Landscape Pests

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Disclaimer

- I am here in place of Frank Hale, to provide a talk worthy of Pesticide Points.
- Images & ideas borrowed from Drs. Hale, Windham & Fulcher
- I will not lie or shoot from the hip today
- I will offer to find the answer first

I am prepared to discuss the following

- Benefits of Hort. Oils
- Trunk Issues: Borers, Slime Flux, Cankers, Ambrosia Beetles
- Bagworms
- Oak Phylloxera
- Mites
- Scale
- Marestail

- **New Pests**
- Brown Marmorated Stink Bug
- Emerald Ash Borer
- A new insect on blueberry
- White Peachtree Scale
- Japanese Maple Scale

Useful Links

- Copy & Paste links, save as favorites

- Link to Middle Tenn Nursery Production Web site
- http://www.utextension.utk.edu/mtnpi/index.html

- Link to UT Extension publications
- http://www.utextension.utk.edu/publications/default.htm

- Chemical Class Chart / Mode of Action
- http://www.ohp.com/Labels_MSDS/PDF/CCC_X.pdf

Useful Links

- **PB1589 - Commercial Insect & Mite Control for Ornamentals**
- https://utextension.tennessee.edu/publications/Documents/PB1589.pdf

- **Find a Pesticide Label quick**
- http://www.cdms.net/tcd

Useful Links

- **Emerald Ash Borer**
- http://www.na.fs.fed.us/spfo/pubs/pest_al/eab/eab.pdf
- http://eppserver.ag.utk.edu/EmeraldAshBorer.html

- **Thousand Cankers Disease (TCD) of Black Walnut** www.TN.gov/agriculture/
- http://eppserver.ag.utk.edu/ThousandCankers.html

Dormant Oil will kill some Over Wintering Insects

- While it is often suggested that oils smother or suffocate small insects and mites that cannot crawl out of it, the disruption of cell membranes and the resulting desiccation of the pest is the more common mode of action for oil.
- The disruption of cell membranes allows
- the insect to dry up when it loses it’s protection

Dormant Oil will kill some Over Wintering Insects

- Absolute total coverage is essential
- The oil must cover the insects & eggs that are overwintering within the crevices of the bark, etc.
- In the branch crotches
- And most important, Total coverage is essential

Dormant Oil is best sprayed Feb - March

- 1 or 2 applications, depending on the population
- One application with complete coverage might be sufficient as a preventative.
- 2 to 3 gallons per 100 gallons is a common rate
- 2 gal/100 gal is a 2% solution
- Oil will remove the bluish blush from existing foliage on blue spruce but the new growth will be normal.

Dormant oil will kill:

- **immature whiteflies**
- the white cottony **pine bark adelgid** (check the trunk and branches of white pine);

pine bark adelgid

Dormant oil will kill:

- spider **mites**, rust mites, and eriophyid mites on (hemlock, juniper, spruce, arborvitae and occasionally burning bush);
- **scale** on (Manhattan euonymus, burning bush, mulberry, ash, lilac, etc.) and
- **Armored white peach tree scale** on ash, mulberry, peach, etc.
- **Japanese Maple Scale**

Dormant oil will kill:

- **oak phylloxera,** that causes oak leaves to wad up in July
- some types of overwintering eggs
- the **white pine aphid**
- the **spiny witch hazel leaf gall aphid** on birch

spiny witch hazel leaf gall aphid on birch, May 9, 2006

Spray Dormant Oil while:

- Plant is still dormant
- when the temperatures are above 40 degrees F
- and freezing will not occur before the spray can dry.
- Apply during good drying conditions to reduce any chance of phytotoxicity (= foliar burn)
- Bright sunny days
- Avoid cloudy, high humidity and low air movement periods.

The Oils are beneficial

- Insects do not develop a resistance to this mode of action.
- A light rain will not remove it.
- Do not breathe the spray mist as serious pulmonary problems may result however.
- Oil and water separate rapidly. Constant agitation is required.

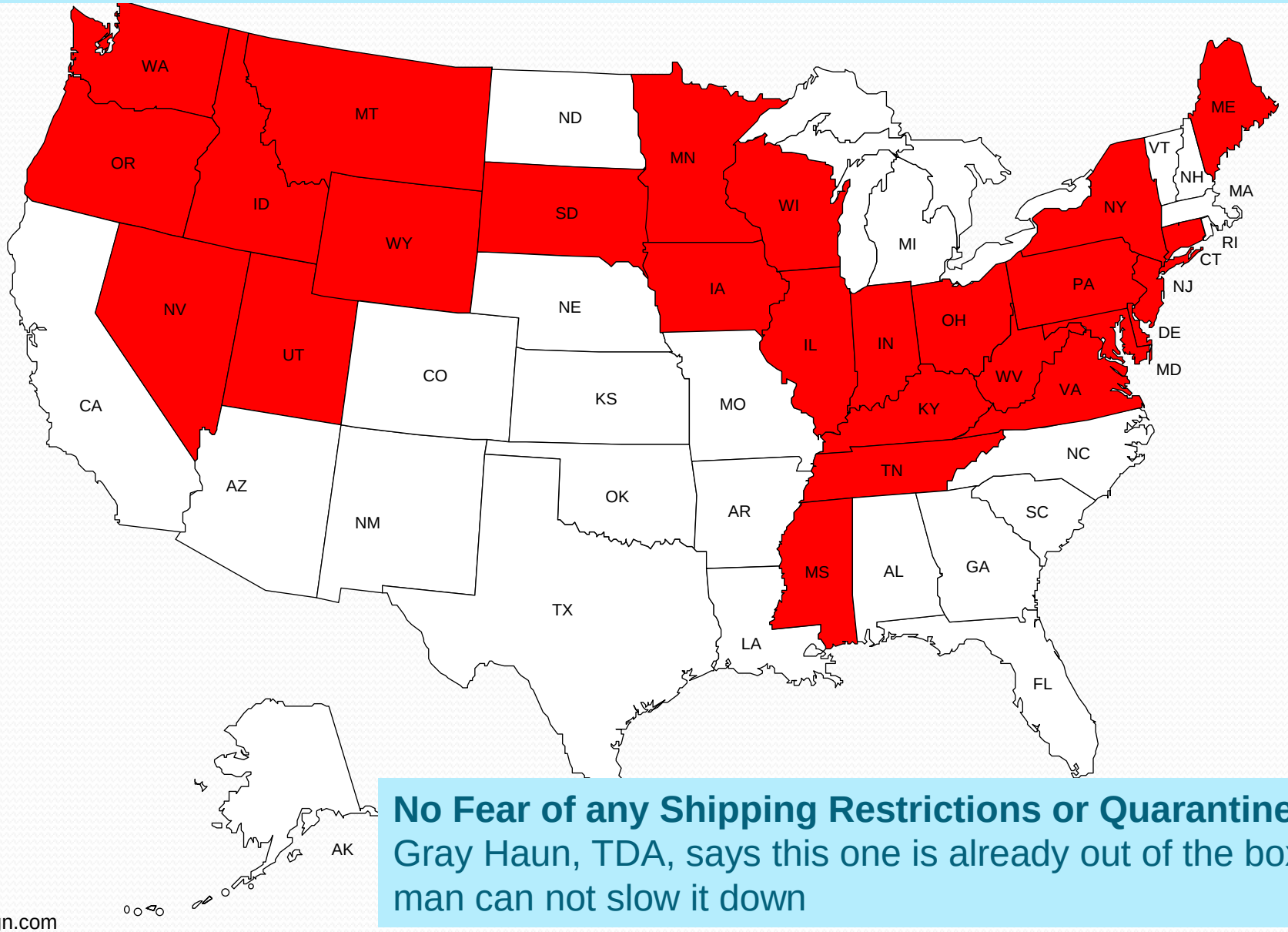
Difference in horticultural Oils

- There is Dormant oil
- Summer oil
- Ultra-fine oil-- more expensive, more pure, safer, can spray in 80’s

Brown Marmorated Stink Bug (BMSB)

- ***Halyomorpha halys***
- Native to Asia
- Attacks many crops
- First found in Allentown, PA in fall of 1996
- Now in multiple states 15 yrs later

Brown Marmorated Stink Bug, 2009



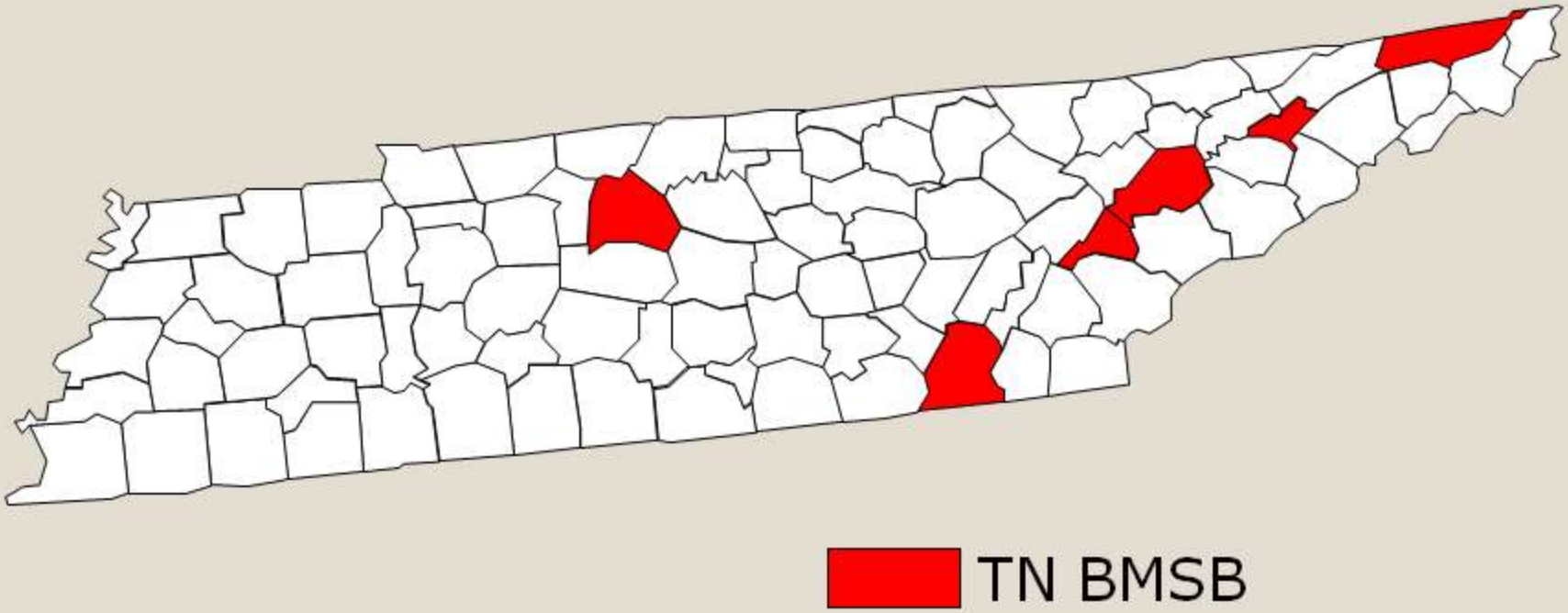
No Fear of any Shipping Restrictions or Quarantines

Gray Haun, TDA, says this one is already out of the box; man can not slow it down

Brown Marmorated Stink Bug

TN records as of December 31, 2010

Arrived in Tennessee in 2009



Brown Marmorated Stink Bug (BMSB)

Adults:

- 5/8 inch long;
- white band on next to last (4th) antennal segment ;
- several abdominal segments protrude from beneath the wings and are alternatively banded with black and white.

