

---

---

---

---

---

---

---

---



---

---

---

---


---

---

---

---

**Be a Plant Disease Detective**

<p>Who? What? Where? When? Why?</p>		<p>Type of plant? Site - soil? Origin of plants? When planted? Who planted? Recent weather? Recent activity?</p>
---	---	--

---

---

---

---

---

---

---

---

Accurate Plant Identification Is Important First Step In Diagnosis



American Beech?

---

---

---

---

---

---

---

---

More Plant Identification Issues  
Blueberry?



[www.waterreeves.com](http://www.waterreeves.com)

---

---

---

---

---

---

---

---

More Plant ID Issues  
Blueberry?



[www.waterreeves.com](http://www.waterreeves.com)

---

---

---

---

---

---

---

---

## What's normal for specific plant?



Fall Needle Drop on White Pine

---

---

---

---

---

---

---

---

## Causes of Disease

– Abiotic Factors – non-living (non-infectious).

- Cold Damage
- Drought
- Nutritional Problems
- Soil compaction, soil grade changes
- Damage from cultural practices: herbicides, fertilizers, pruning, mulching



---

---

---

---

---

---

---

---

## Causes of Disease

– Biotic Agents – living agents (infectious).

- Pathogens - parasitic microorganisms that cause disease
  - Nematodes
- Fungi
  - Bacteria
  - Viruses
  - Phytoplasmas



---

---

---

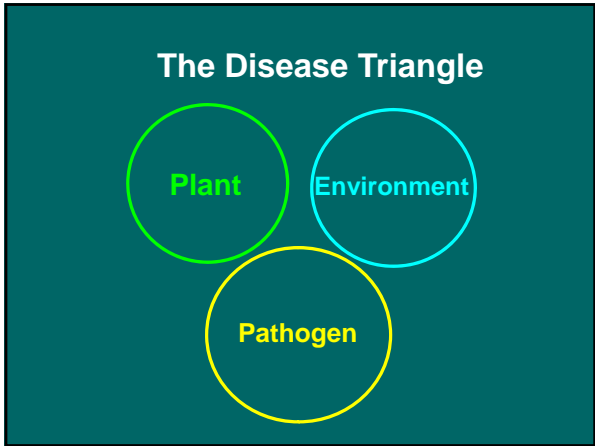
---

---

---

---

---



---

---

---

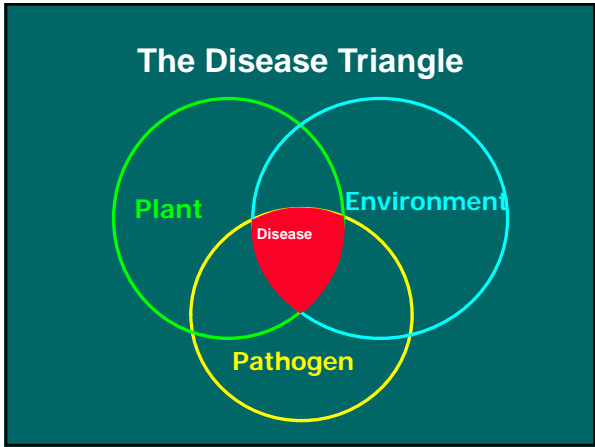
---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---

## Soil – Site Problems



Poor Drainage

---

---

---

---

---

---

---

---

## Recent Weather?



Leaf Scorch on dogwood during drought

---

---

---

---

---

---

---

---

## Recent Weather?



Cold Damage - Ice ribbons on crepe myrtle

---

---

---

---

---

---

---

---

### Recent Weather?



Hail Damage



---

---

---

---

---

---

---

---

### Recent Activity?



New sewer line installed  
summer 2000

---

---

---

---

---

---

---

---

### Recent Activity?



Herbicide Injury

---

---

---

---

---

---

---

---



### Recent Activity?



Roundup Injury on Pomegranate

---

---

---

---

---

---

---

---

### Recent Activity?



Streptomycin sulfate (Fire Blight Spray) Damage to Pear

---

---

---

---

---

---

---

---

### Check the Trunk and Branches



- Sapsucker damage to sugar maple
- Don't mistake sapsucker damage for borer exit holes

