OAK WILT

Identification & Management in Texas

Texas A&M Forest Service

texasoakwilt.org

What is Oak Wilt?

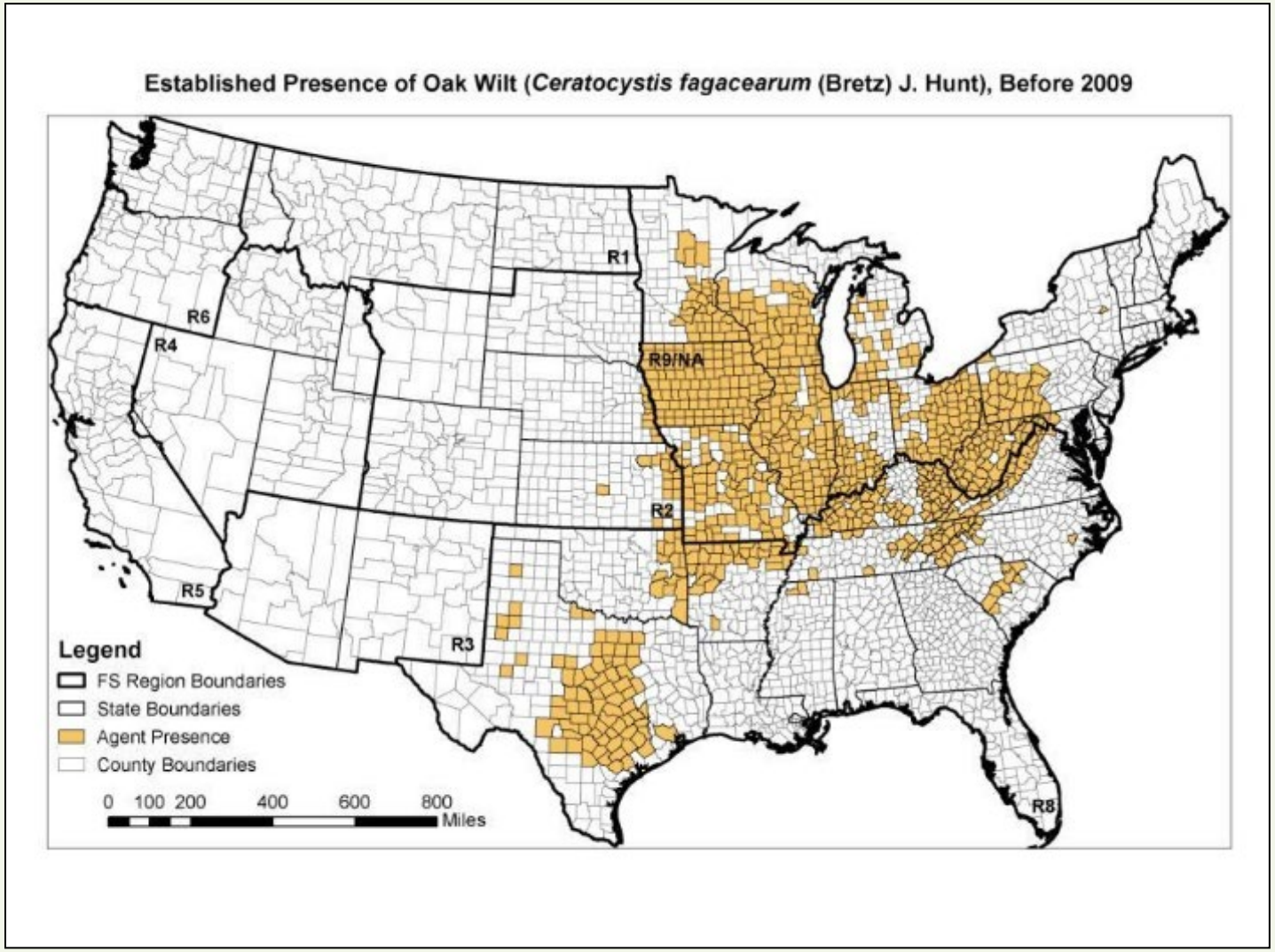
- Caused by the fungus: *Bretziella fagacearum*
- Primary vascular pathogen (disease) of oaks
- Invades the water-conducting vessels of the tree, called xylem
- Tree responds by activating **Tyloses** which blocks xylem tissues, resulting in a lack of water to the leaves.

TEXAS OAK WILT

The Impact of Oak Wilt

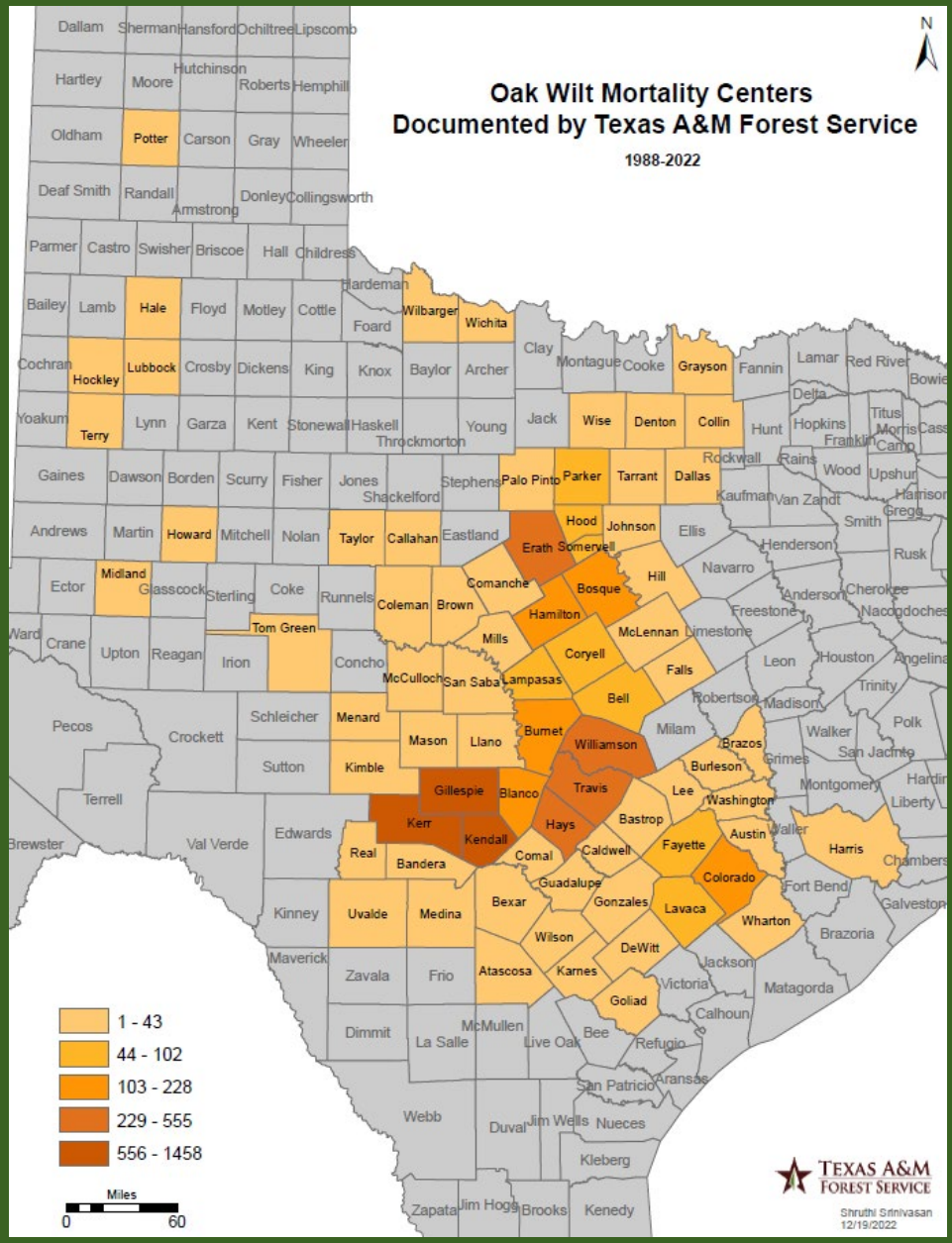
- Thousands of acres throughout central and west Texas have been adversely affected by oak wilt
- Oak wilt may reduce urban and suburban property values by 15-20%
  - *$90,000 reduction on a 450K home.*

Where is Oak Wilt?



