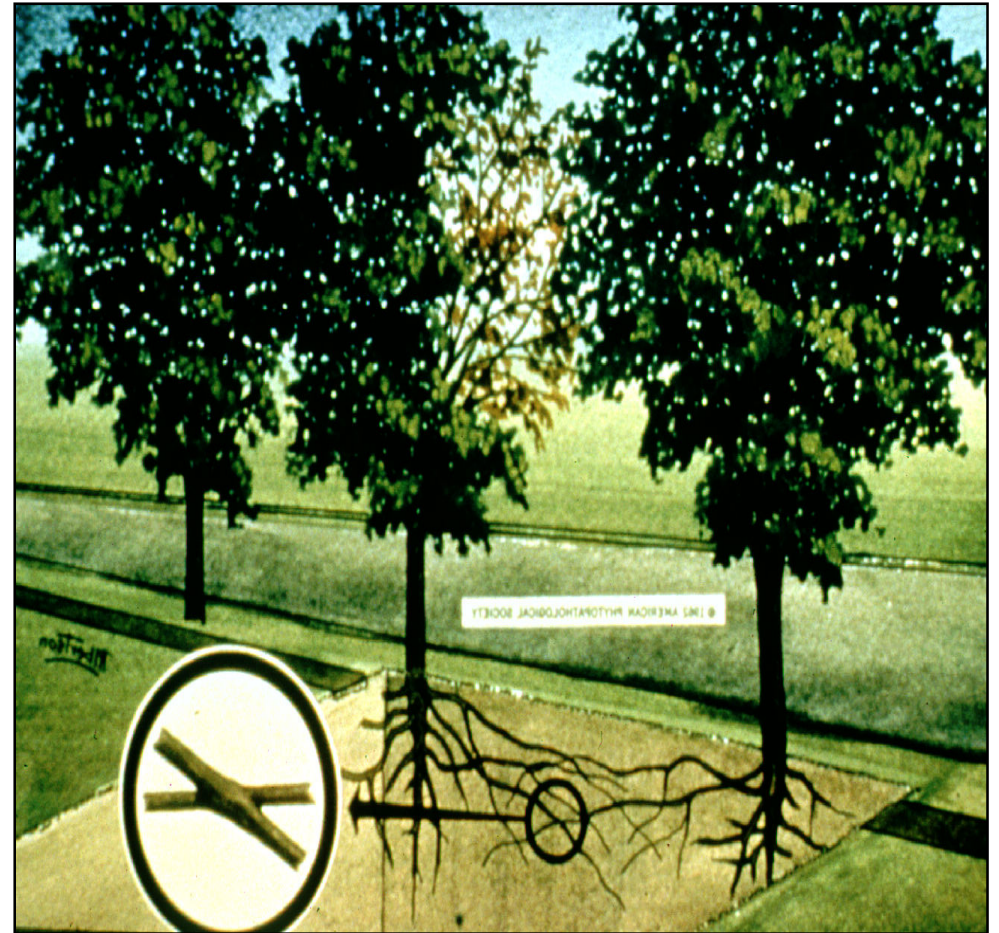
- The oak wilt fungus can be spread in two primary ways:
  - Above Ground (Long Distance Spread): Certain insects can carry fungal spores from infected red oaks to fresh wounds on healthy oaks, thus forming a new Oak Wilt center.
  - Underground (Local Spread): Through grafted or joined root systems (responsible for the vast majority of tree deaths).



# Disease Transmission



**5% Insect Vectors**



**95% Root Grafts**



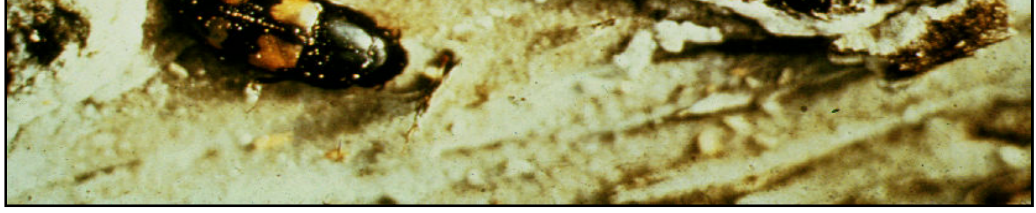
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# Insect Vectors and Fungal Mats

- When a red oak dies and does not quickly dry out, fungal mats can form between the bark and the sapwood.
- Fungal mats crack the bark open and attract insects with their fruity odor.
- Beetles feed on the fungal mats and can then transmit the disease via fresh wounds on healthy oaks.