---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

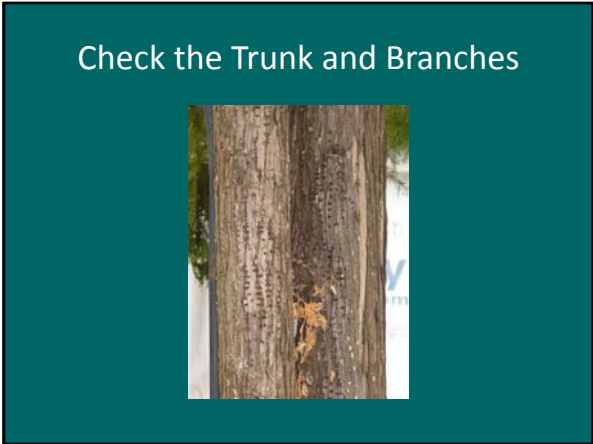
---

---

---

---

---



---

---

---

---

---

---

---

---



### Check the Trunk and Branches But...



---

---

---

---

---

---

---

---

### Deep Planting



- Check for flare at base of trunk



---

---

---

---

---

---

---

---

### Girdling Roots



- Girdling roots are a common problem with trees that are planted too deep



---

---

---

---

---

---

---

---



---

---

---

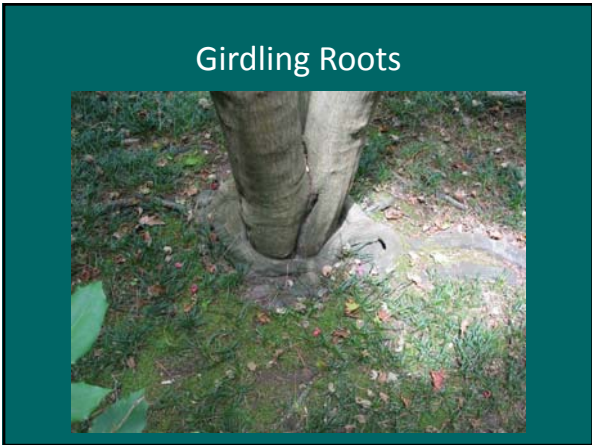
---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---

## Other Types Of Injury



Randy Cyr, Greentree, Bugwood.org

---

---

---

---

---

---

---

---

## Other Types Of Injury 'Lantern Injury'



Joseph O'Brien, USDA Forest Service, Bugwood.org

---

---

---

---

---

---

---

---

## Abiotic Injuries Can Lead to Additional Damage By Pathogens



Ganoderma causing decay following construction Damage

---

---

---

---

---

---

---

---

## Types of Tree Diseases

- Foliage
  - Leaf spot, blights, anthracnose
- Decays
  - Heart Rot, Root Rot, Sap Rot
- Cankers
  - Diffuse, Annual, Perennial
- Galls
- Vascular Wilts

---

---

---

---

---

---

---

---

## Foliar Diseases



Bulls-eye Leaf Spot on Magnolia

---

---

---

---

---

---

---

---

## Foliar diseases can damage trees in several ways



Anthrachnose on red maple

- They reduce photosynthetic activity
- They cause unsightly appearance of ornamental trees
- They can cause leaf drop

---

---

---

---

---

---

---

---

## Most foliar diseases have minimal effects on tree health in most years



Sycamore defoliated by anthracnose

- Late season foliar damage or loss has little effect (cherry)
- Most trees have much more photosynthetic area than they actually need
- Trees may refoliate if damage severe or occurs before mid-summer

---

---

---

---

---

---

---

---

## Oak Leaf Blister

- Common fungal disease on oaks, especially red oaks
- Disease favored by cool, wet springs
- Symptoms appear in late spring as yellow, blister-like, circular, raised areas



---

---

---

---

---

---

---

---

## Oak Leaf Blister

- Spots become dull brown with age
- As leaves mature, become resistant to infection
- Affects appearance not tree health
- Fungicides not needed, but one application of chlorothalonil or mancozeb before budbreak will control disease