Oak Wilt in Texas

- 76 counties with confirmed oak wilt occurrences as of 2019
- Verified by lab sample, aerial detection, and on-site inspections
- First detected in Texas in 1961



What Trees are Susceptible?

Red oak

White oak

Live oak

ALL OAKS!

- **Red Oaks** are extremely susceptible to the pathogen and play a unique role in disease spread.
- **White Oaks** are more resistant of the disease; however, they are <u>not immune</u> to infection!
- **Live Oaks** are intermediate in their susceptibility to the fungus; however, they are seriously affected due to their vast, interconnected root systems that allow for disease spread among trees.

TEXAS OAK WILT

Oaks are Affected Differently

How is Oak Wilt Spread?

Above ground (long distance) via sap-feeding beetles carrying fungal spores:

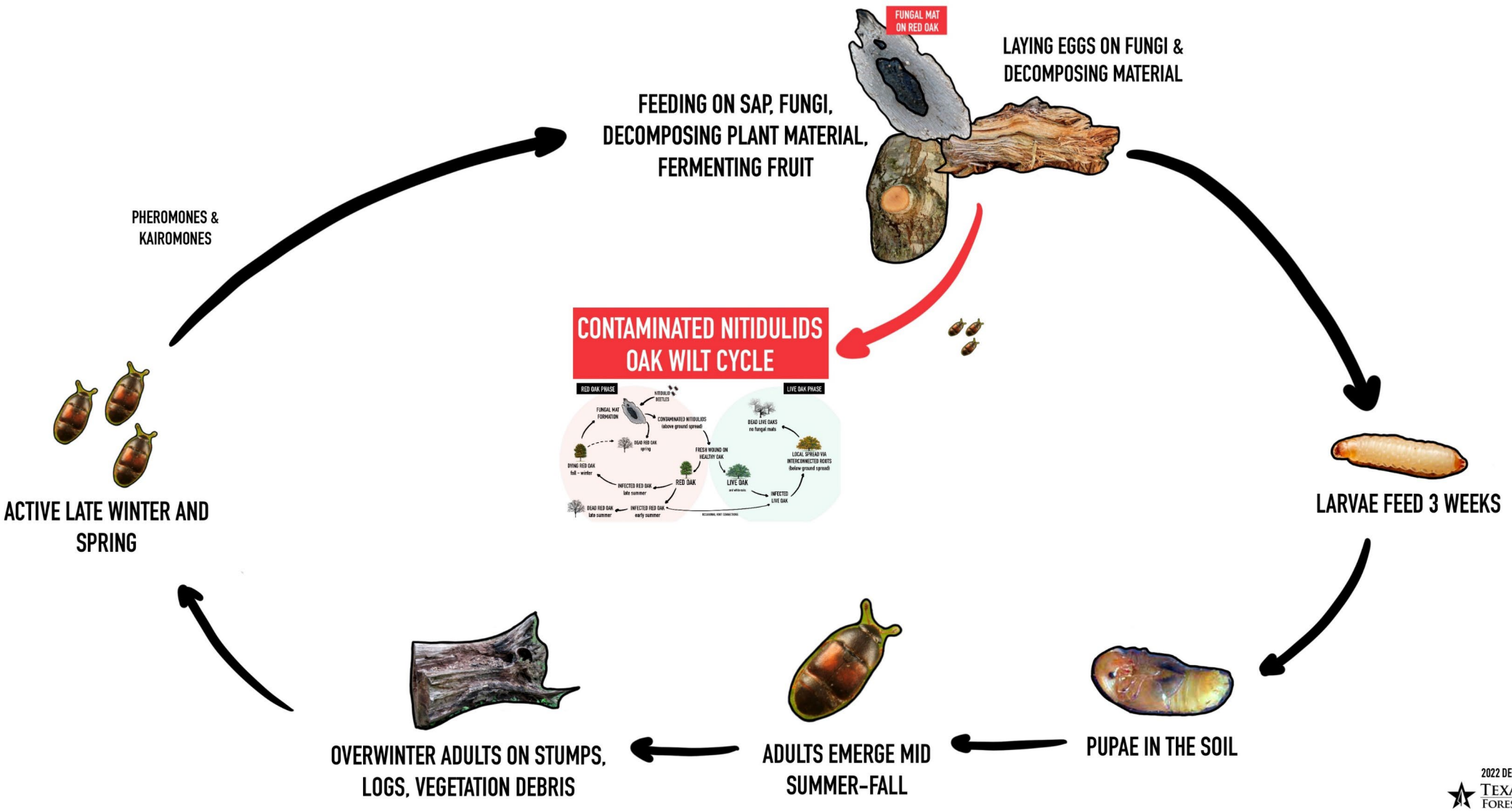
- Fungal spores are picked up from certain infected **red** oaks and carried to fresh wounds on other oak species. New infection centers are started in this manner.

Sap Beetle

Fungal Mat on Red Oak

Fresh Wound on Different Oak

NITIDULIDAE LIFE CYCLE



2022 DEMIAN F GOMEZ
TEXAS A&M FOREST SERVICE

TEXAS OAK WILT

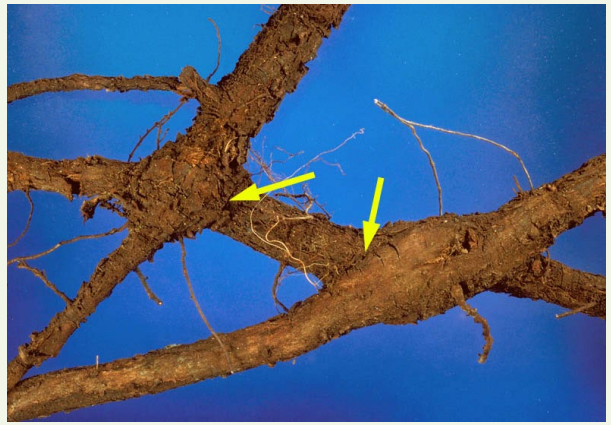
How is Oak Wilt Spread?

Underground (localized) via interconnected root systems:

- The fungus travels from tree to tree in the interconnected root system.
- This occurs primarily in **live** oaks and is responsible for the majority of spread and tree deaths in central Texas.
- Rate of spread averages **75 feet per year** through the root system.

Live Oak Mott

Root Grafts



OAK WILT EXPANSION

- Moves 75 feet a year on average.