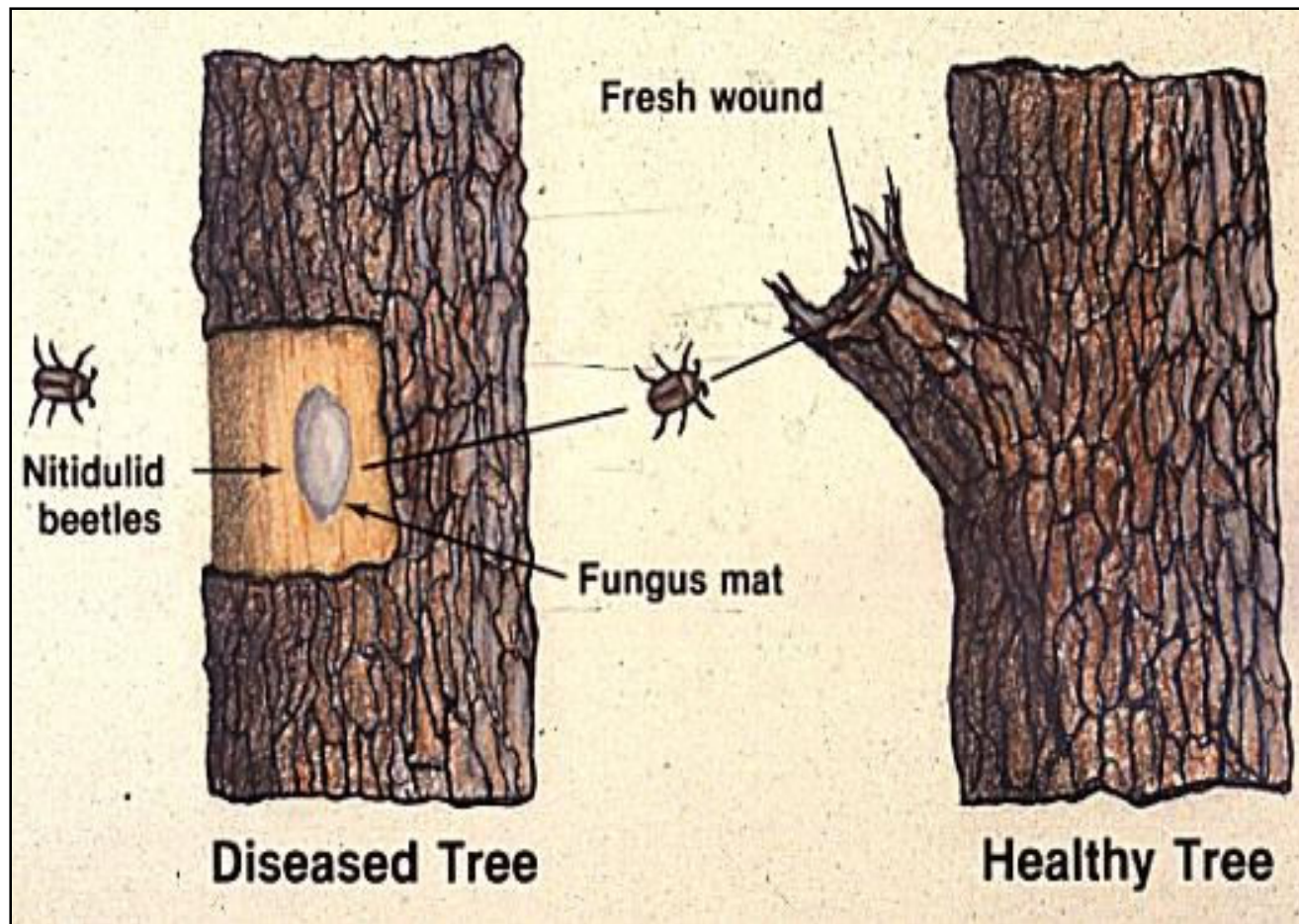
# Red Oak Fungal Mats

- Fungal “spores” or “mats” can form on infected red oaks.
- Their growth and expansion under surface of the bark can be identified by splitting or cracking.