Brown Marmorated Stink Bug (BMSB)

- When disturbed or squashed, emit a foul smelling odor
- Will not bite man or animal
- Not a chewing insect like JB, but a sucking insect that uses its snout or proboscis to pierce the host plant to feed.

Damage to fruit is catfacing; which is a corky disfiguration of the fruit caused by stink bug feeding when the fruit is small

Brown Marmorated Stink Bug (BMSB)

- Like Asian Ladybird beetles & Boxelder bugs, gathers on house walls in fall
- The adult will move inside to overwinter
- Will live 6-8 months
- A nuisance pest in homes & buildings with a tendency to hitchhike via vehicles and quickly expand its range

Brown Marmorated Stink Bug (BMSB)

- Prefers the fruit of apples, grapes, cherry, citrus, figs, mulberry, raspberries, peach, pear & persimmon); vegetables (green beans, sweet corn, pumpkins), field corn, soybeans beginning in late May/early June (in Penn).

Brown Marmorated Stink Bug (BMSB)

- Has the **potential to** become a *major agricultural pest*

- ***It is* unknown** at this point whether the damage will cause *significant economic loss in ornamentals*.

- ***It has the ability to*** *transmit plant pathogens as* it sticks it's snout in foliage and young stems.

Brown Marmorated Stink Bug Damage on Apple

Images courtesy of Carol Holko, Maryland Dept. of Ag.

Emerald Ash Borer (EAB) Adult
A New Flatheaded Borer in Tenn

- First found in southeastern Michigan and Windsor, Ontario, Canada in 2002, but thought to have been established there for 6-10 years prior to that date

- New Pest Alert fact sheet available on-line at: http://www.na.fs.fed.us/spfo/pubs/pest_al/eab/eab.pdf

Emerald Ash Borer Larvae

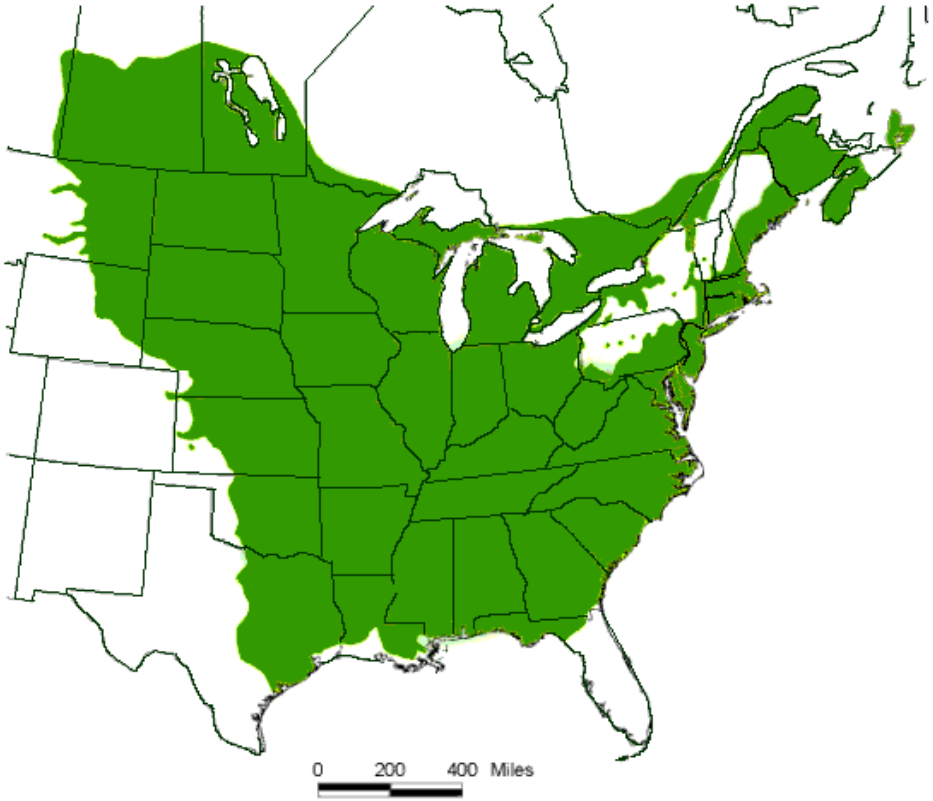
- Now found throughout Michigan, across much of Ohio, and in parts of Indiana, Illinois, Maryland, **Missouri**, Minnesota, New York, **Kentucky**, Pennsylvania, Virginia, West Virginia, Wisconsin and East Tennessee (2010). Also, infestations found in more areas of Ontario and in Quebec.

Range Maps

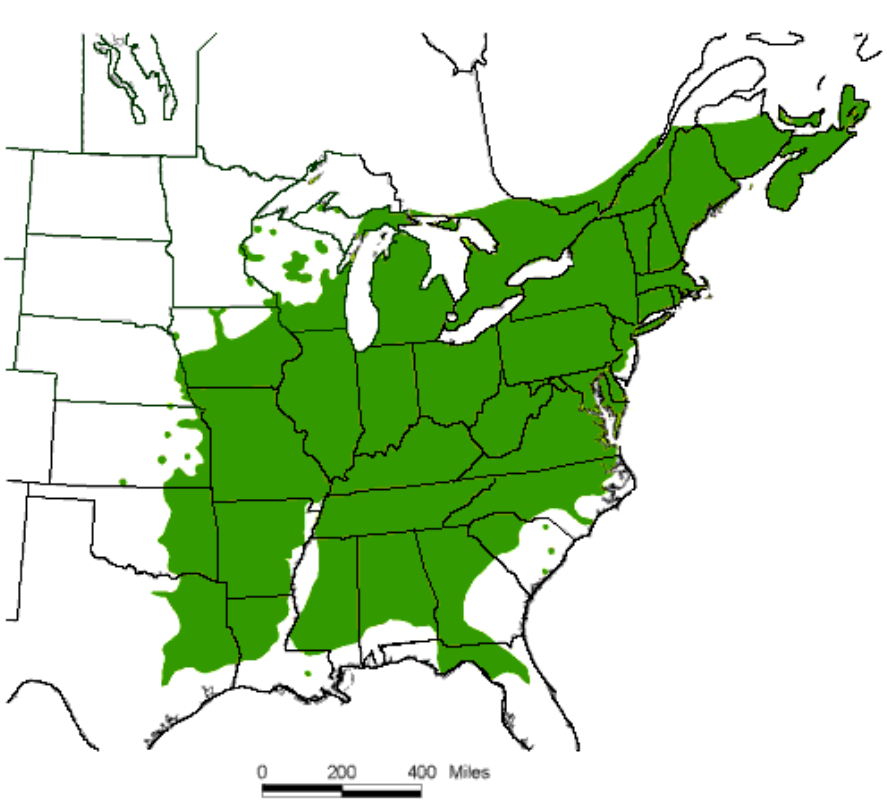
Emerald ash borer has the potential to wipe out ash over its North American range

Be careful when buying firewood from out of state

Native Range of Green Ash



Native Range of White Ash



Emerald Ash Borer

- EAB found in Knox & Loudon counties 2010; Grainger County in 2011
- *Man moves this pest in firewood.*
- *Man has been unable to stop Man.*

- **Take home**
- Quit growing and planting ash

Blueberry Insect

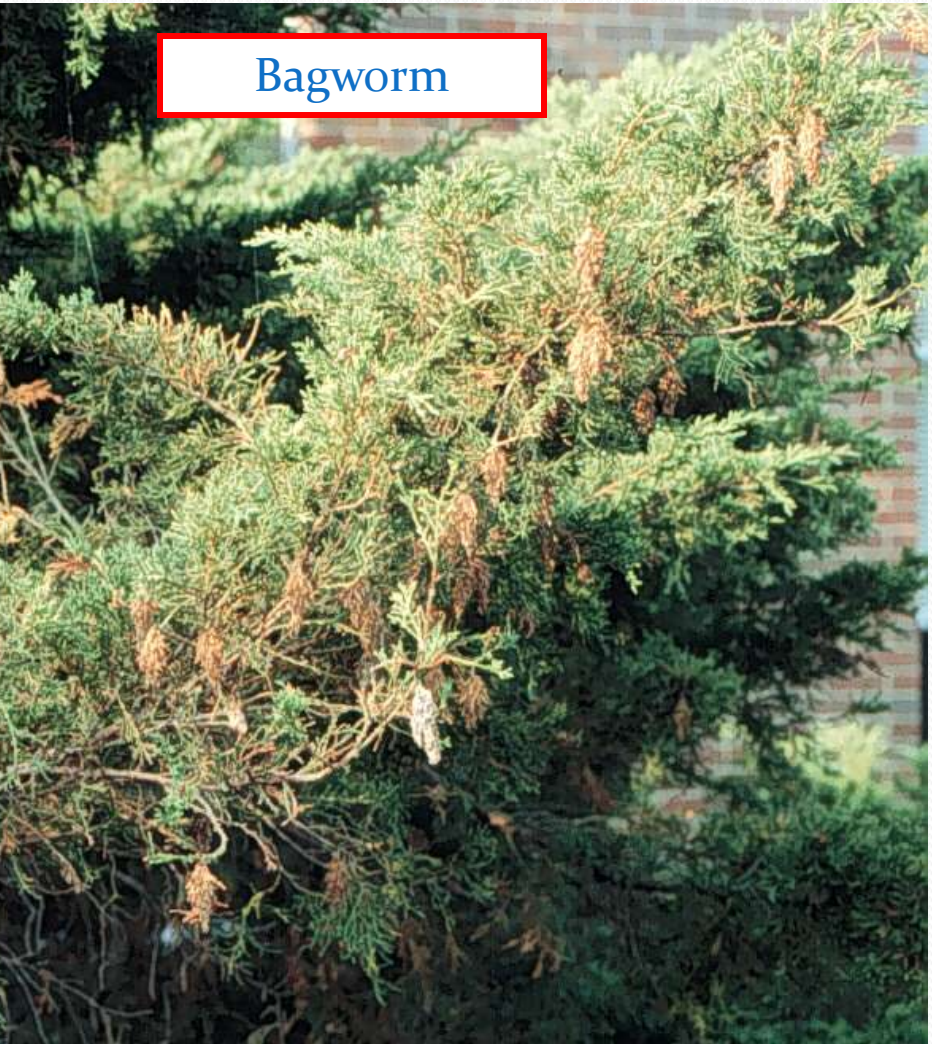
- A new insect has been found in Tennessee that will feed on the fruit
- **The spotted wing drosophila** is an invasive fruit pest that was first detected in California in 2008.
- Since then it has spread to Florida, North Carolina and a number of other states.
- In August 2011 it was found attacking blueberries in Unicoi County Tennessee.