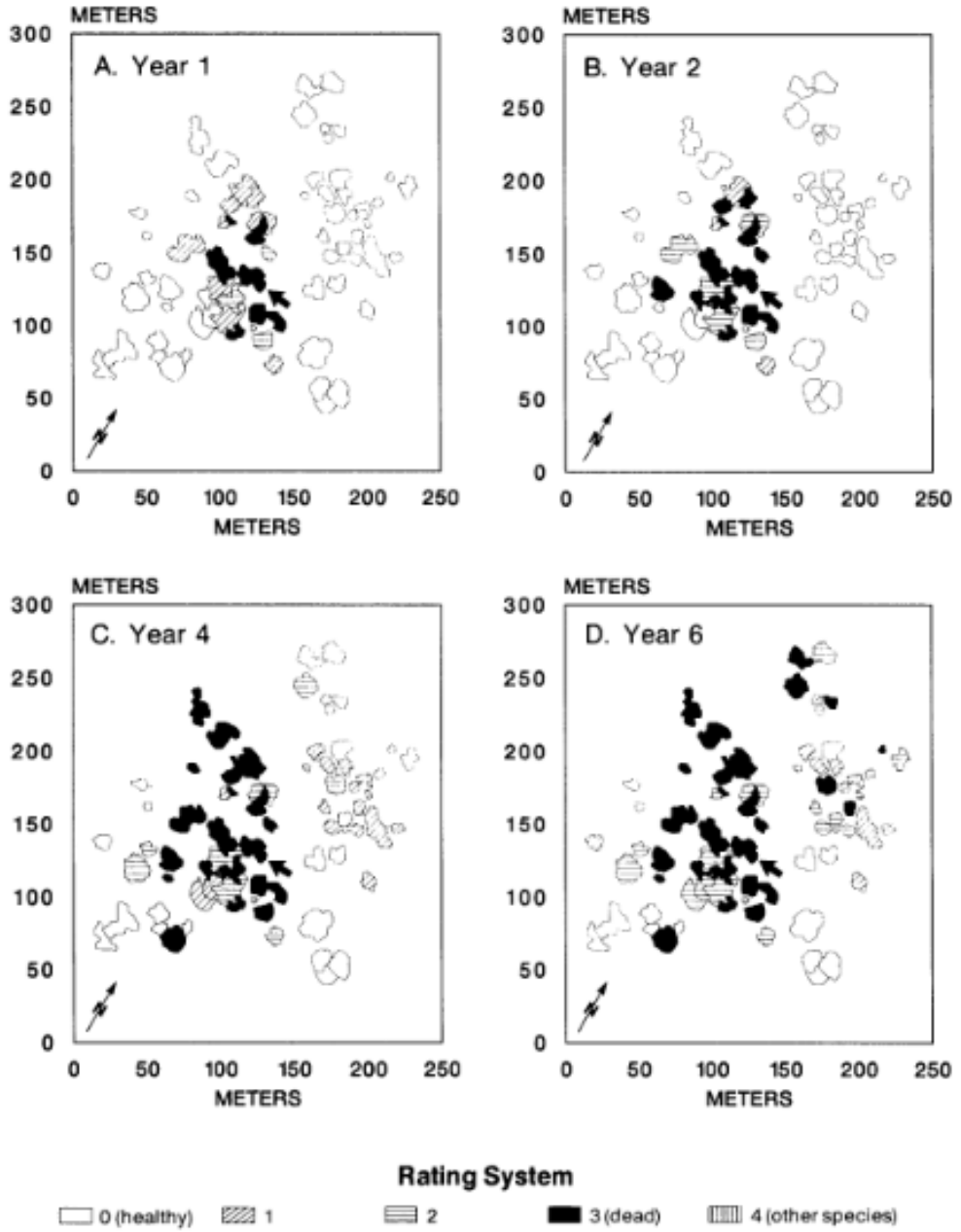


Fig. 1. Computer maps of expansion of oak wilt foci KBBP282 during 1982–1987. **A,** Year 1, 1982. The arrow indicates the polygon selected as the hypothetical origin, or first infection. **B,** Year 2, 1983. **C,** Year 4, 1985. **D,** Year 6, 1987.

Appel, D. N., Maggio, R. C., Nelson, E. L., and Jeger, M. J. 1989. Measurement of expanding oak wilt centers in live oak. Phytopathology 79:1318-1322.

TEXAS OAK WILT

Oak Wilt in Live Oaks

- Rapid defoliation
- Death in 3 to 6 months
- Spread to adjacent trees
- No fungal mat formation
- About 5-15% survival rate with no treatment
- Leaf symptoms: veinal necrosis, vein banding, tip burn, and marginal necrosis

Veinal necrosis

Oak Wilt in Live Oaks


Tip burn / marginal necrosis


Veinal necrosis


Vein banding

TEXAS OAK WILT

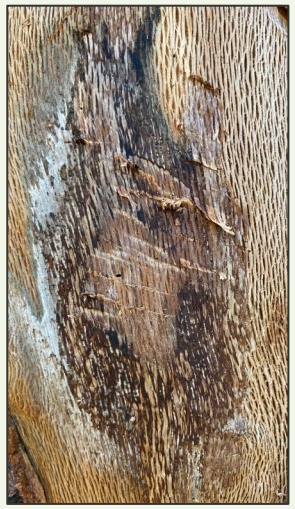
Oak Wilt in Red Oaks

- Typically maintains leaves, then defoliates
- Flagging: branches turn brown or red
- Death in 4 to 6 weeks
- Possible spread to adjacent trees
- Possible formation of fungal mats
- 100% mortality (no survivors)
- Bronzing leaves

TEXAS OAK WILT

Oak Wilt in Red Oaks

- Fungal mats contain the oak wilt spores
- Form only on infected **red** oaks
- Mats form under bark
- Can have multiple mats per tree
- Produces a sweet odor like rotting fruit which attracts the sap beetle
- Trees infected in fall/winter are more likely to produce mats the following spring
- Mat production is accelerated by cool, moist weather (typically springtime – but we know TX weather and conditions change)



Oak Wilt in White Oaks

- Decline over 1-3 years.
- Higher likelihood of survival- Tyloses.
- Often have solitary roots systems- less likely to graft and spread from roots.
- No fungal mat- deadwood safe to keep standing firewood.