---

---

---

---


---

---

---

---

### Maple - Leaf Spots



- Phyllosticta leaf spot
- Common on red, silver, and Japanese maple
- tan spots with purple borders
- Damage is unsightly, but not fatal
- Practice good tree care
- Rake and remove leaves
- Daconil, Mancozeb, Cleary's 3336

---

---

---

---

---

---

---

---

### Japanese Maple Phyllosticta Leaf Spot



---

---

---

---

---

---

---

---

### Maple Eyespot Gall Midge



---

---

---

---

---

---

---

---



## Pine Needle Rust

- Common on 2 and 3 needle pine (Virginia, Loblolly)
- Alternate hosts are aster and goldenrod
- Spring is the best time to identify these fungi on the pine host.
- Look for rust on aster and goldenrod in late summer-fall
- No control needed



---

---

---

---

---

---

---

---

## Pine Needle Rust



---

---

---

---

---

---

---

---

## Tree Decays

Heart Rot, Root Rot, Butt Rot

---

---

---

---

---

---

---

---

### Tree Decay



---

---

---

---

---

---

---

---

### Heart Rot



---

---

---

---

---

---

---

---

### Root and Butt Rots



---

---

---

---

---

---

---

---

A fungal fruiting body or conk is a sign of root and butt rots.



*Inonotus dryadeus* (weeping conk fungus)

---

---

---

---

---

---

---

---

### Weeping Conk (*Inonotus dryadeus*)

- Common fungus on oaks that can become a problem in street, park, and ornamental trees.
- Infected trees show no aboveground symptoms at first, but eventually show signs of decline including sparse foliage, poor color, and crown dieback.
- Oaks with many infected roots may suddenly die during periods of heat and drought.
- To limit the fungus, protect soils and trees from compaction, root damage, construction, and other damage.

---

---

---

---

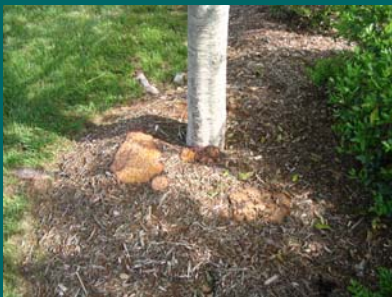
---

---

---

---

### Slime Mold – Does Not Cause Decay



---

---

---

---

---

---

---

---

## Armillaria Root Rot



---

---

---

---

---

---

---

---

## Armillaria Root Rot - Cherry



---

---

---

---

---

---

---

---

## Hispidus canker

- Primarily found on oaks
- Causes canker and heart rot
- Entry point for this fungus is usually through old branch stubs or wounds.
- Best control is pruning correctly to encourage rapid wound closure.



---

---

---

---

---

---

---

---

## Hispidus canker

- Once trunk decay fungi are actively growing, there is no control.
- Maintain vigor to add to its lifespan



---

---

---

---

---

---

---

---

## Identifying Trunk and/or Root Decay Problems

- Visual examinations of defects and conks fungi are only indicators of potential problems
- Devices that take actual cores or use other methods to evaluate the extent of decay are preferred



---

---

---

---

---

---

---

---

### Basic Methods



Mallet

### Portable Drill



---

---

---

---

---

---

---

---

## Resistograph



---

---

---

---

---

---

---

---

## Canker Diseases

---

---

---

---

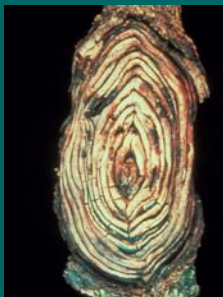
---

---

---

---

## Perennial or 'Target Cankers'



*Nectria* Cankers

---

---

---

---

---

---

---

---



## Hypoxylon Canker

- Diffuse Canker
- Most common on oaks, but also other hardwoods
- Fungus infects trees as seedlings (inner bark)
- Insect defoliation, drought, lightning, or construction cause stress and fungus infects sapwood (<60-70% MIC)
- Fungal mat causes bark to slough off



---

---

---

---

---

---

---

---

## Hypoxylon Canker



Small patches of stroma beginning to appear

Terry Price, Georgia Forestry Commission, Bugwood.org

---

---

---

---

---

---

---

---

## Hypoxylon Canker

- Keys to disease prevention are maintaining tree vigor (watering during drought, mulching) and minimizing injury (construction and grade changes)
- Trees showing fruiting structures of fungus will not survive regardless of treatment