# Insect Spread of Oak Wilt





# Root Grafting

- Root Grafting can also take place on individual (planted) trees.
- Roots must grow, touch, and graft.
- Inter-species grafting is common.





# Grafted roots from adjoining live oaks







# Small roots at 7 feet deep



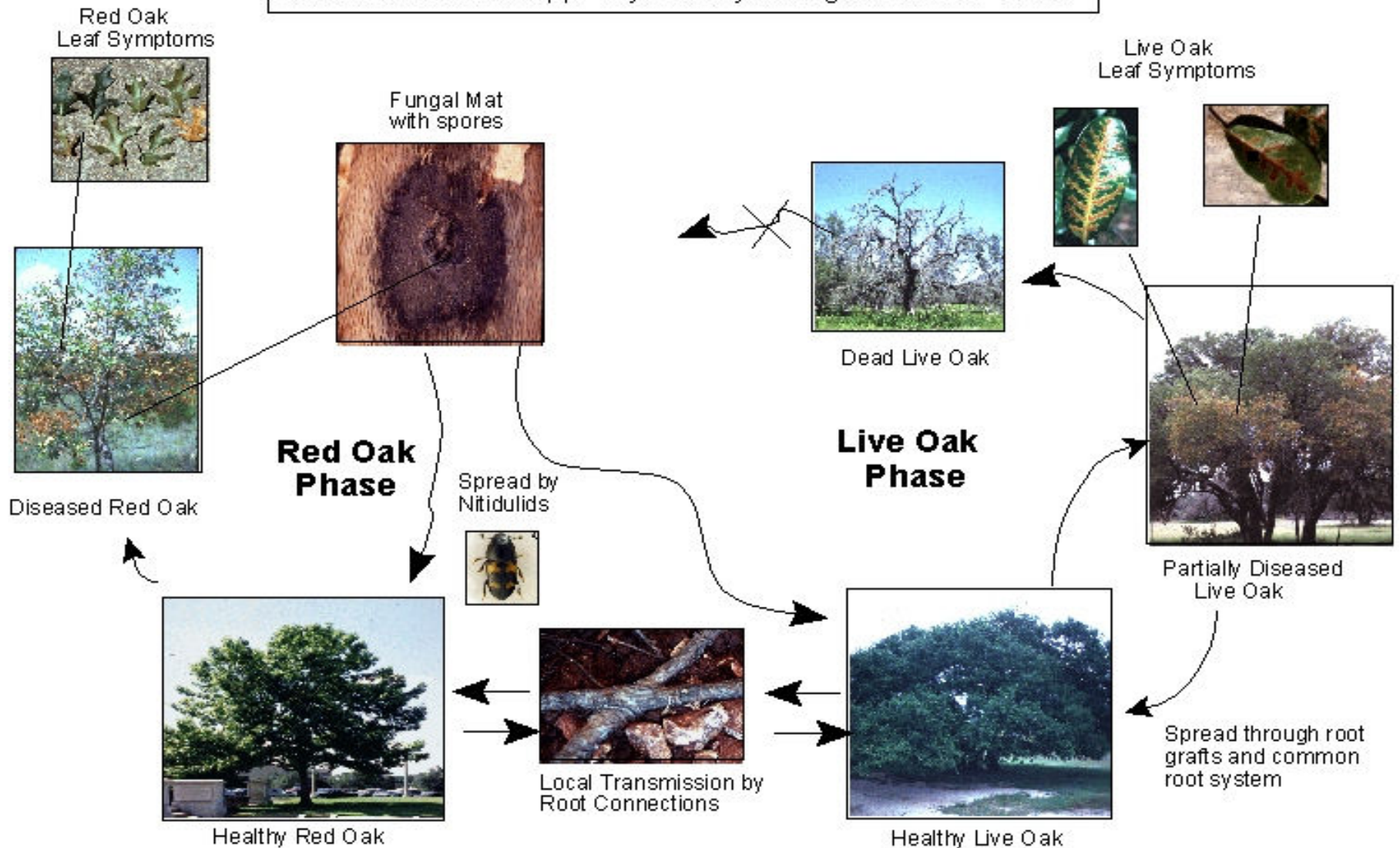


# More small roots in rock cracks



# Oak Wilt Disease Cycle

Infection of *Quercus* spp. By *Ceratostyis fagacearum* in Texas





# Oak Wilt Killing Method

- Trees resist the spread of the fungus by plugging their water conducting vessels.
- This defense mechanism is often unsuccessful.
- The disruption of water flow to the canopy causes wilting and defoliation.