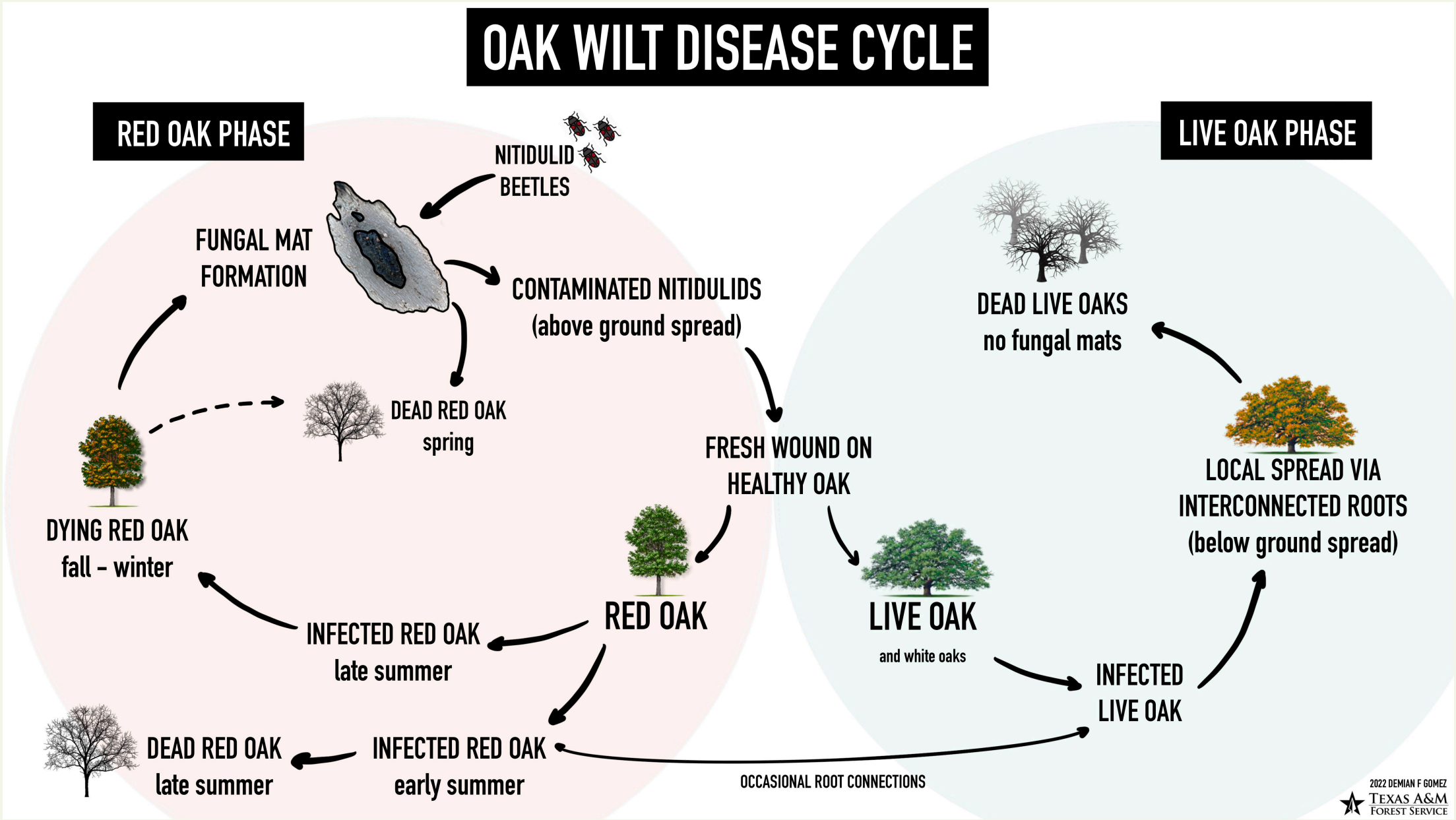
FOLIAR SYMPTOMS IN WHITE OAKS

Chinkapin oak

Lacey oak

Monterrey oak

OAK WILT DISEASE CYCLE



TEXAS OAK WILT

Lab Samples

- Samples can be taken and sent to a lab to confirm the presence of oak wilt
- Learn how to take a sample with this **video**
- For more information, contact the Texas Plant Disease Diagnostic Lab:
  - (979) 845-8032
  - PlantClinic@ag.tamu.edu
  - **plantclinic.tamu.edu**

TEXAS OAK WILT

Diagnosis – 5 Step Process

1. Diagnosis in a stand of trees (pattern of mortality)
2. Diagnosis in individual trees
3. Foliar symptoms
4. Presence of fungal mats
5. Taking samples

OAK WILT MANAGEMENT

There is no cure for oak wilt,
but managing the disease can significantly reduce tree losses.

Oak Wilt Management

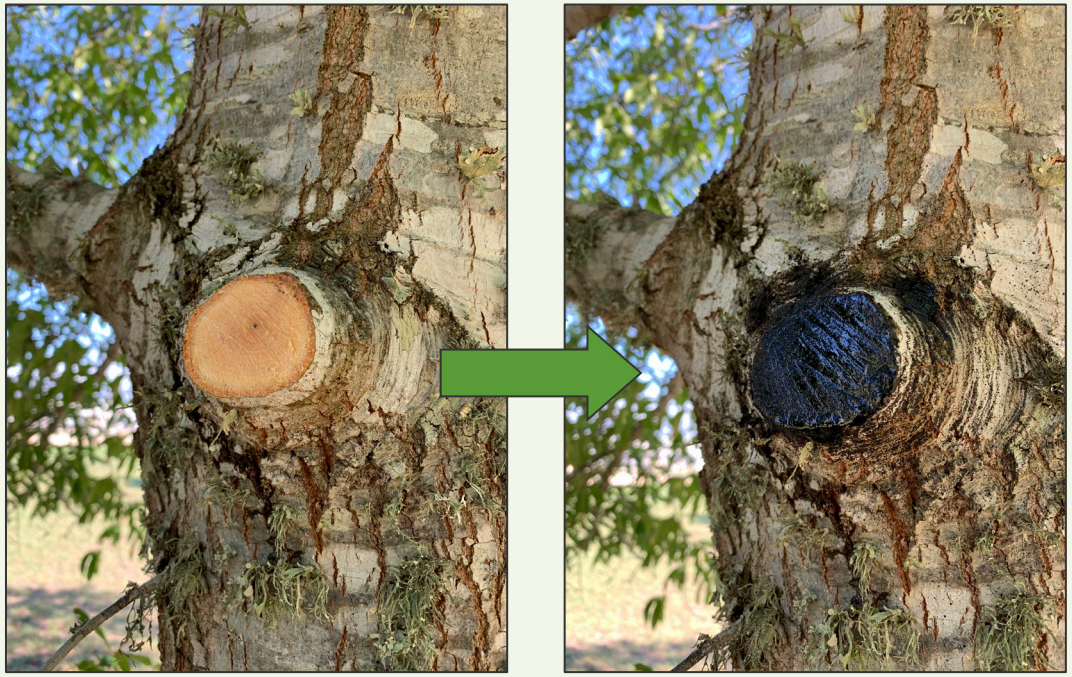
Early detection and prompt action are essential for successful management of oak wilt.

Four key management approaches:

- **Prevention**
- Plant other Trees
- Trenching
- Fungicide Injections

Prevention: Pruning

- Peak beetle activity and fungal mat production occur in the spring; therefore, avoid wounding and pruning oaks from **February through June** unless there is an immediate safety concern.
- Regardless of season, **immediately paint** all pruning cuts and other wounds to oaks.
- The paint discourages sap beetles from visiting fresh wounds by blocking the sweet scent coming from the tree.



TEXAS OAK WILT

Beetle Activity

- Beetles are active year-round
- Could be carrying the fungal spores year-round
- However, peak activity is Feb-June
- Paint open cuts/wounds immediately, every time
- Avoid wounding in peak times

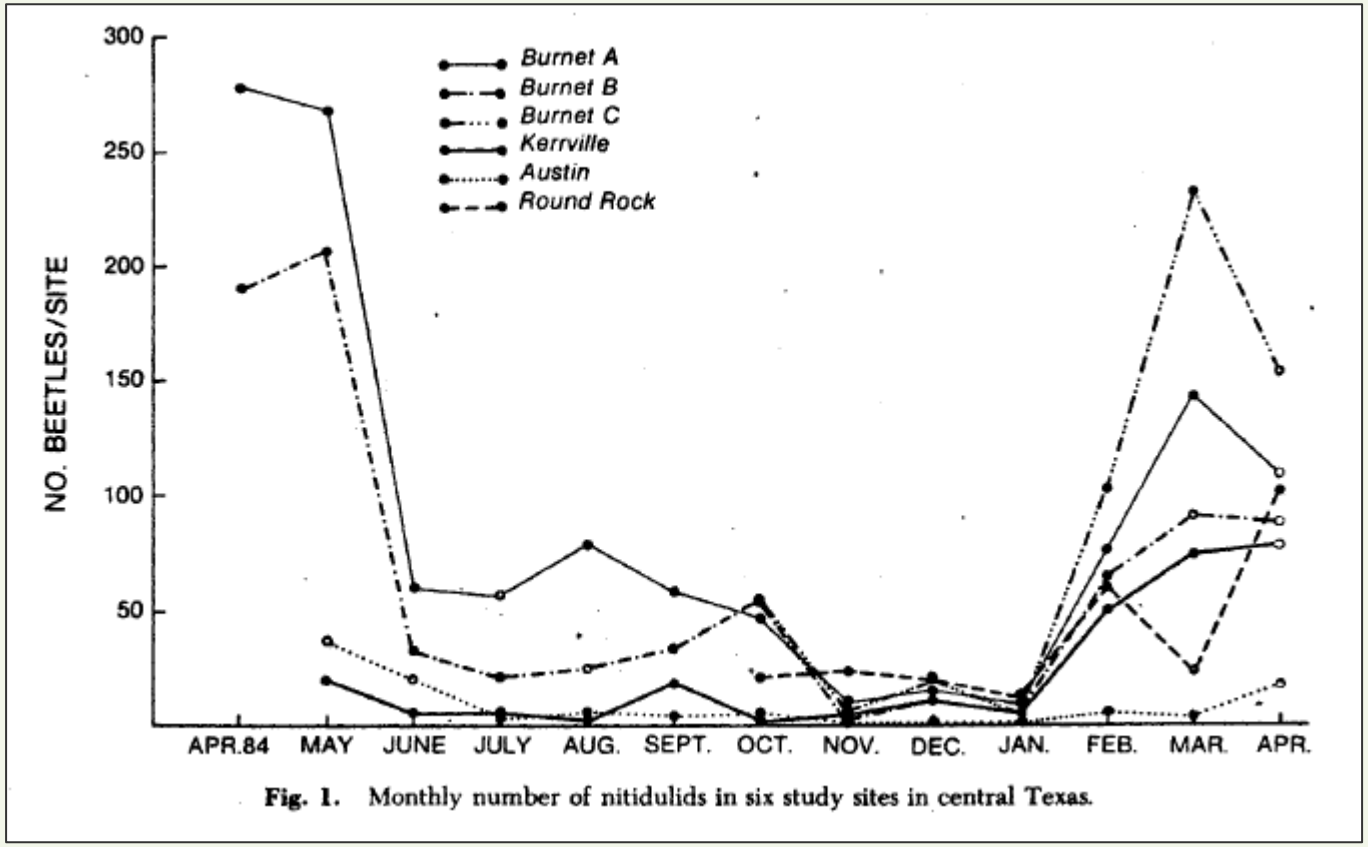


Fig. 1. Monthly number of nitidulids in six study sites in central Texas.

