

On The Lookout For Oak Wilt

Robert E. Marra, Ph.D.

Forest Pathologist

Connecticut Agricultural Experiment Station

New Haven, Connecticut



Overview

Two important diseases not yet detected in New England, but which should be on our radar:

- **Oak Wilt**
 - *Bretziella fagacearum*
- **Bacterial Leaf Scorch**
 - *Xylella fastidiosa*

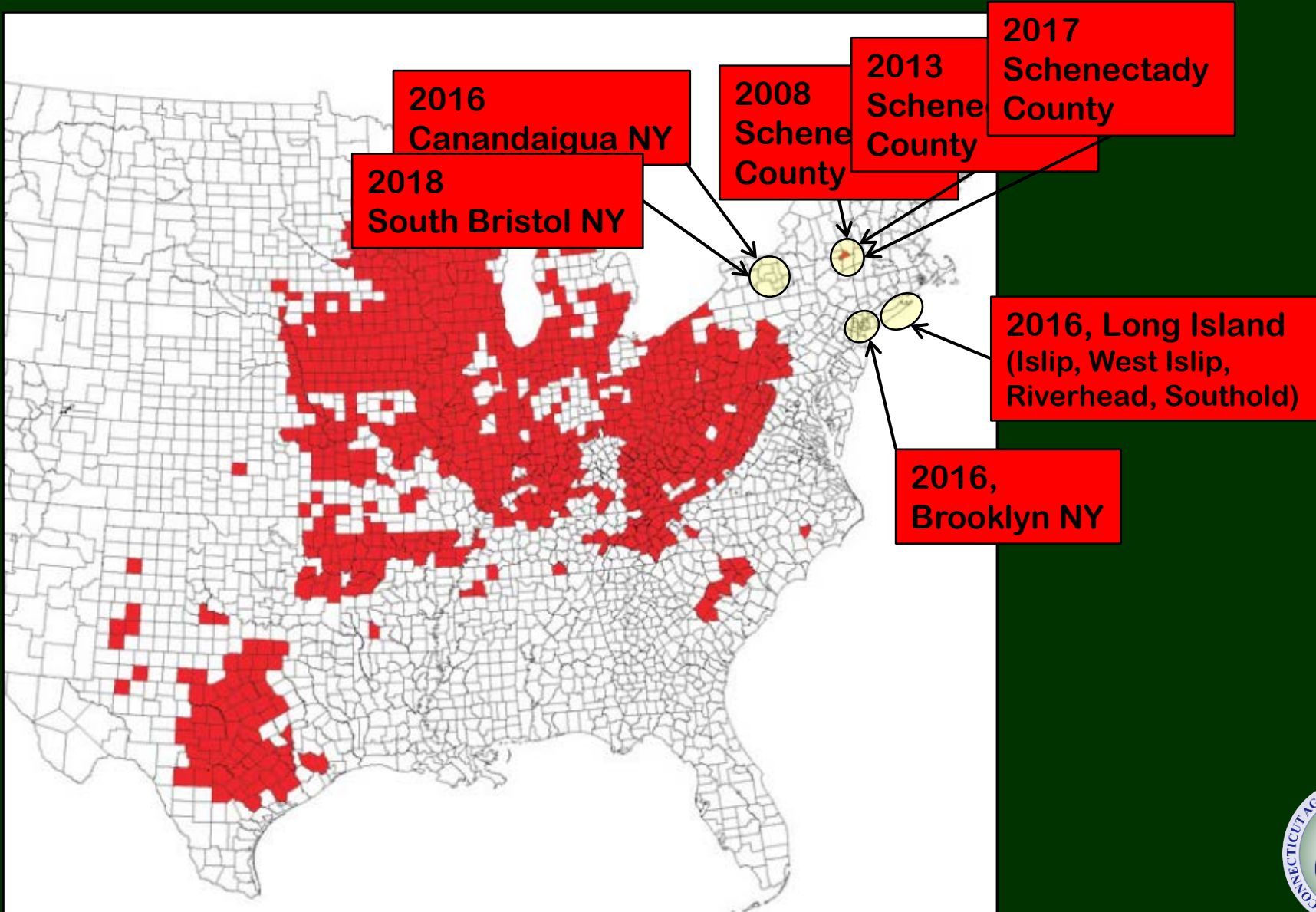


Oak Wilt

- First identified in Wisconsin in 1944
- Now in 21 states
- Vascular Wilt
- Aggressive disease caused by *Bretziella fagacearum*
 - Ascomycete fungus;
 - Formerly known as *Ceratocystis fagacearum*
 - Systemic, xylem-limited;
 - Spreads rapidly through vessels;
 - Disrupts water transport.