# Is There a Cure for Oak Wilt?

- No, there is no immediate cure, however, the disease CAN be effectively managed to reduce tree losses.
- Oak wilt is a primary pathogen



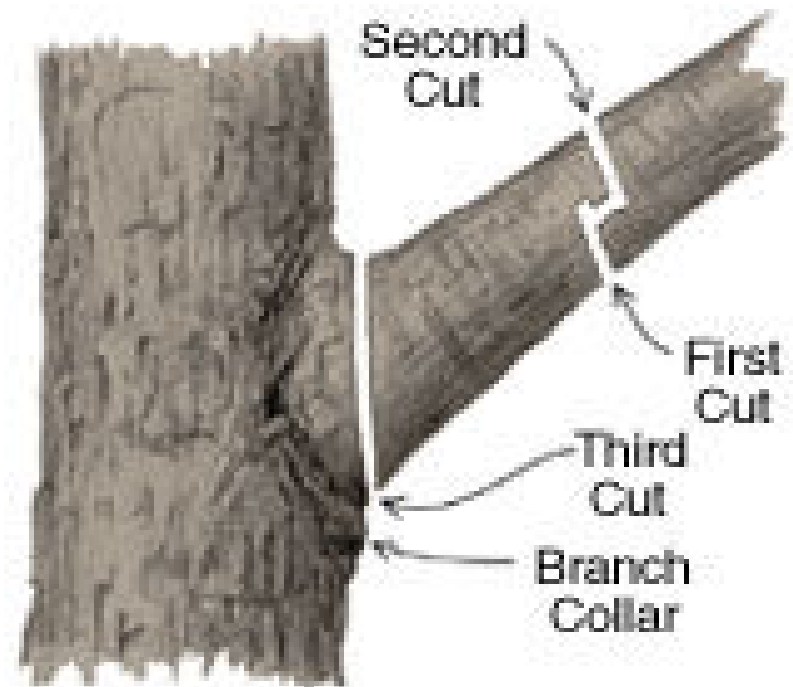
## Treatments & Recommendations

- Utilize proper avoidance precautions. (No Pruning in Spring, Wound Painting, Tool Sterilization, Hire Qualified Arborist)
- Remove & dispose of infected red oaks.
- Trench around expanding centers.
- Inject fungicides into threatened, high value oaks.
- Plant disease resistant trees. Diversify.



# Treatments & Recommendations

- Avoid wounding and pruning oak trees from February through June.
- Make proper pruning cuts.





# Paint Wounds and Pruning Cuts on Oaks All Year!







# Homemade spray device to reach pole saw cuts





# Dispose of Red Oaks

- Infected red oaks should be identified and removed from the environment immediately by **Burning, Burying in a Landfill, or Chipping/Composting.**
- This practice will help reduce the potential aerial spread where the fungal spores are transported to healthy trees by insects.



Jerral Johnson - TAEX - 1995

## HANDLING FIREWOOD

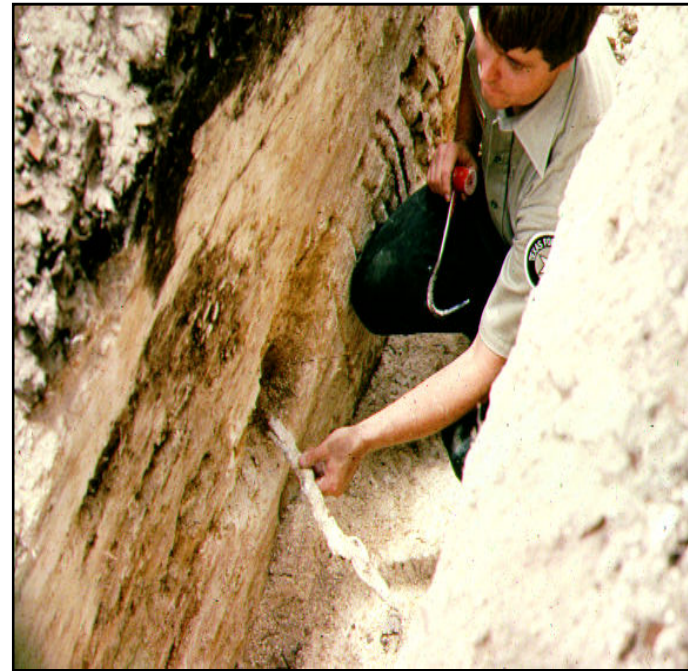
- DO NOT USE DISEASED RED OAKS
- SELECT WELL-SEASONED WOOD
- TAKE PRECAUTIONS W/UNKNOWN





# Oak Wilt Management

- Root Graft Disruption (Trenching)
  - Physically isolate healthy trees from infected trees to prevent the disease from spreading.