Appel et al., 1986

Prevention: Red Oak Firewood

- With an infected red oak, destroy it by:
  - Burning
  - Chipping
  - ~~Burying~~

  to prevent fungal mat formation.

- **Never** use infected red oaks as firewood!
  - Do not store it
  - Do not travel with it

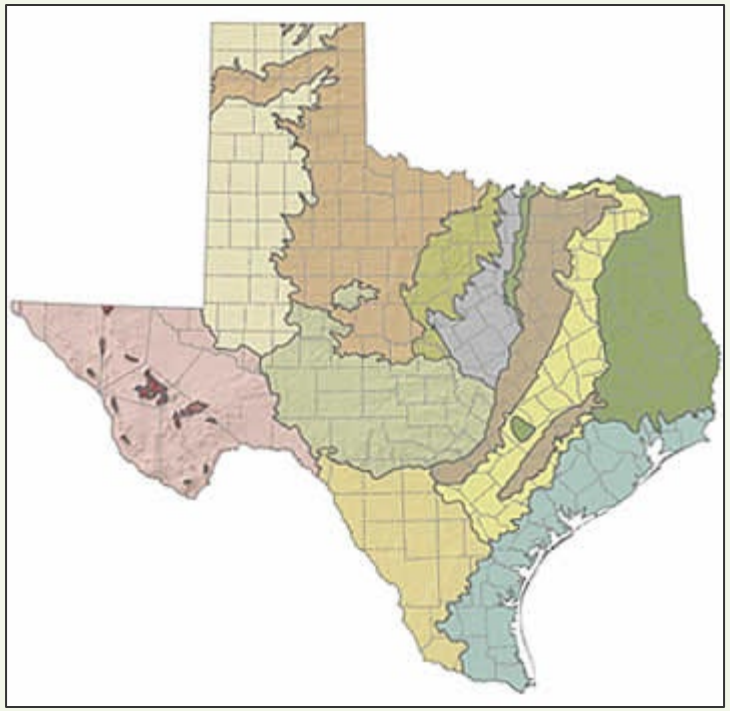
Prevention: White & Live Oak Firewood

- With **white/live oak** infected firewood:
  - Only use dry, well-seasoned firewood
  - Leave unseasoned firewood on-site for one year before moving
  - Do not store infected wood near or up against healthy trees

Plant Other Trees

Select trees that are:

- Native or adapted to the local environmental conditions
- Tolerant of temperature extremes, amount and pattern of precipitation, and local soil conditions
- Not invasive nor detrimental to the local environment
- Suitable for the space available – right tree, right place



TEXAS OAK WILT

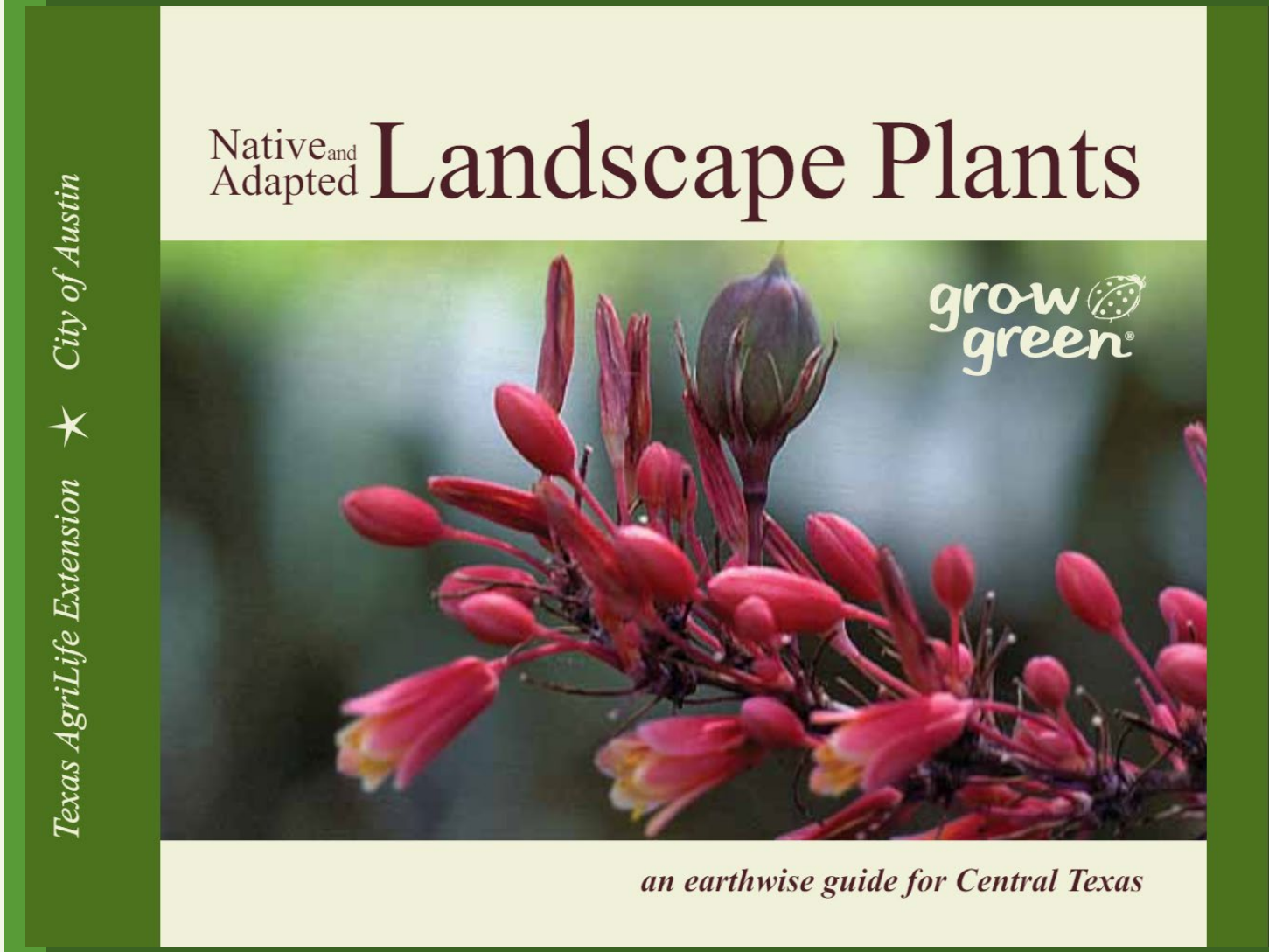
Plant Other Trees

- Avoiding planting monocultures (planting only one species)
- Create diversity in the landscape
- Avoid wounding oaks during planting
- For more planting information and recommended trees in your area, visit texasoakwilt.org

Plant Other Trees

- Texas Tree Selector
- texastreeplanting.tamu.edu
- Ladybird Johnson Wildflower Center
- Go Native!