The spotted wing drosophila

- Not on handout, will update this PPt on web soon
- To learn more about this destructive fruit pest, check out this on-line presentation at: http://entnemdept.ifas.ufl.edu/hodges/ProtectUs/presentations/spotted%20wing%20drosophila%201_23_2012.pdf
- http://entnemdept.ifas.ufl.edu/hodges/ProtectUs/presentations/spotted%20wing%20drosophila%201_23_2012.pdf

Always correctly identify the pest before planning a course of action.

Name the pest on the left



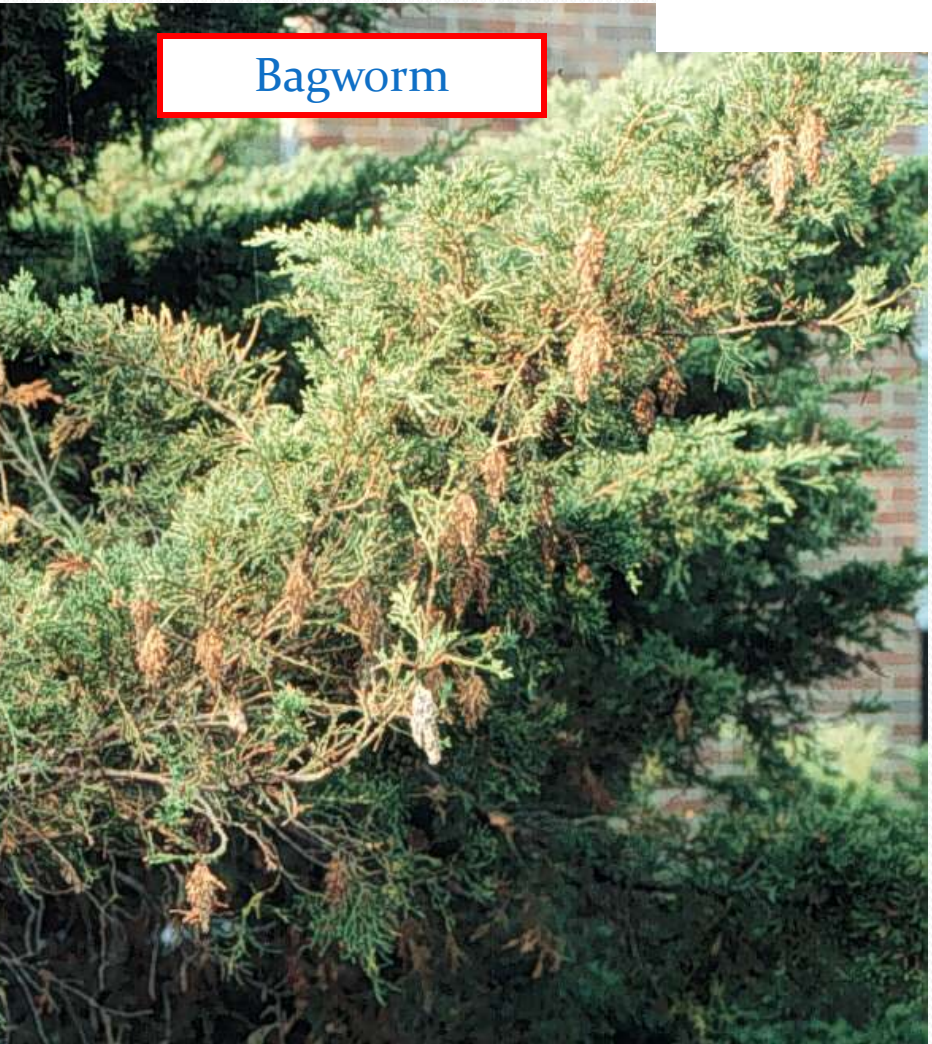
Developing Economic Thresholds

- Many foliage leaf spots and feeding pests, at low population levels, will not significantly harm plants (aesthetically only)

- Many insects and pathogens only cause cosmetic issues.
- May be difficult to convince the consumer

Bagworms will defoliate but not kill until about the 3rd consecutive year

Webworms & E Tent caterpillars are just unsightly



Bagworm

Fall Webworm

Bagworm Control

- Each female bagworm can overwinter 500 eggs.
- The female bags are in upper parts of plants—more difficult to pick them.
- Begin scouting late May, but wait for all to hatch; which is usually early June. Easier to kill when small. ***1st week of June***
- Pyrethroids (Asana, Talstar, permethrin, Mavrik)
- Spinosad (SpinTor or Conserve SC)
- Sevin no longer effective for most folks
- ***1st week of June***

Bagworm

Bagworms will feed on deciduous plants, but prefer conifers.

Can float on a long silken thread, birds feet

Bagworms

Droppings found under the plant. Can hear them fall.

Bagworm

Bagworms: Take home message

- ***1st week of June***
- Talstar or Conserve SC

Can you identify the following on trunks of young trees?

- Deer Rubbing
- **Borer** Damage
- **Cankers** from freeze stress: Bots
- **Mechanical** Wounds
- Lichens (a symbiotic relationship between algae + fungus)

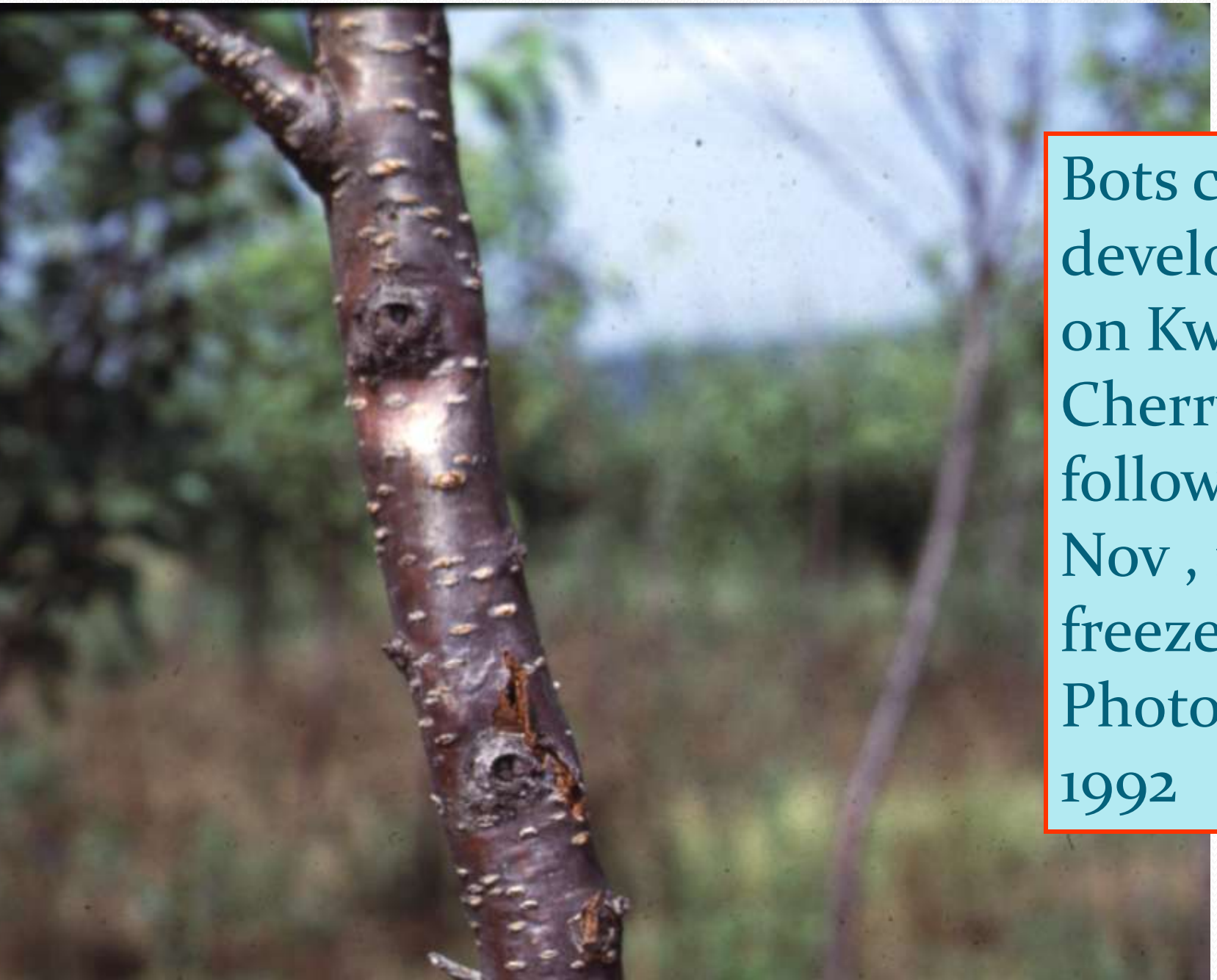
Mechanical Wound. On Side, no frass, no tunneling, galleries.

Deer scrap
Height, length, no frass, no tunneling, galleries.

Lichens

Redbud Bots Canker following stress


A stress canker on Cherry, 8-6-06
Are the roots alive?