# Trenching

- Trenches are used to disrupt root connections and stop the localized spreading of the disease.





# Trenching

- Rock Saw
- 60" depth





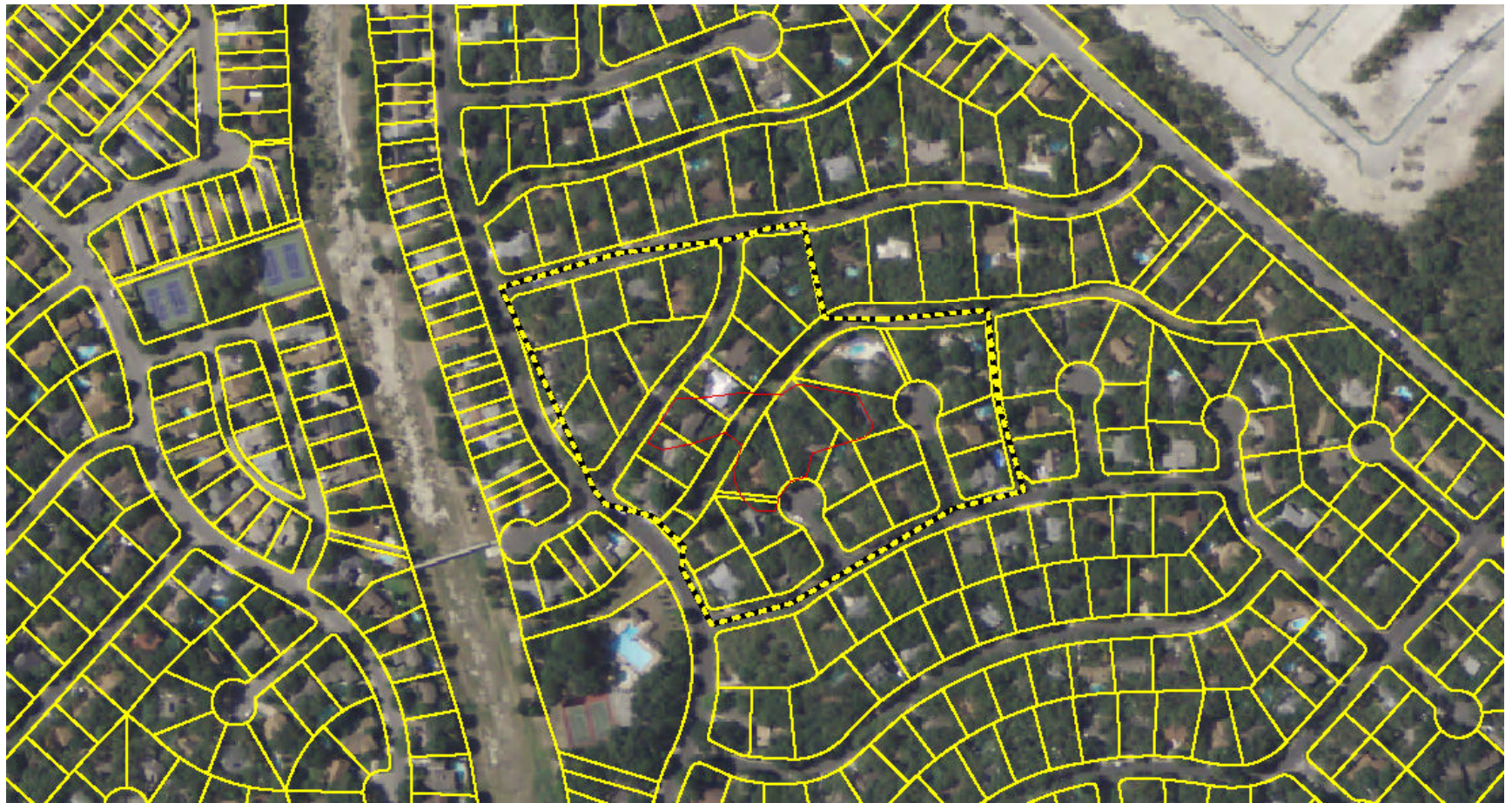
# Treatment Protocol

- Place trench line at least 100 feet from nearest diseased tree and at least 48” deep.