Oak Wilt Distribution



Oak Wilt: Hosts

All oaks are susceptible

- Red Oak Group: most susceptible
- White Oak Group: less susceptible than red
- Other hosts
 - Chestnut
 - Chinkapin
 - Tanoak
 - Some apple varieties



Oak Wilt: Red Oak Group

- Rapid leaf discoloration
 - beginning early summer
 - Browning along tips and margins
- Wilt and defoliation
 - From top of tree and downward
 - Defoliation within 3-4 wks of symptom onset
 - Typically while still partially green



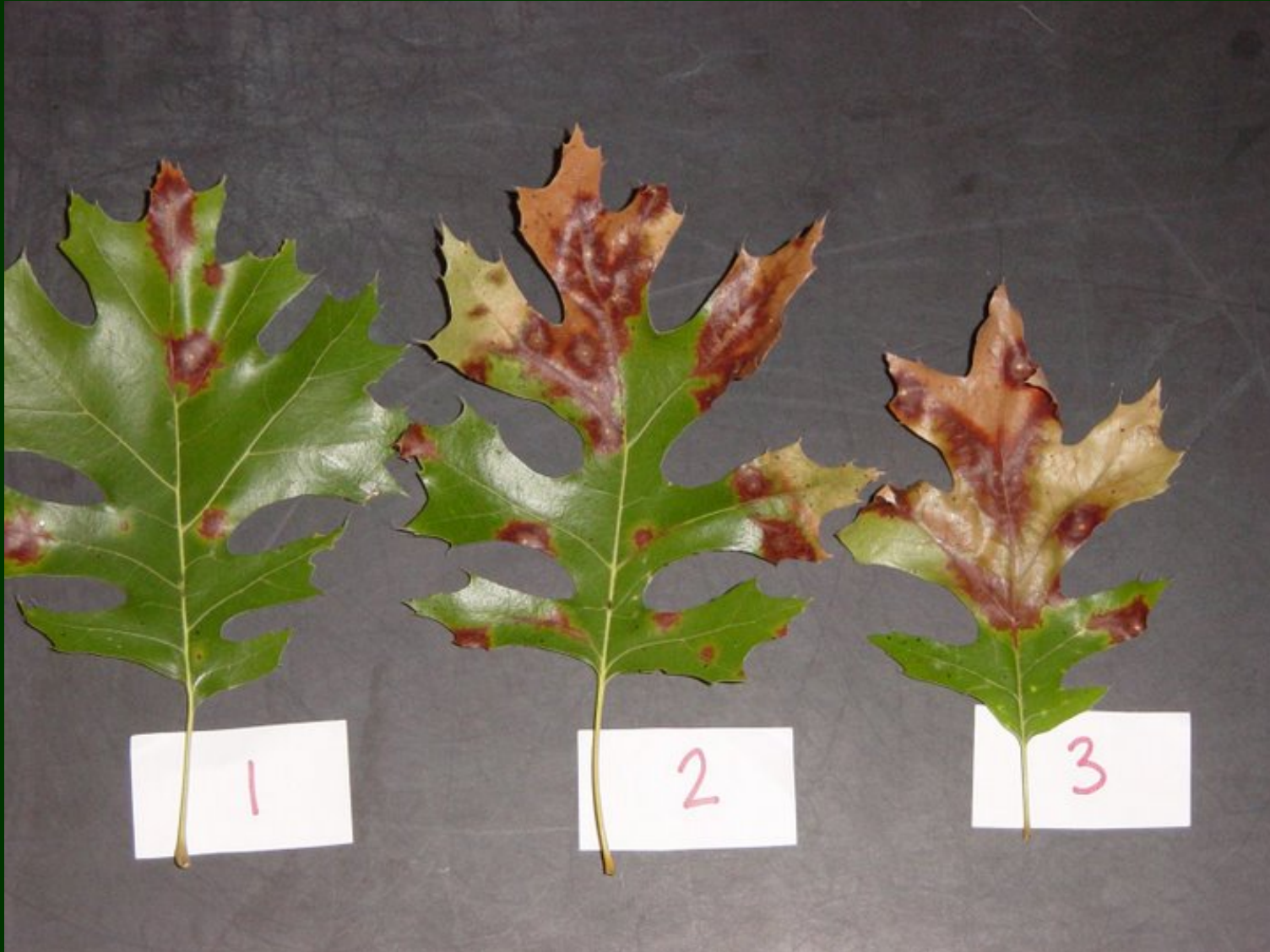
Oak Wilt: Red Oak Group

- Twigs and branches
 - Brown streaks in sapwood
 - Outermost annual ring completely brown
- Fungal mats under bark; erupts following spring
- Death of tree: within 6 months
 - As little as 3 weeks after infection