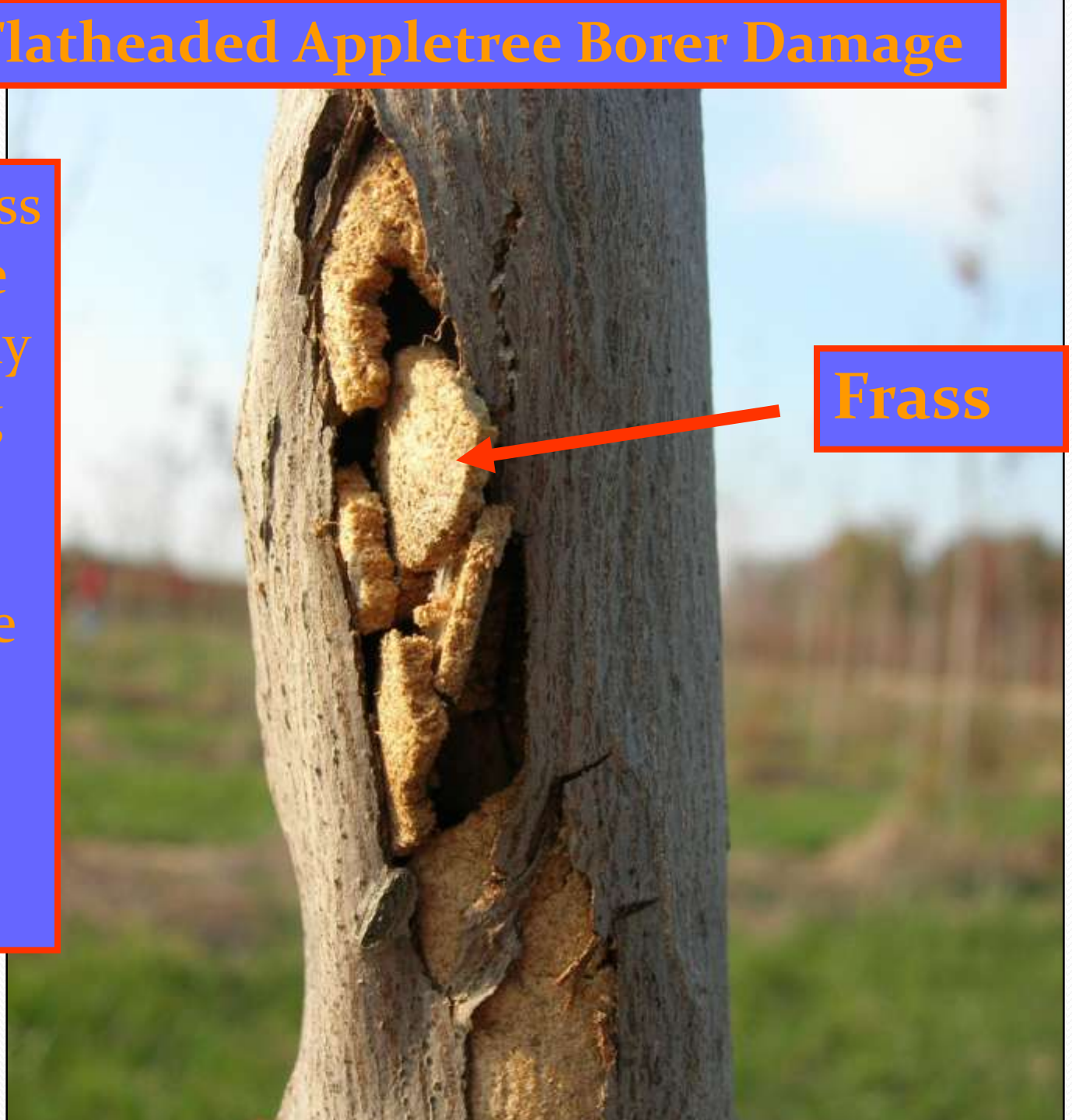


Bots canker developed on Kwanzan Cherry following Nov , 1991 freeze. Photo June 1992

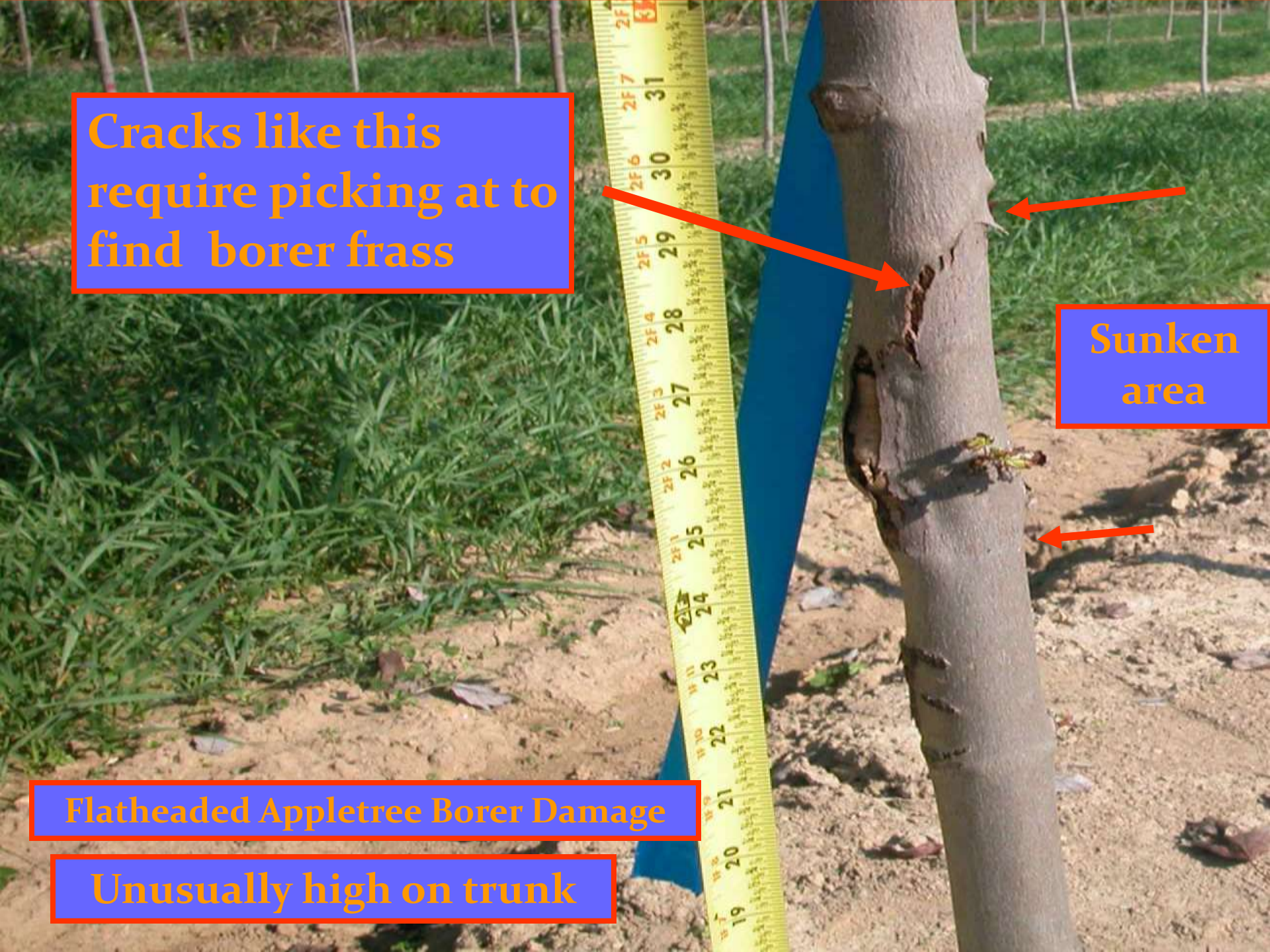
The bark on this young apple tree busted during an early freeze in the fall with the help of excessive fertilizer

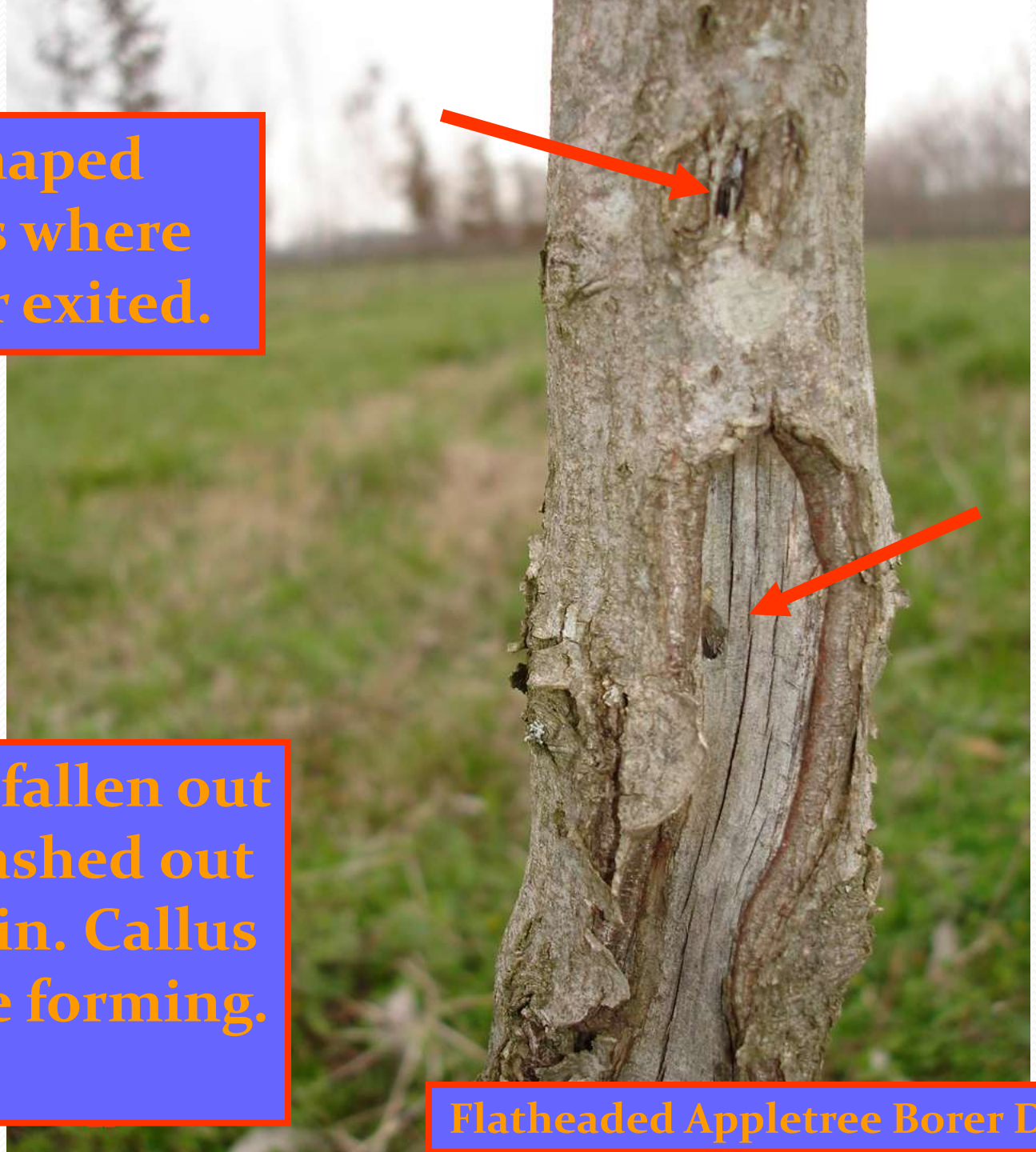
Freeze injury found on Oak in summer after April, 2007 freeze.