## Urban Oak Wilt - Whispering Oaks, SAT







## Experimental water-permeable fabric root barrier





# 5 years post trenching





# Total Trench Accomplishments 1988 - 2010

**Centers trenched = 2,652**

**Feet of trench = 3,720,000 (705 miles)**

**Total cost shares = \$ 2,726,790**

**Total costs = \$ 6,728,285**

**Ave. cost/foot = \$2.68 Rural non-res.  
= \$9.30 Urban**

**Success of trenches = 79%**



# Injection: Macro-Infusion

- The rapid introduction of large volumes of solution directly into a tree's vascular system.





# Drilling the flare roots





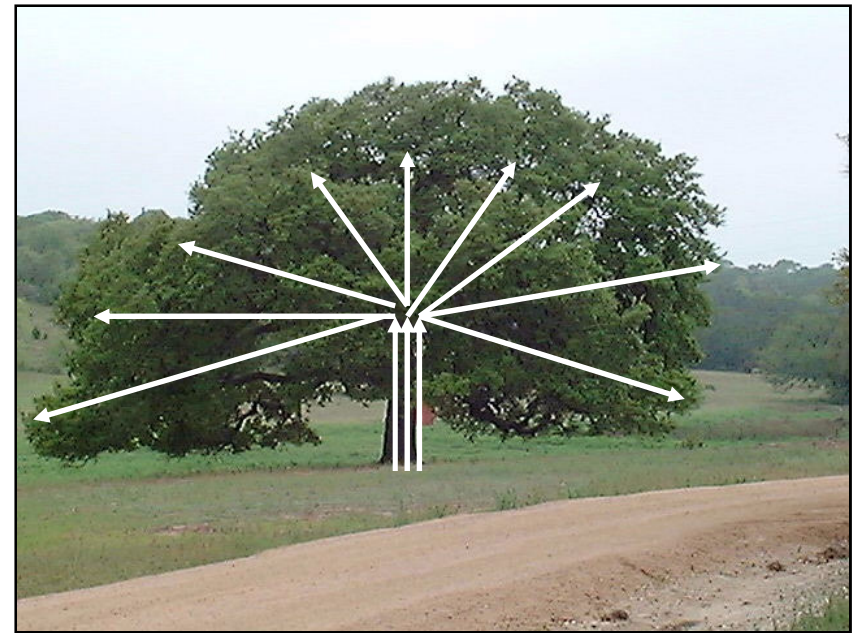
## Setting up the macro-infusion system





# Injection: Macro-Infusion

- The purpose of macro-infusion is even and complete coverage of entire crown.
- All the small twigs and branches get enough chemical to keep the disease from growing.





## Macro-Infusion

- NOTE: Injection of trees DOES NOT PREVENT LOCAL SPREAD OF DISEASE. The injection May or May Not save that particular tree. The tree should be injected with little or no symptoms in order for the tree to have the best chance of survival.





# Urban Forest Renewal

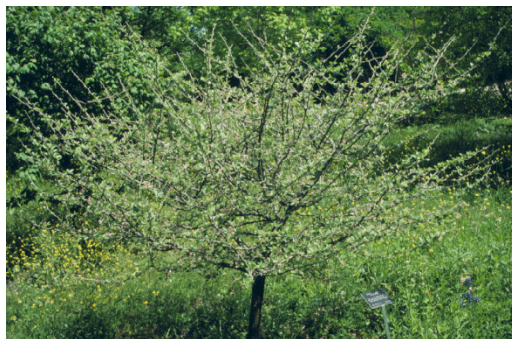




# Plant diversity - Grow native!



A diverse woodland is healthier and better able to withstand pests & disease outbreaks.





# Hypoxylon canker in live oak





**Brasher Oak – Champion Live Former Texas Oak**



# For More Information

**Texas Oak Wilt Website:**

**[www.texasoakwilt.org](http://www.texasoakwilt.org)**

**Texas Forest Service Website:**

**<http://texasforests-service.tamu.edu>**

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**210-494-1742**

Questions?