Leaves turn brown/bronze

From margins inwards, from tip to base





Karen Schrey, Akron Beacon Journal



ISU Plant Disease Clinic

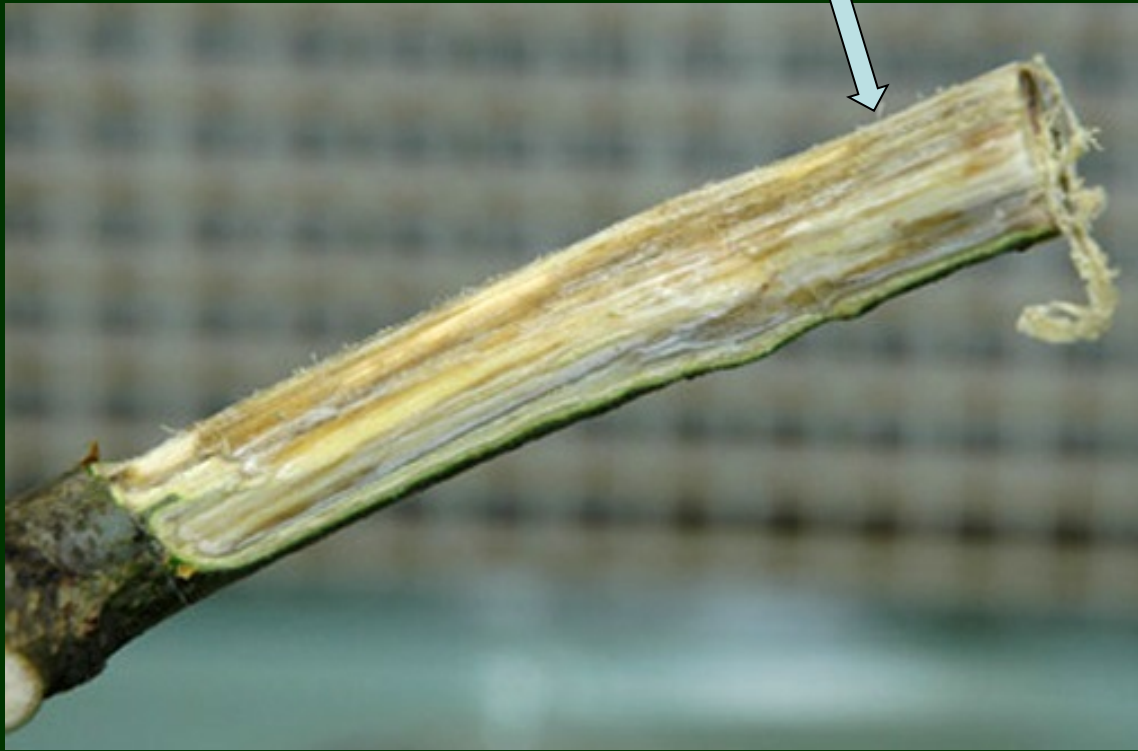


William Ciesla, Forest Health Mgmt Int'l

UGA0758073



Streaking in sapwood



Oak Wilt: White Oak Group

- Slower leaf discoloration (relative to red oaks)
- Wilt scattered throughout crown
- Leaves curl and remain attached
- Wood in cross-section
 - Outer ring of vessels sometimes discolored
- White oaks can remain alive for years with oak wilt



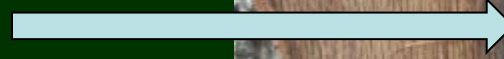


Leaves turn brown/bronze
From margins inwards, from
tip to base

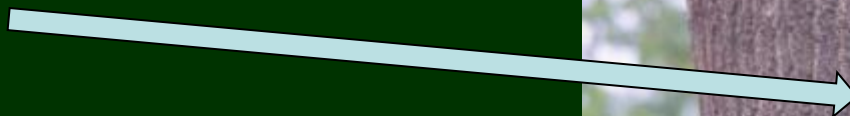


Oak Wilt: Signs

Fungal mats under bark



Bark split from fungal mat
pressure pads



(mostly in red oaks)