Flatheaded Appletree Borer Damage



Compare frass to composite board: mostly wood boring dust and insect poop. Will crumble into dust between fingers


Cracks like this require picking at to find borer frass
Sunken area
Flatheaded Appletree Borer Damage
Unusually high on trunk



‘D’ shaped holes where borer exited.

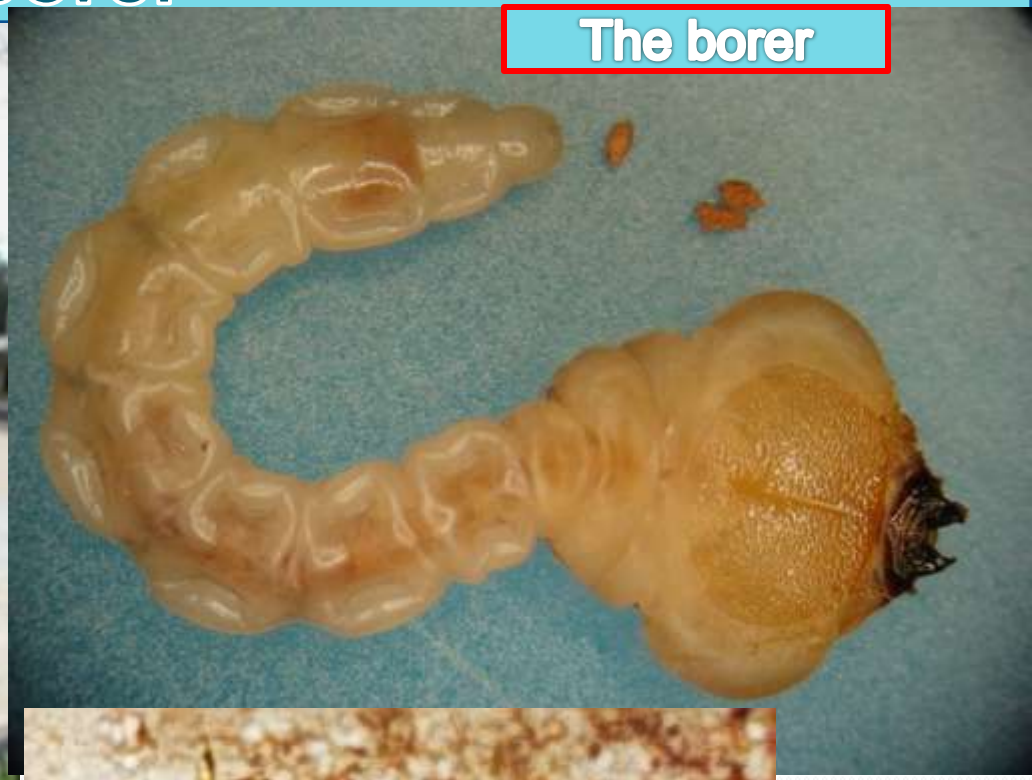
Frass fallen out or washed out by rain. Callus tissue forming.

Flatheaded Appletree Borer Damage

Flatheaded Appletree Borer Damage

Notice the spiral wound.

Flatheaded Borer



Flatheaded Appletree Borer Damage

Too late to prevent; treat soon after transplanting

Images courtesy of A. Windham, UT Extension

Bottom Line

- Need to learn to distinguish between mechanical, borer and cankers
- So you can strive to control the borers better
- Borer damage can be mistaken for mechanical damage when it is not.
- And understand stress is powerful in plants and animals.

Various tree borers and bark beetles attack stressed trees

- **Causes of Stress**

- Transplanting
- when not dormant
- insufficient rootball
- moisture stress
- too much, too little
- Planted too deep

FHAB Attacks Many Types of Trees

- Attacks some 30 species of woody plants, but maple, oak, hickory, linden, sycamore, tulip poplar, dogwood, and crabapple are most commonly infested

Protective Bark Sprays

- To prevent the Flatheaded Appletree Borer from damaging newly transplanted trees
- Apply protective sprays in early May & mid-June (previously mid May and late June)
- Spray trunks with Bifenthrin (Onyx, Onyx Pro)
- or permethrin (Astro, Perm-Up)
- Effective for most wood-boring pests
- Apply first 1-3 years twice a year following transplant or

To prevent the Flatheaded Appletree Borer from damaging newly transplanted trees

- Drench One Time with Merit, generic **Imidacloprid**, Discus or Allectus
- To those trees listed previously
- Homeowner: Bayer Advanced Tree & Shrub Insect Control
- Apply the systemic insecticide as a drench over the root system April 1-15 to trees planted in recent months or year.
- 1 time; effective 1-3 years.

Flatheaded Appletree Borer take home message

- In the landscape where the imidacloprid is being used on larger trees, late fall allows plenty of time for the insecticide to get into the tree and control pests the following spring, summer and fall. Many pests such as hemlock woolly adelgid and scale insects are on the tree feeding throughout the year. A soil application can thus be made whenever it is convenient and it will move up into the tree and provide control over a period of time.
- 21.4% Imidacloprid; 2.8 ml/inch of tree caliper
- Add to 1 or 2 cups of water per tree
- Controls many other types of insects; refer to label. Not mites

Slime Flux or Wetwood or Bleeding Canker on Oak 9-10-08

Caused by Stress

Possible Causes of the stress:

- rootball too small for top;
- moisture stress, either too much or too little moisture;
- planted too deep,
- rootball dried out

Gas pressure develops, forces sap out a weak place in bark

Granulate Ambrosia Beetle

[formerly called Asian Ambrosia Beetle, (AAB)]

Granulate Ambrosia Beetle [formerly Asian Ambrosia Beetle, (AAB)]

Image by M. Windham

Granulate Ambrosia Beetle [formerly Asian Ambrosia Beetle, (AAB)]

- Only attacks stressed plants--
- Too wet, too dry, too cold, late frost, etc
- Is sporadic, unpredictable, and costly.
- Frequently found on: cherry, chestnut, hydrangea, lilac, red maple cultivars, weeping Mulberry, redbud

Scout every 3 days beginning mid March

- Trigger for AAB attack is generally the first 2-3 consecutive sunny 70 degree days
- As early as Feb but typically not before late March with peak flights occurring in April. Can vary by several weeks from year to year
- Adult overwinters, so a flush of flight activity can occur as soon as the weather becomes suitable.

Granulate Ambrosia Beetle
[formerly Asian Ambrosia Beetle, (AAB)]

- Onyx or Astro for commercial, licensed Landscaper
- Onyx Pro, RUP; for comm land. and nursery
- Perm-up 3.2EC, RUP; for cert. Nsy & Land.
- Leave those attacked to become trap plants
- Request Handouts for more details or how to trap.

Stress is a 4 letter word

- Borers, bark beetles, and Ambrosia beetles
- Slime Flux or bleeding canker or Wetwood
- Canker diseases
- Bots, nectria, ……
- Seridium canker and Botryosphaeria canker & Dieback Diseases of Leyland Cypress
- http://www.aces.edu/pubs/docs/A/ANR-1160/ANR-1160.pdf by Auburn Extension

The result of Oak Phylloxera

The feeding of this insect causes a leaf distortion

Oak Phylloxera


Oak Phylloxera

Oak Phylloxera Control

- Spray Dormant oil in February-March to prevent
- Or Spray foliage when nymphs first appear in April-May with Sevin, Dursban, Decathlon, Discus, insecticidal soap, or horticultural oil
- Latter is more expensive.


Spider Mite Magnet
Dwarf Alberta Spruce
Adults may overwinter
on backside next to brick

First symptoms are usually noticed on a lower side

Twospotted Spider Mites

Spruce Spider Mites

- A cool season mite pest of arborvitae, juniper, false cypress, hemlock, pine, spruce and others

- Active in the spring and late summer-fall
- Overwinter in the egg stage

Spruce Spider Mites

- Control overwintering eggs with horticultural (Dormant) oil sprays

Spider Mite Control

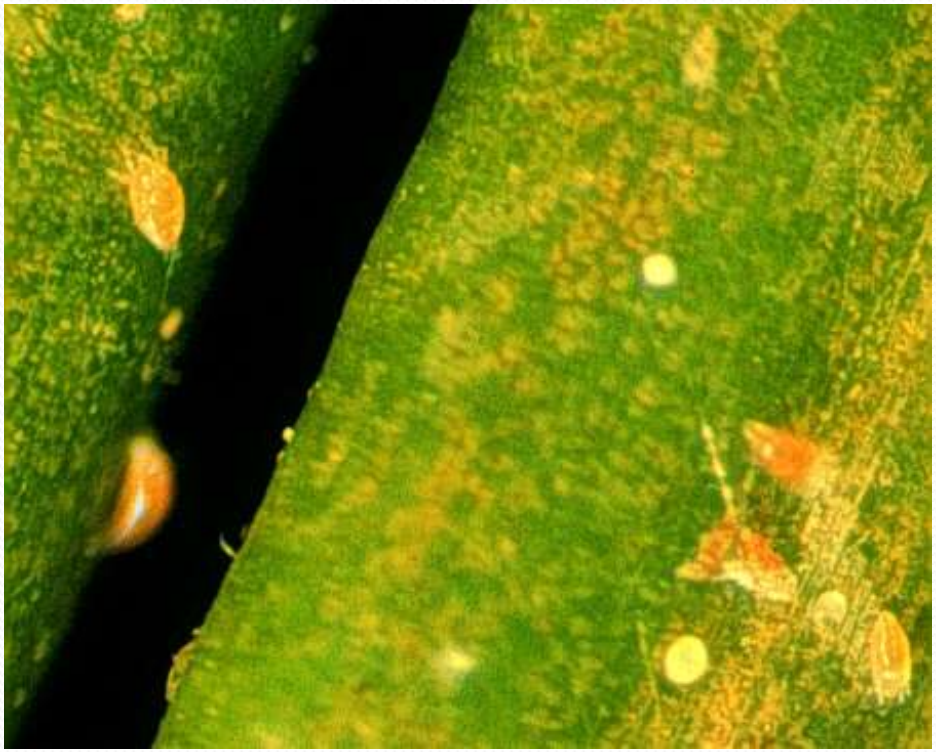
- Mites are not insects. Insecticides not effective
- Coverage of plant interior critical; pressure
- Miticide required: Kelthane, Sanmite, Hexygon, Floramite, Ornamite, TetraSan, Judo
- Avid, Talstar, Scimitar
- 3 times, 5 days apart. Refer to label
- Or just Dormant oil during Feb-March, 1-2 times
- Ultra-Fine Hort. Oil in Summer

Rust Mites on Conifers

- Eriophyids or rust mites are much smaller than spider mites
- Active during the late fall, most of the winter and the early spring
- Coverage is critical.