- Best time to plant a tree:
  - *Fall/ winter-Container grown*
  - *Spring-Bareroot*
- Texas Arbor Day: First Friday in November



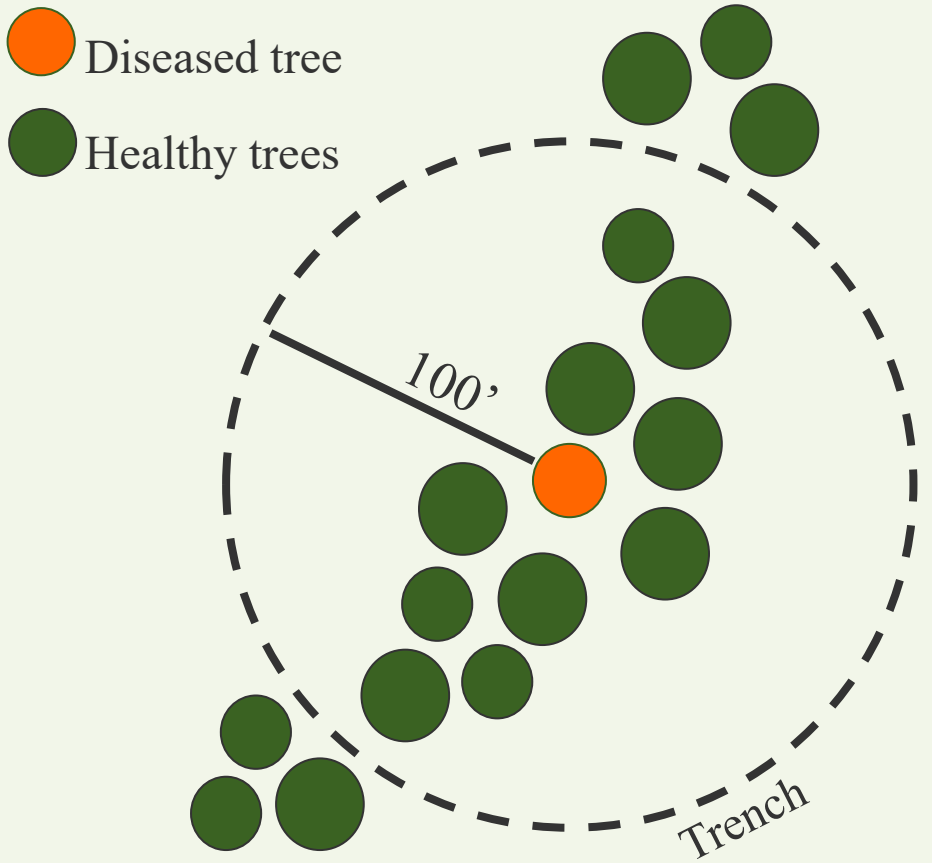
TEXAS OAK WILT

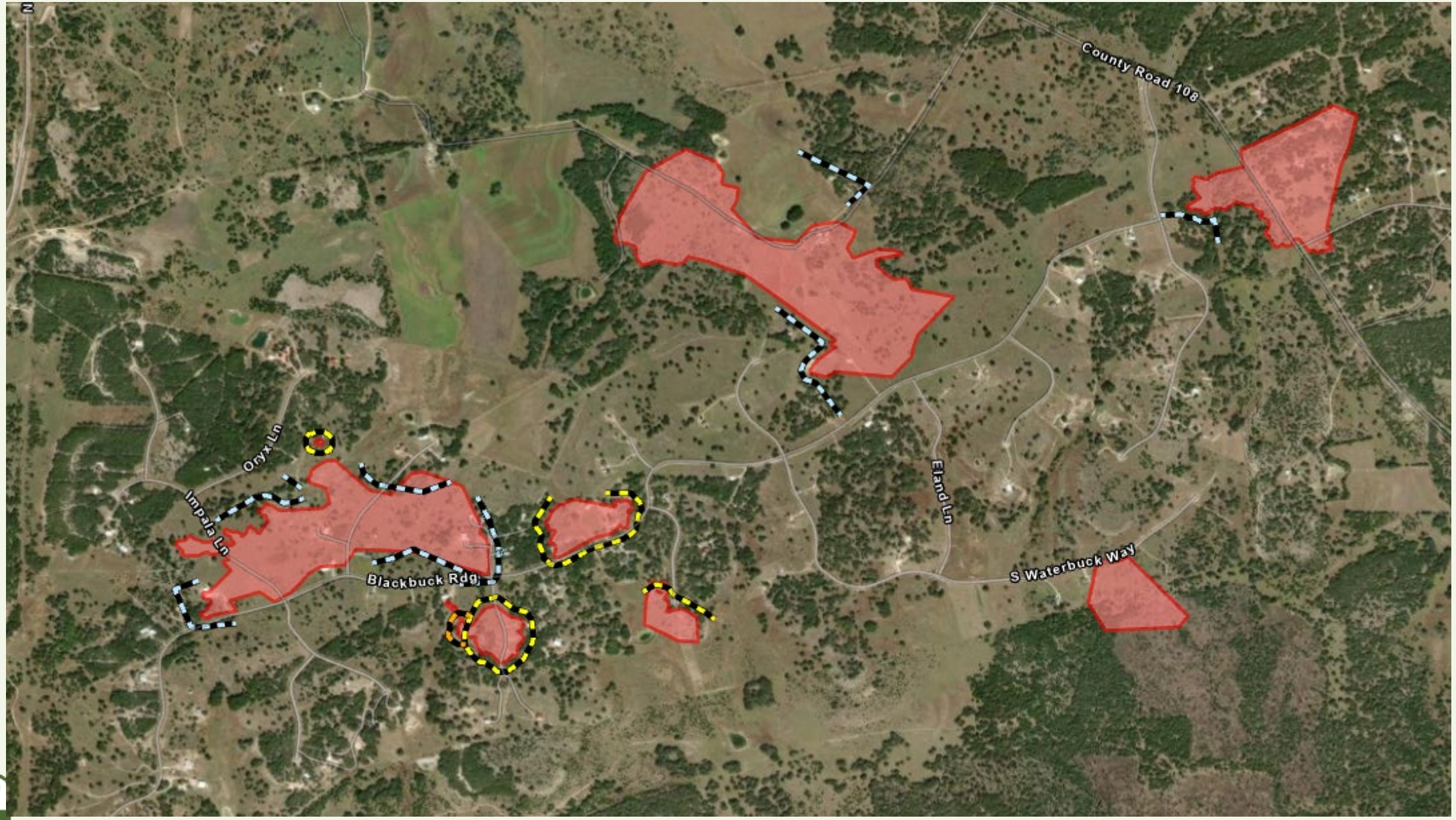
Trenching

The goal of installing a trench is to halt the spread of oak wilt moving through interconnected root systems by severing these connections.

Trenches must be:

- Placed a minimum of 100 feet ahead of the disease
- Excavated to at least 4 feet deep (sometimes deeper)
- Sever all root connections to be effective





TEXAS OAK WILT

Trenching

- Determine the disease perimeter using visual symptoms
- Locate the trench a minimum of 100 feet from the disease perimeter (measured from the drip line of infected trees, not their trunks)
- Equipment choice should be based on site characteristics and not solely on meeting minimum depth requirements
- Backfill the trench using same soil
- Pushing all oaks down (‘roguing’) within the barrier may improve effectiveness because it increases root detachment.