Oak Wilt: Signs

Bretziella (Ceratokystis) fagacearum
fruiting bodies



C.E. Seliskar

UGA1949014



Oak Wilt: Signs

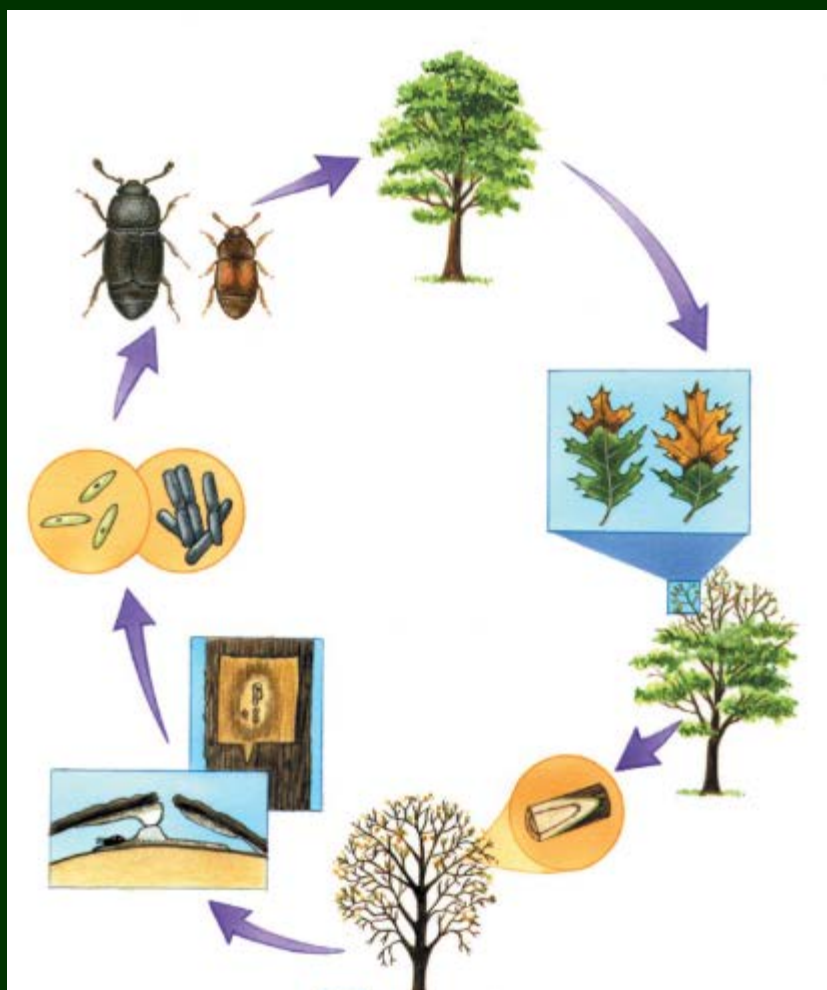
Nitidulid beetles with fungal mat



Oak Wilt

- Mode of spread
 - Root grafts
 - Nitidulid (sap) beetles
 - Attracted to odor of storm-damaged or recently pruned (and potentially infected) trees;
 - feed on fungal mats under bark, get covered with spores;
 - fly to uninfected trees, initiate new infection.





Long Distance Spread:

Nitidulids carry spores from spore mats on infected trees to wounds on healthy trees

Local Spread:

Root grafts between healthy and infected trees



Oak Wilt: Diagnostics

- Oak Wilt symptoms can be confused with other stresses and diseases
- Positive identification requires laboratory testing
- CAES:
 - gearing up to perform molecular (PCR) testing to confirm infection by *B. fagacearum*
 - Fact sheets and outreach to educate tree care professionals
 - Symptoms and signs
 - Sample acquisition and handling



Oak Wilt: Diagnostics

- Quality of sample is critical!
- Recently wilted branches with some partially green leaves still attached
- Branches $\frac{1}{4}$ - 1 inch diameter
 - ideally (but not necessarily) with discolored vascular tissue