Rust Mite Control

- Best controlled with a dormant oil spray Feb-March



- Can also be controlled in the fall or spring with horticultural oil or Sevin


Can you find any mites?

What is the mite take home message?

- Spray dormant oil Feb-March once as preventative; twice if a known population is present
- Look at the Mite Table
- Link to Middle Tenn Nursery Production Web site
- http://www.utextension.utk.edu/mtnpi/index.html

Soft Scale

- Produce honeydew
- Sooty mold grows on honeydew

Armored Scale

- Do not produce honeydew
- No sooty mold
- They have a **protective waxy armor** or cover that is separate from the body of the insect

Scale: Take home message

- That scale is an insect; not a fungus or a knot
- That oil is the most effective, economical and safest pesticide to use.
- Spray late Feb-March annually

Sooty Mold

Tuliptree Scale

Image by Alan Windham

Tuliptree Scale

Sooty Mold

- Hosts: Tuliptree (yellow poplar), magnolia and linden.
- One generation - Females produce up to 3000 eggs.
- Crawlers emerge in late August through September.

Magnolia Scale

Apply dormant oil in February-March. Foliar insecticide applications should target crawler emergence in September-early October.

Fletcher Scale with Emerging Crawlers

Pine Tortoise Scale

Apply dormant oil in February-March for overwintering nymphs. Foliar insecticide applications should target crawler emergence in early June-July.

Cottony Camellia Scale

Cottony Camellia Scale Control

- Apply dormant oil to adults in February-March
- Egg masses (ovisacs) are laid in May and crawlers emerge soon after
- Target adults and ovisacs with horticultural oil in May or wait until crawlers emerge for foliar insecticide applications

Monitoring Scale

- Sticky traps can be made to catch the emerging scale crawlers
- Use double sided Scotch tape or black electrical tape coated with a thin layer of petroleum jelly
- Flag the branch and check at least once per week starting 10-14 days before expected emergence

Soft Scale Control

- **horticultural oil: Dormant, Summer, Ultra-Fine**
- carbaryl (Sevin)
- cyfluthrin (Tempo)
- malathion (Malathion)
- Imidacloprid plus cyfluthrin (Discus)(generic)
- dinotefuran (Safari)
- acetamiprid (Tristar)
- pyriproxifen (Distance)
- buprofezin (Talus)

Wax Scale

Wax Scale

- Systemic insecticides – Discus, Orthene, Dimethoate,, Flagship, Safari, TriStar
- Contact insecticides – Dursban, Distance, Talus

Wax Scale

- **Apply dormant oil in February-March**
- Applications of systemic insecticides to the soil should be made in late April
- Wait until mid-May to make foliar applications of recommended insecticides
- A second foliar application should be made 10-14 days after the first
- Since there are 2-3 generations per year for Indian wax scale, spray again with the two spray regiment whenever crawlers emerge

Soft Scale

- Produce honeydew
- Sooty mold grows on honeydew

Armored Scale

- **Do not produce honeydew**
- **No sooty mold**
- **They have a protective waxy armor or cover that is separate from the body of the insect**

Euonymus scale, an armored scale

Pine Needle Scale

Chionaspis pinifoliae

Pine Needle Scale

Reddish adult female and eggs under scale armor

Control emerging reddish crawlers in April and again in July-August

White Peach Scale

Dormant oil application in February-March

White Peach Scale

Apply insecticide when crawlers present for the three generations in (May, July, and September)

White Peach Scale

Good coverage is essential when using horticultural oil and other contact insecticides

Oystershell Scale

- Grayish-brown, oystershell-shaped with striations.
- An armored scale.
- Two forms:
  - Apple
    - Solid, slightly smaller, develops earlier
  - Lilac
    - Banded, slightly larger, develops later

Courtesy of A. Fulcher, UT

Oystershell Scale

- 128 host plants:
  - Apple/crabapple, ash, beech, birch, boxwood, cotoneaster, dogwood, elm, horsechestnut, lilac, linden, pachysandra, pear, plum, sycamore, tulip poplar, viburnum, willow.

Courtesy of A. Fulcher, UT

Oystershell Scale

- Overwinters as white egg under female's cover.
- Two generations per year.

Eggs

Courtesy of A. Fulcher, UT

Managing Oystershell Scale with IPM

- ~ May 12-20 all crawlers emerge and settle in Kentucky observations (probably earlier in Tennessee)
- Begin forming wax in 7 days.

Courtesy of A. Fulcher, UT

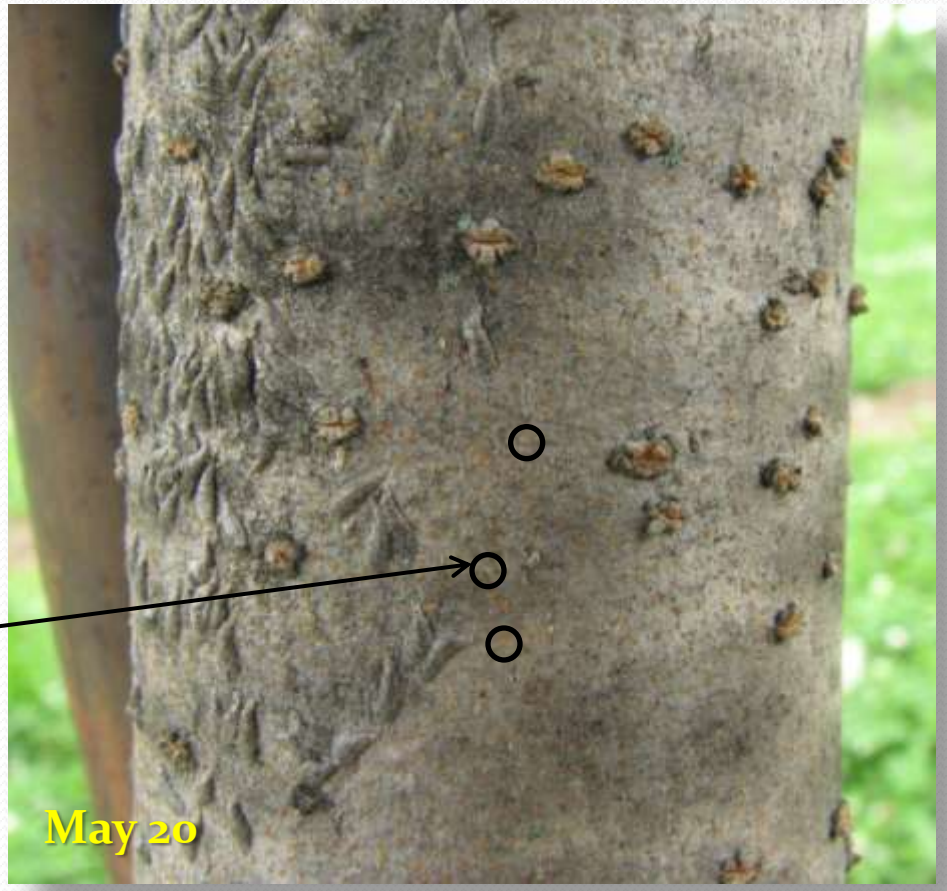
Managing Oystershell Scale with IPM

- Scout trunks of lilacs.
  - Start in early May
  - Flowering dogwood
  - Sargent crabapple
- Trunks and large limbs of other plants.
- Large crawlers are easy to spot!

Courtesy of A. Fulcher

Managing Oystershell Scale with IPM

- Bifenthrin + 1.5% oil effective 6 days after treatment.



Courtesy of A. Fulcher

Japanese Maple Scale

- Very small, white body.
- Feeds on numerous species!
  - cherry, dogwood, euonymus, holly, hornbeam, Itea, lilac, linden, magnolia, maple, pyracantha, privet, redbud, serviceberry, stewartia, and styrax, yellowwood, zelkova.

Courtesy of A. Fulcher, UT

Japanese Maple Scale

- Two generations per year in KY, TN and MD.
- East coast, south of us, and spreading.
- Threat to sales, not to plant health.
- First found in KY in 2006.

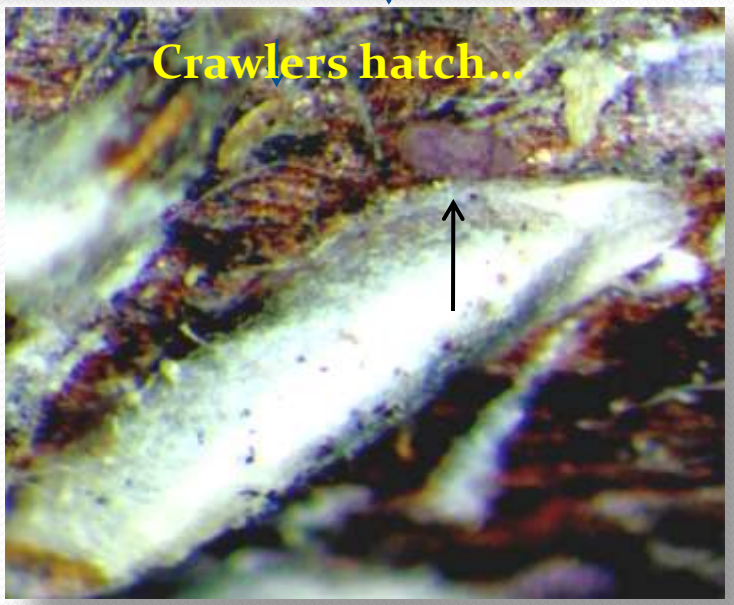
Courtesy of A. Fulcher, UT

Japanese Maple Scale

Female overwinters

Eggs form in spring

Courtesy of A. Fulcher, UT



Crawlers hatch…

But don't move far, immediately develop wax

2nd generation develops mid-late August, overwinters as adult.

Japanese Maple Scale

- Very little information available about the pest. The following information is from Kentucky.
- March 16 - no eggs.
- April 30 - 30% females developed eggs.
- May 20 - 100% developed eggs.
- May 27 - crawler emergence (one).
  - Crawlers emerge much earlier around hardscaping.

Courtesy of A. Fulcher, UT

Japanese Maple Scale

- June 1 - crawlers developing **waxy coating.**
- Lengthy crawler emergence (through July)!!
- Mid-August 2nd generation of eggs developed
- Overlapping generations?

Courtesy of A. Fulcher, UT

Control Challenges of Japanese Maple Scale

- Long crawler emergence period.
- Immediate wax development.
- 2 generations / year
- Small, difficult to see.