---

---

---

---

---

---

---

---

## Hypoxylon Canker



---

---

---

---

---

---

---

---

## Smooth Patch



- Caused by the fungus *Aleurodiscus*
- The fungus colonizes the dead outer layers of bark on living trees causing the bark to slough off
- Doesn't damage tree
- Most common on oak

---

---

---

---

---

---

---

---

## Vascular Wilt Diseases

---

---

---

---

---

---

---

---

## Bacterial Leaf Scorch



- Bacterial disease, caused by *Xylella fastidiosa*
- Marginal and interveinal leaf scorch in mid-late summer
- Hosts: elm, oaks, mulberry, red maples, sycamore
- Transmitted by leafhoppers, treehoppers, and spittlebugs

---

---

---

---

---

---

---

---

## Bacterial Leaf Scorch



Sycamore

---

---

---

---

---

---

---

---

## Bacterial Leaf Scorch



---

---

---

---

---

---

---

---

## Bacterial Leaf Scorch

- Bacterial leaf scorch is not a curable disease, but it can be slowed with injections of antibiotics (oxytetracycline, sold as Bacastat and Mycoject) applied in springtime.
- Treatments are not 100% effective and injections must be repeated every year or symptoms will return.
- Infected trees don't die immediately and often survive for several years (5-8+), but will slowly decline over time.
- Maintaining tree vitality through proper watering and fertilization will prolong the life and quality of the tree.

---

---

---

---

---

---

---

---

## Dutch Elm Disease



Before and after Dutch elm disease

---

---

---

---

---

---

---

---

## Dutch Elm Disease

- Damages the plant by plugging the xylem
- Spreads rapidly in large vessels of springwood
- Spreads throughout canopy, branches, trunk and roots
- Usually fatal to tree if left untreated



---

---

---

---

---

---

---

---

## Dutch Elm Disease



---

---

---

---

---

---

---

---

## Dutch Elm Disease Disease Transmission

- Not spread by wind blown spores
- Not spread by rain or splash
- Not dependent of weather conditions for spread
- Carried by elm bark beetles
- Also spreads tree to tree by root grafts

---

---

---

---

---

---

---

---

## Root Graft



---

---

---

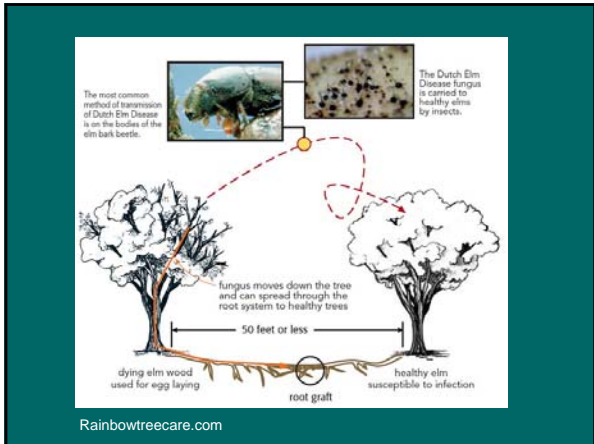
---

---

---

---

---




---

---

---

---

---

---

---

---

## Dutch Elm Disease

- Sanitation (removal of dead trees, debark firewood, pruning)
- Insecticides to control bark beetle vector
- Breaking root grafts by trenching
- Protective fungicide injections (Arbortec, Alamo, Fungisol)
- Plant resistant varieties (American Elm hybrids, Asian elms)

---

---

---

---

---


---

---

---

## Using Tree Injections

- Tree injections can be used to control specific tree diseases including Dutch Elm Disease and Bacterial Leaf Scorch
- But, efficacy is variable and timing is very important
- Wounds caused by injections have the potential to allow decay organisms to enter the tree




---

---

---

---

---

---

---

---



## Using Tree Injections



---

---

---

---

---

---

---

---

## Using Tree Injections



---

---

---

---

---

---

---

---

Questions?

[jacobjc@auburn.edu](mailto:jacobjc@auburn.edu)

---

---

---

---

---

---

---

---