Oak Wilt: Control

- Remove diseased trees ASAP
 - Consult CAES for details
- Disrupt potential root grafts
 - Trenching
- Prune only from November through March
 - Discourages nitidulid beetles
 - Cover all wounds with paint to discourage insect visitations
- Chemical: Propiconazole (Alamo)
 - Protective (white oaks), not curative



Bacterial Leaf Scorch (BLS) of Shade Trees

- Vascular (and therefore systemic) disease
- Usually fatal
- Rapid drying of leaf margins
- Symptoms similar to those associated with abiotic (environmental stresses) and biotic (living) factors





Bacterial leaf scorch of elm

(Sherald, APS Press)

(Note irregular marginal scorch and bright yellow band)



Bacterial Leaf Scorch of Shade Trees

- Caused by bacterium *Xylella fastidiosa*
- Found throughout eastern, southeastern, some mid-western states, and Texas
- *Xylella* also causes diseases on economically important hosts (e.g., Pierce's Disease on grape)
- *Xylella* can be found in “alternative” asymptomatic hosts



Shade Trees Affected by BLS

- *Acer rubrum* Red maple
- *A. negundo* Boxelder
- *A. saccharum* Sugar maple
- *Cornus florida* Flowering dogwood
- *Liquidambar styraciflua* Sweet gum
- *Morus alba* White mulberry
- *Ulmus americana* American elm
- *Platanus occidentalis* American sycamore
- *P. x acerifolia* London plane
- *Quercus sp.* Oak



Oak Hosts of BLS (northeast)

- Black
- Bur
- Chestnut
- Northern red
- Pin
- Post
- Scarlet
- Swamp white
- White
- Willow



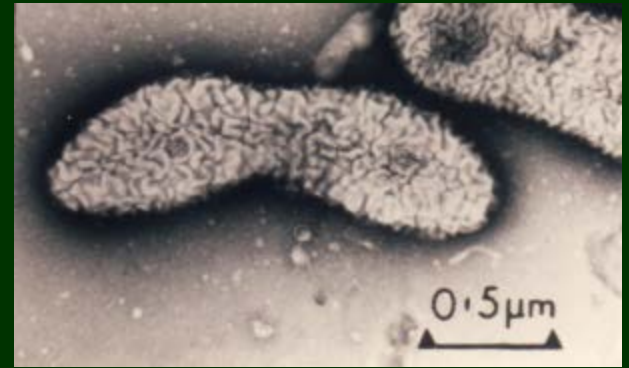
Alternative Hosts of *Xylella fastidiosa* (short list)

- Yellow buckeye
- Peppervine
- California mugwort
- Eastern baccharis
- American beautyberry
- Oriental bittersweet
- Flowering dogwood
- Bermuda grass
- Wild strawberry
- English ivy
- Miner's lettuce
- Black cherry
- Virginia creeper
- Boston ivy
- Dallis grass
- Sumac
- Blackberry
- American elder
- Goldenrod
- Johnson grass
- Ladino clover
- Periwinkle
- Wild grape



BLS: Causal Agent

- *Xylella fastidiosa*: inhabits xylem vessels
- Scorching: low-level moisture stress caused by bacteria blocking xylem vessels in leaf veins



BLS Transmission

- Vectored by xylem-feeding insects
 - leafhoppers
 - treehoppers
 - planthoppers
 - spittlebugs
 - sharpshooters



Symptoms Of BLS of Oak

- Marginal leaf necrosis beginning mid-summer;
- Worsening through late summer - early fall;
- Scorch bounded by sharp red-brown or yellow band;
- Most or all leaves on a branch affected simultaneously;
- Slow tree decline, eventual death (years).



BLS vs. Oak Wilt

- BLS occurs over a much longer period of time;
 - Oak Wilt (and DED) can kill a tree within as little as a month.
- BLS: no streaking of sapwood;
- BLS: scorch bounded by sharp red-brown or yellow band;
 - Oak wilt uniform browning.
- BLS: affects older leaves first;
 - Oak wilt typically develops first in outermost leaves.
- BLS: leaves tend to stay on tree;
 - Oak wilt: leaves fall prematurely while still partially green.





(Gould, 2001)





(Gould, 2001)



Sampling

- Proper sampling important for accuracy
- Small branch specimen (pencil-width diameter) with symptomatic leaves attached



QUESTIONS?



Robert E. Marra, Ph.D.
Forest Pathologist
Connecticut Agricultural Experiment Station
New Haven, Connecticut