Courtesy of A. Fulcher, UT

Managing Japanese Maple Scale with IPM

- Scout diligently – its small!!

Courtesy of A. Fulcher, UT

Managing Japanese Maple Scale with IPM

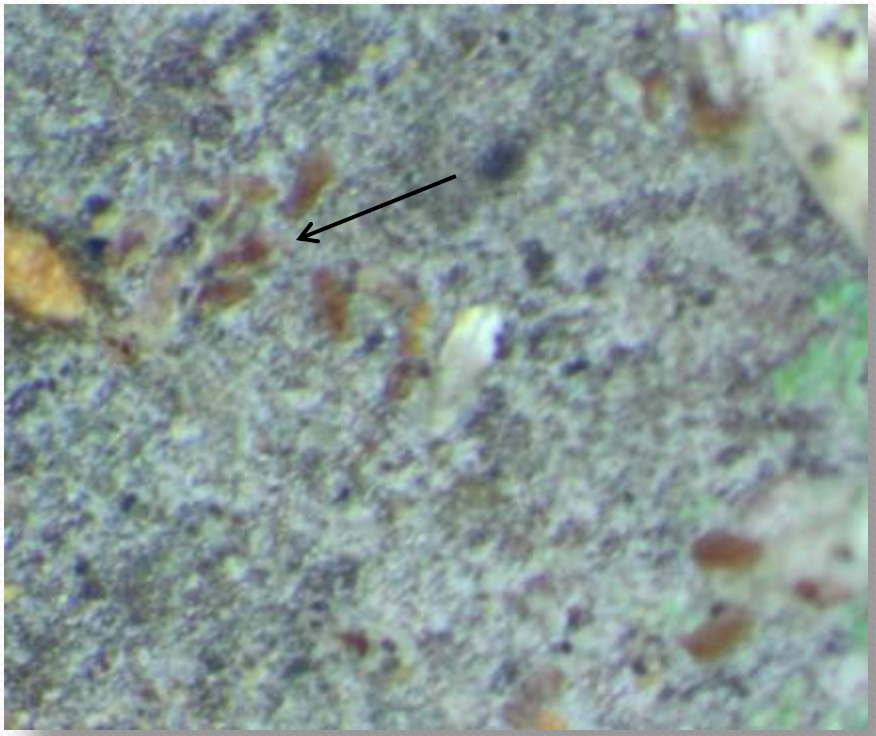
- Time heightened scouting when oakleaf hydrangea, tree lilac, smokebush are in bloom.
- Respect microclimates.

Courtesy of A. Fulcher, UT

Image by F. Hale

Managing Japanese Maple Scale with IPM

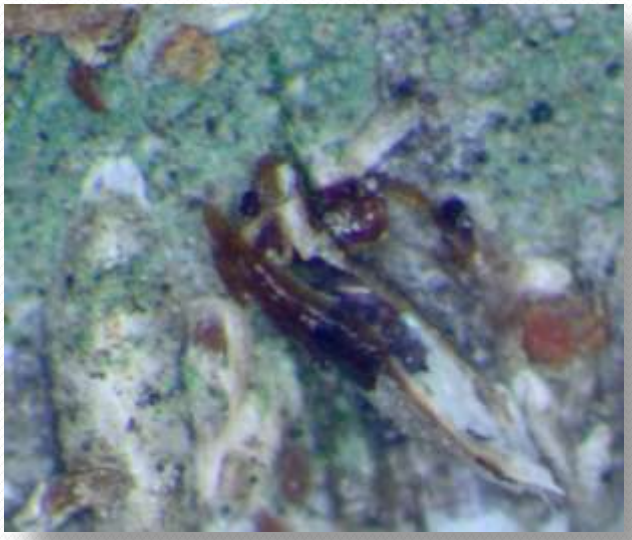
- Inspect incoming plants thoroughly.
  - Shrubs - Scout interior branches at base-older.
  - Trees - Scout trunk and base of large limbs.
- *Heavy* dormant oil applications.
- Crawlers are killed with bifenthrin and 0.5% -1.5% oil



Courtesy of A. Fulcher, UT

Managing Japanese Maple Scale with IPM

- *Challenge is crawlers emerge over a long period and contact is essential.*
  - June 1 to July 12+



Courtesy of A. Fulcher, UT

Armored Scale Chemical Control

- Horticultural oil targeting adults and eggs during dormant and crawlers during growing season

- pyriproxifen (Distance) - IGR
- buprofezin (Talus 40 SC) - IGR
- acetamiprid (TriStar)
- dinotefuran (Safari 20 SG) foliar or trunk application
- acephate (Orthene)
- dimethoate (Dimethoate)

Armored Scale Contact Insecticide Spray Intervals

- Horticultural oil, insecticidal soap, Dursban, malathion, Talus, Distance, and Sevin
- Apply two sprays 10 days apart whenever crawlers are emerging

Glyphosate (Roundup) **Resistant Marestail**

- Is this a problem for you?
- Where?
- Marestail seed can travel hundreds of miles

Postemergence

- **Finale** (2-4 fl oz/gal)
- Non-selective, like glyphosate (Roundup)
- capable of killing grass, shrubs, etc, like glyphosate
- Great Coverage, No root uptake, No vaporization
- **2,4-D**
- Possible root uptake
- Vaporization possible
- ester – will form a gas, lower foliage, travel miles
- amine – less likely to form a gas, but will move 90

Preemergence

- Gallery 0.66 lbs/A (CFL)
- Princep 1.5 qt/A (CF),
- SureGuard 8 oz/A (CF)

Compatibility issues

All generic glyphosate products are not equal.

Difference is in the inert ingredients.

Compatibility issues with 2,4-D

Compatible: Gly-4; Gly-Star

Cornerstone is used by most but, two instances of jell

Use the jar test to learn if compatible

2011 was a tough year for Tennessee Extension

Frank Hale - Back on job following triple bypass surgery.

Alan Windham - Back on job after knee surgery following a fall.

Position of Area Nursery Specialist in Middle Tennessee eliminated after June 30, 2013

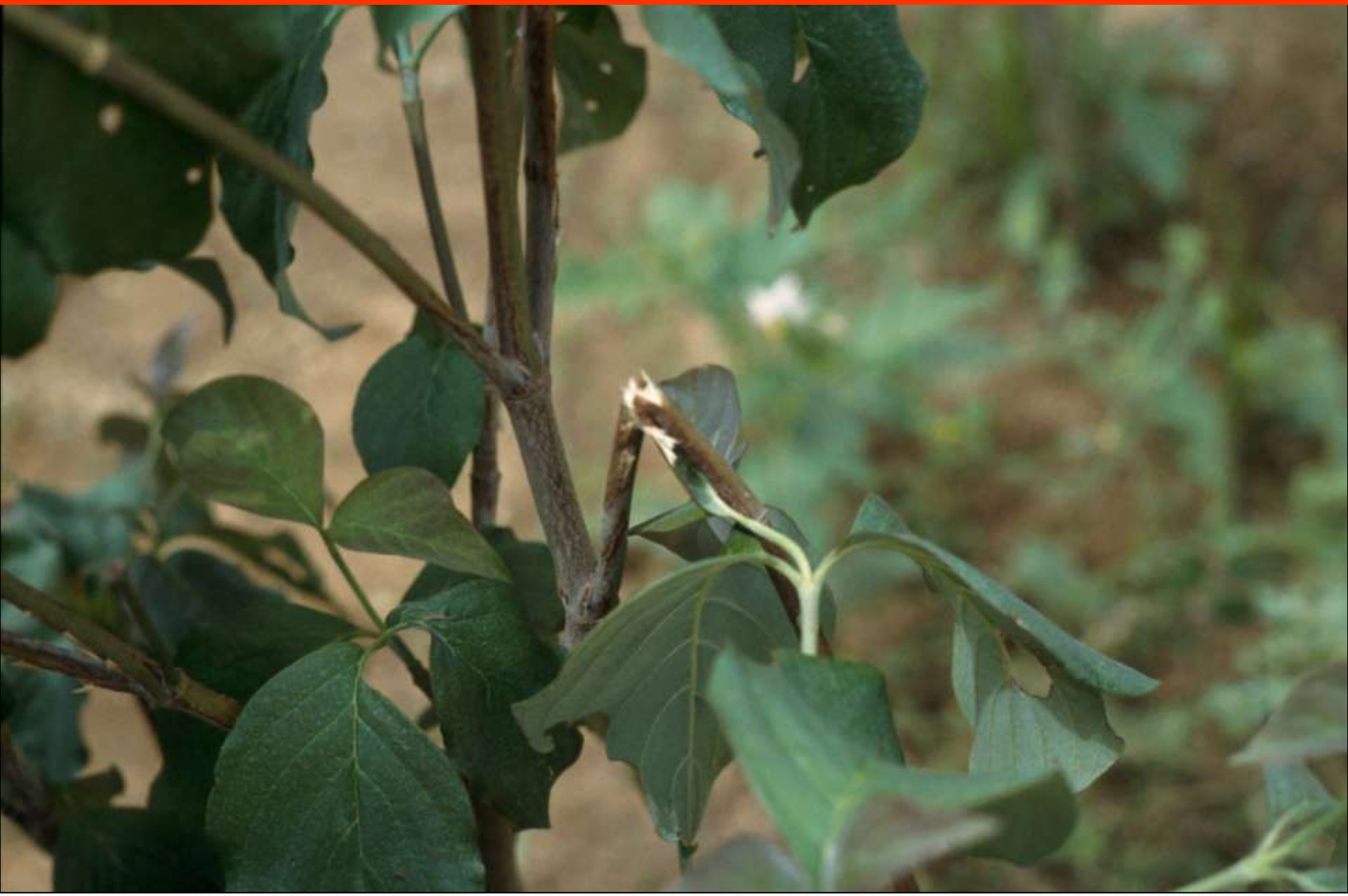
Position of Area Hort Specialist in E Tn and two hort agents in state eliminated. Funding

Periodical Cicada

Broods are on either 13 or 17 year cycles

White Cicada found emerging from split in skin while clinging to tree that it crawled up from roots

Flagging from multiple wounds on 2 sides of branch



Flagging on dogwood from Cicada egg laying

Callus formation from egg laying. Note the splinters of wood


Callus formation; wood splinters indicate this is not a scrap.

Periodical Cicada Control

- Very little can be done. Insecticides not effective.
- They do not feed.
- They prefer to lay eggs in pencil size wood.
- High population can cause loss of year's growth
- Prune damaged branches out July 1 or so to allow time for re-growth.
- They return either every 13 or 17 years, depending on the Brood you have.