Rocksaw

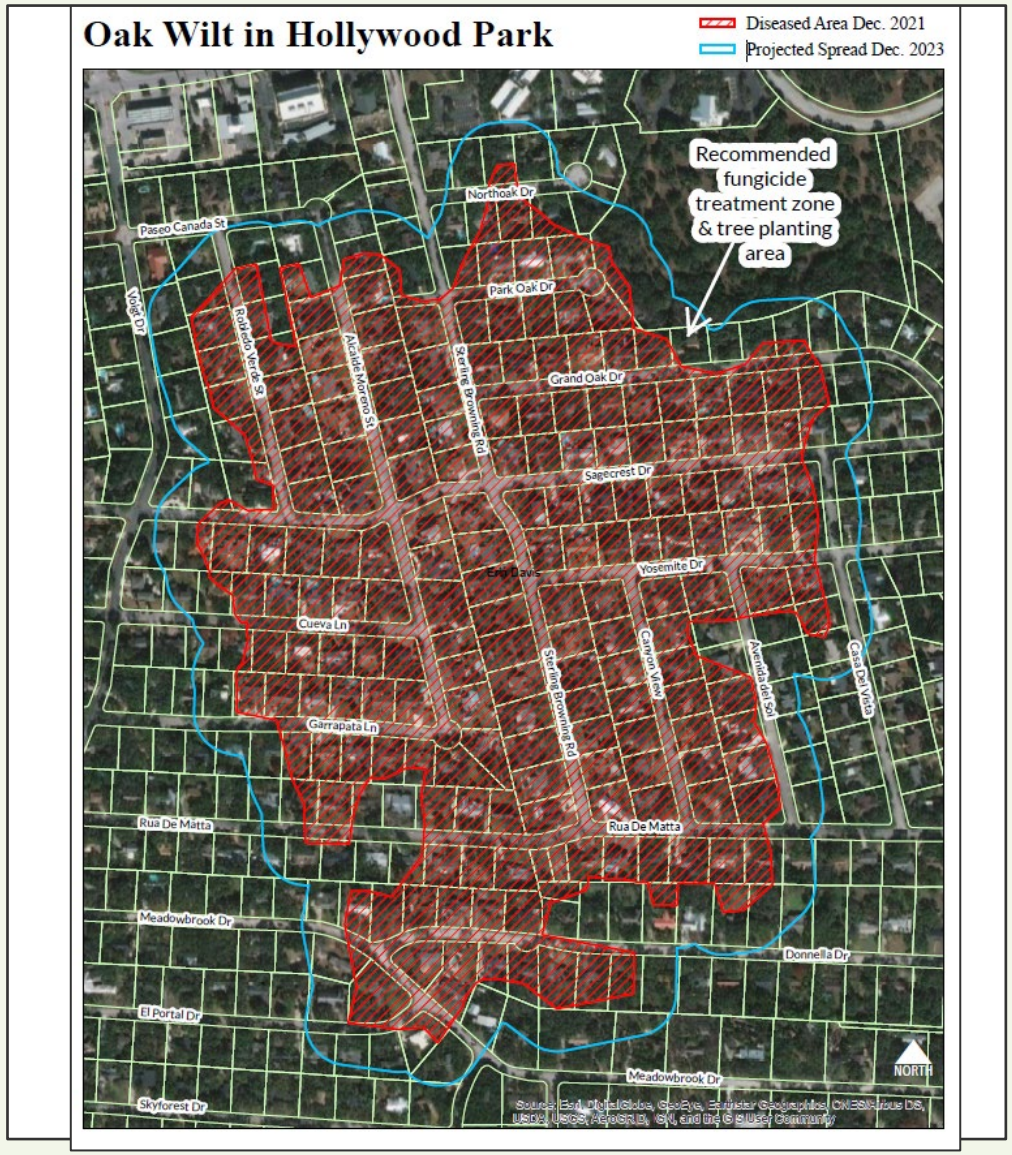

Backhoe


Excavator

Fungicide Injections

- May be used to protect high-value oaks in advance of an expanding oak wilt center
- Best candidates for injection are healthy, non-symptomatic live oaks up to 75-150 feet from symptomatic trees
- Injection does **not** stop root transmission of the fungus
- Injections only protect the individual tree injected when successful

Fungicide Injections



39

Fungicide Injections: Macro System

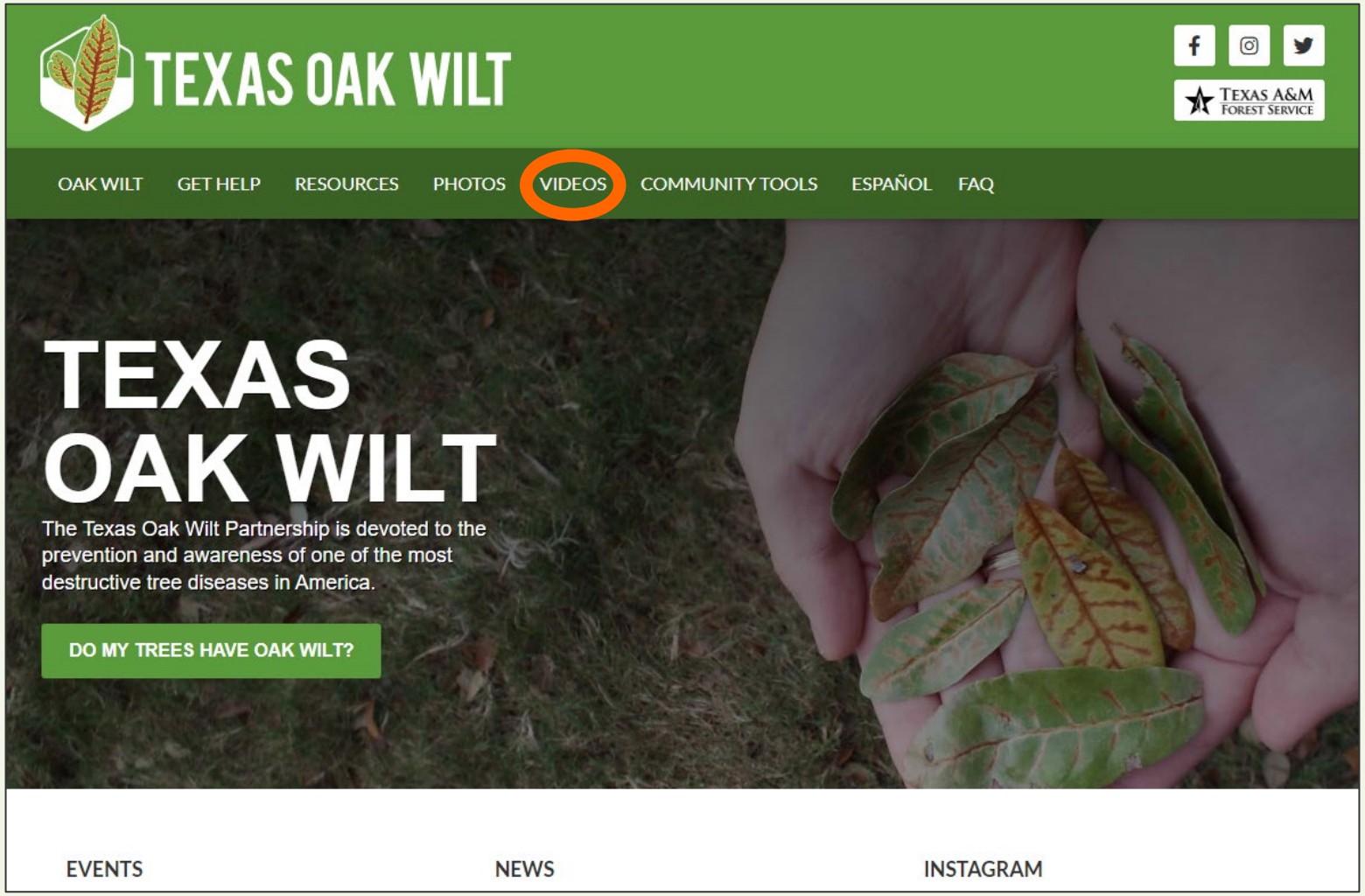
- Success depends upon the level of infection, the application rate, and injection technique.
- Several products are currently labeled and registered for this treatment.
  - However, macro-injections of Alamo® fungicide in the root flares have been **scientifically proven** effective and continue to be the industry standard.