The End

Brown Marmorated Stink Bug (BMSB)

- In Maryland nurseries, feeding has been observed on crabapple, apple, Zelkova, hibiscus, lilac, & dahlia while many common trees and shrubs will probably serve as hosts (maple, dogwood, redbud etc.)
- The stink bugs feed on sap in the trunk and main branches while wasps will feed on any leaking sap
- Maryland greenhouse and cut flower growers have observed feeding on chrysanthemums, zinnias, and sunflowers

Brown Marmorated Stink Bug (BMSB)

- Has the potential to become a major agricultural pest and high numbers showed up summer of 2010 in Maryland

- In summer and fall 2010, major losses of fruit crops including peaches and apples were reported in Washington County Maryland (also found in western Maryland on grapes, raspberries, sweet corn, soybeans, tomatoes, peppers, cucumber and eggplant)

Brown Marmorated Stink Bug (BMSB)

- **Damage is** leaf stippling, catfacing on tree fruits, seed loss, and transmission of plant pathogens.

- Feeds on leaves, stems, fruit, and vascular tissues beneath the bark of woody ornamentals.

Brown Marmorated Stink Bug (BMSB)

- ***It is*** unknown at this point whether the damage will cause significant economic loss in ornamentals.
- The BMSB feeds on more than 56 genera and more than 80 woody and herbaceous ornamental plant species.
- Various individuals are reporting personal observations and opinions, with no research concerning ornamentals

Brown Marmorated Stink Bug (BMSB)

- ***Several of the states have begun research.***
- Biological control will be the long-term strategy
- The BMSB has no enemies in US
- This is another pest introduced because we import so much from foreign countries, more than can be inspected.
- Could arrive here anytime from Nashville

Emerald Ash Borer Adult (A New Flatheaded Borer Invader in TN)

- Larger and brighter green than native species of *Agrilus* (adults 7.5 – 13.5 mm long) ¼ to just over ½ inch long
- Top of abdomen under the elytra (wing covers) is metallic coppery red
- New Pest Alert fact sheet available on-line at: http://www.na.fs.fed.us/spfo/pubs/pest_al/eab/eab.pdf

Emerald Ash Borer Control

- While control has been difficult with variable results, some viable options are emerging
- Neonicotinoid insecticides (imidacloprid, dinotefurnan) have been tested by various application techniques (soil drench, soil injection, trunk injection, basal trunk spray)
- Xytect has a higher (2X) label rate than other imidacloprid insecticides & is effective as soil drench on >15 DBH trees if applied each year

EAB found in Knox & Loudon Counties 2010; Grainger County in 2011

Man moves this pest in firewood. Man has been unable to stop Man.

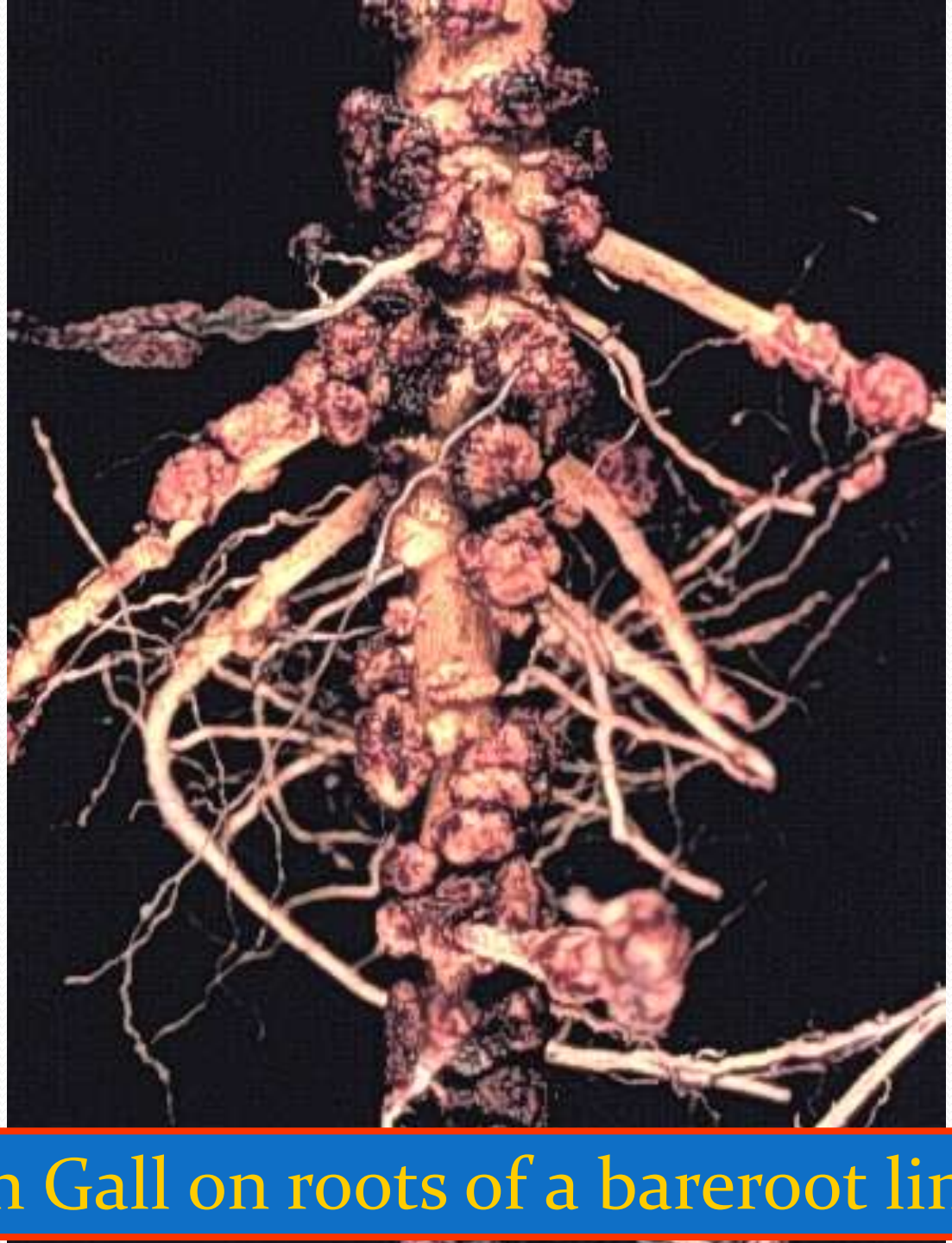
I brought each company

- A nursery buyer's guide
- A list of the nurseries in Middle Tennessee
- A map to their door
- Information about Tennessee's only nursery trade show, in McMinnville, Sept 30-Oct 1 2011
- 5 Pesticide Points, cat 3,10,12 + ISA Sept 30, $30
- Nursery Tour Sept 29, $25
- In Murfreesboro in 2012

Crown Gall

- A bacterial disease of euonymus, rose, willow & fruit trees
- The pathogen enters via a wound
- Often spread during propagation
- Buy only disease free plants
- Can be spread with infected pruning tools

Crown Gall on Wisteria



Crown Gall on roots of a bareroot liner

Nitrogen fixation nodules on Eleagnus roots

Crown Gall will infest the soil for years

- Susceptible: Euonymus, rose, willow, peach, cherry, plum, maple, Weigela, oak, dogwood, forsythia, privet, common lilac, juniper, eastern redcedar, pine, apple arborvitae, brambles, mountain ash, spirea, poplar, hydrangea, +
- No reports on: beech, serviceberry, birch, boxwood, redbud, holly, sweetgum, tulip poplar, magnolia, spruce, hemlock, ginkgo, zelkova, sourwood, beech, smoketree, fringetree, & more.

Fireblight on Bradford during a severe year for it,

June or July, 2007

Severe Fireblight on 3 inch Cleveland Select Pear

during a tough year for it, May 6, 2010

Severe Fireblight on Cleveland Select Pear,

May 6, 2010

Fireblight beginning on Cleveland Select Pear,

May 6, 2010

Fireblight is

- favored by humid, rainy weather, above 65ºF.

- fireblight is most severe on tender, succulent spring growth caused by excessive nitrogen fertilization.

Fireblight just loves

- fruiting apple, crabapple, fruiting pear and ornamental pear.
- Pear cultivars Aristocrat, Autumn Blaze & Redspire are more susceptible than Bradford, Capital, Cleveland Select, Fauriei and Whitehouse.
- It will also attack Amelanchier (serviceberry), cotoneaster, hawthorn, mountain ash, firethorn (pyracantha), plum, quince & spirea.

Symptoms

- Branch terminals will be green and appear healthy one day and will wilt the next.
- The leaves on 3-8 inches of a terminal will turn brown or black in a day or so.
- Leaves will stay attached.
- There will be a characteristic crook in the terminal as the tip bends over, resembling a shepherd’s crook.
- The shoots and limbs appear as though they’ve been burned by a torch.

New Information

- Insects, wind and splashing rain or irrigation can spread the bacteria.
- Insects would not have to feed, just visit a plant.
- Labor might spread it while handling foliage before and after symptoms appear.

Fireblight Control

- Prune out during winter, cut 12-18” below.
- Disinfect tools between each cut with Lysol, bleach, alcohol, but Greenshield (by Whitmire) is best.
- Delay spring fertilization til June on Malus & Pyrus—to reduce severity of infection.
- Spray Streptomycin at 20% bloom and every 5-7 days during bloom. More frequent during rainy weather. Spray late in day.
- Zerotol offers no residual control; it is a contact disinfectant
- Grow resistant cultivars

Oozing of bacterial Fireblight on Pear

Thousand Cankers Disease (TCD) of Black Walnut

- A quarantine in Knox county prohibits the movement of firewood and black walnut nursery stock and limits the movement of black walnut timber and other material that can spread TCD.
- Tennessee Div of Forestry estimates 26 million black walnut trees on Tennessee public and private timberland potentially valued as high as $1.47 billion is at risk.
- Do not transport walnut or ash firewood or logs out of neighborhood. Do not buy from out of area. Man is man's worst enemy in the spread of this pest.

Thousand Cankers Disease (TCD) of Black Walnut

- Watch for signs of infestation in your black walnut trees. If you suspect your black walnut tree could be infested with TCD, visit www.TN.gov/agriculture/tcd for an online symptoms checklist and report form or call TDA's Regulatory Services Division at 1-800-628-2631.

- New TCD Quarantine and Buffer Counties announced:
- http://www.tn.gov/agriculture/publications/regulatory/tcd_map.pdf
- from Dr. Steve Powell, TDA State Entomologist - Division of Regulatory Services

- http://eppserver.ag.utk.edu/ThousandCankers.html

Useful Links

- Tenn Nursery & Landscape Assoc's Buyer's Guide
- www.tnla.com
- Middle Tennessee Nursery Assoc
- www.mtna.com/