Fungicide Injections

- To hire someone: costs about $15/diameter-inch
- DIY
  - You can move the soil away beforehand, but do not pre-drill the holes
  - Inject on a sunny morning
  - Holes do not need to be painted
- Second injection recommended 18-24 months after initial injection
- Other Injection Methods

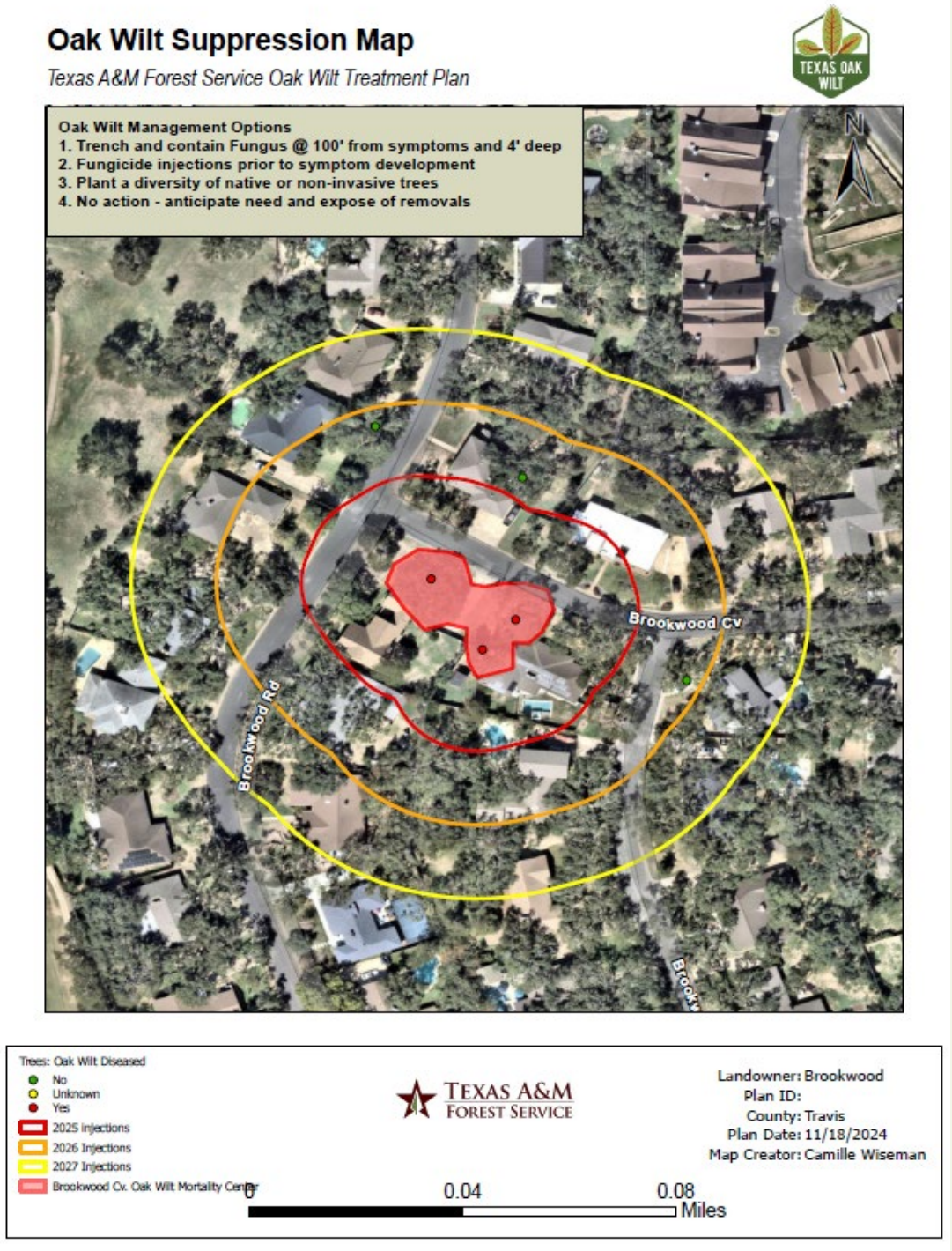
Fungicide Injections

For more information and instructional videos, please visit texasoakwilt.org.



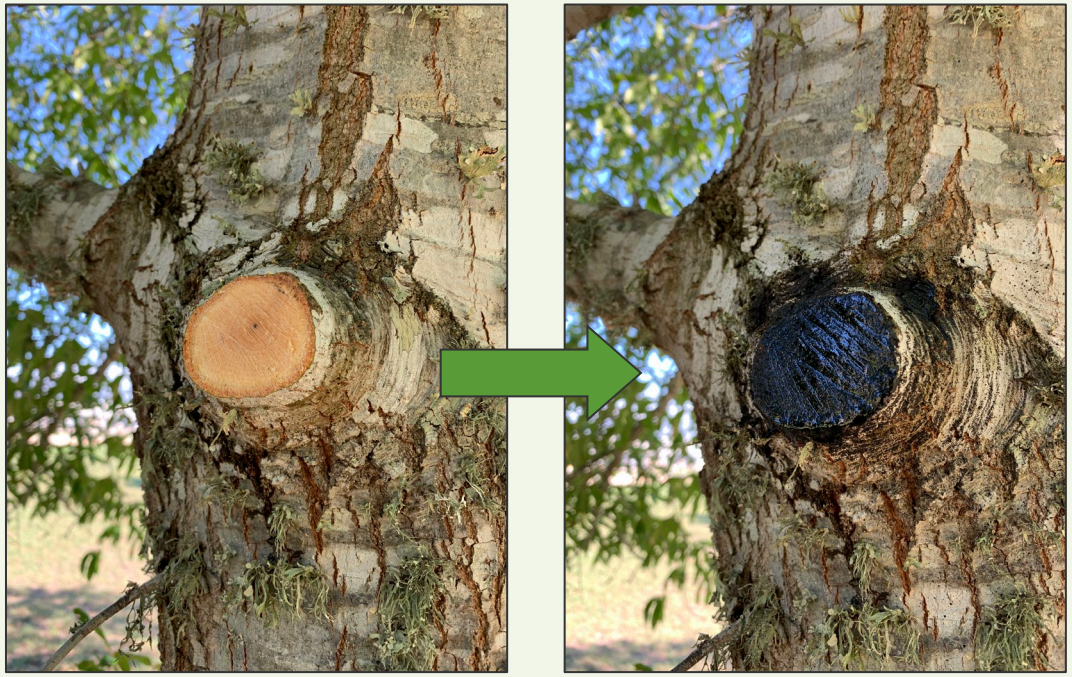
Oak Wilt 11/18/2024

- Moves on average 75 feet per year
- Trenching difficult with housing density
- Fungicide injection can protect individual trees within 150 feet of symptomatic trees



Prevention: Pruning

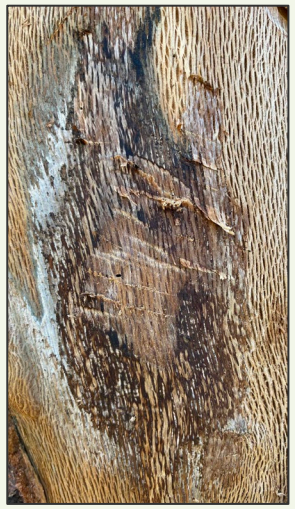
- Peak beetle activity and fungal mat production occur in the spring; therefore, avoid wounding and pruning oaks from **February through June** unless there is an immediate safety concern.
- Regardless of season, **immediately paint** all pruning cuts and other wounds to oaks.
- The paint discourages sap beetles from visiting fresh wounds by blocking the sweet scent coming from the tree.



TEXAS OAK WILT

Oak Wilt in Red Oaks

- Fungal mats contain the oak wilt spores
- Form only on infected **red** oaks
- Mats form under bark
- Can have multiple mats per tree
- Produces a sweet odor like rotting fruit which attracts the sap beetle
- Trees infected in fall/winter are more likely to produce mats the following spring
- Mat production is accelerated by cool, moist weather (typically springtime – but we know TX weather and conditions change)



Prevention:

- Plant new trees.
- Increase age and species diversity
- Support local forestry initiatives:
  - *Tree City USA*
  - *Texas Arbor Day*
  - *Urban Forestry*
  - *Nonprofits*
  - *Tree sales*

https://westtexasnursery.com/

QUESTIONS?

Camille Wiseman
512-339-3772
Camille.wiseman@tfs.tamu.edu