Tree Insect Problems: Scale, Aphids & Borers

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EXTENSION
UtahStateUniversity

UTAH PESTS

Integrated Pest Management (IPM)

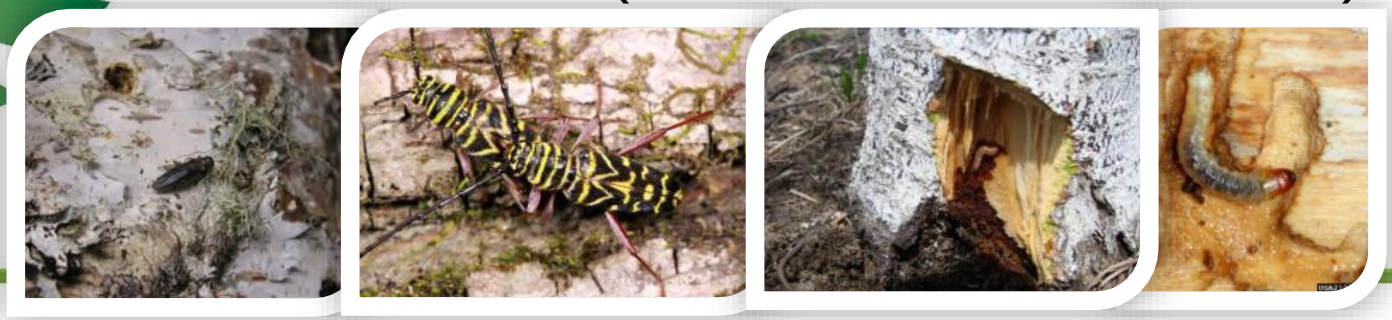
- Sustainable
  - $, environment, human safety, society
- IPM Strategies
  - Cultural (plant & site management)
  - Mechanical or physical (barriers, disruption, traps)
  - Biological (natural enemies)
  - Chemical (pesticides)
- Action Thresholds
  - Avoid calendar-based sprays
  - Treat only when needed

Insect Plant-Feeding Groups

Defoliators, Fruit Tunnels (chew)

Stippling, Distortion, Limb Dieback (suck sap)

Borers (chew into trunks & stems)



Scale Insects

European Elm Scale

Soft Scales

Lecanium Scale

Oystershell Scale

Armored Scales

Black Pineleaf Scale

How Scales Feed

- Suck plant sap
  - soft scales feed in phloem vessels
  - armored scales puncture various cells
- Some inject toxic saliva into plants
- Plant stress
  - yellow leaves
  - black sooty mold (soft scales produce sticky honeydew)
  - limb dieback
  - tree decline

Scale Infestation Symptoms

Ants tending
soft scales

Twigs & limbs encrusted in
scale insect bodies

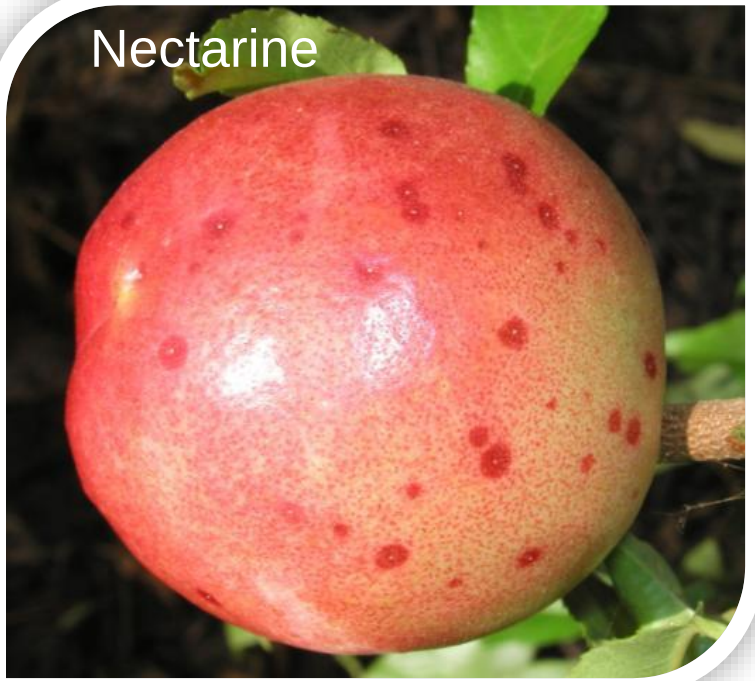
Limb dieback when
scales are abundant

Scales on Fruit


Apple

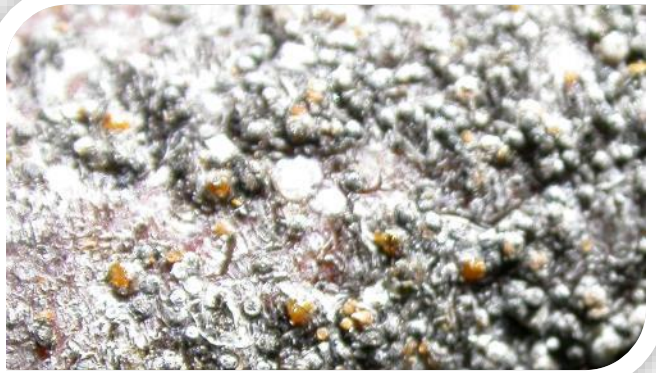
San Jose Scale (all tree fruits)

Feeding spots & scales on fruits
“measles spots” with white center



Scale Mechanical and Cultural Controls

- Prune out infested limbs
- Prevent tree stress
  - proper irrigation especially during droughty times, including spring & fall



Scale Biological Control

Parasitic wasps attack scales

Provide blooms with nectar

Ladybeetle predators: twice-stabbed

Exclude tending ants

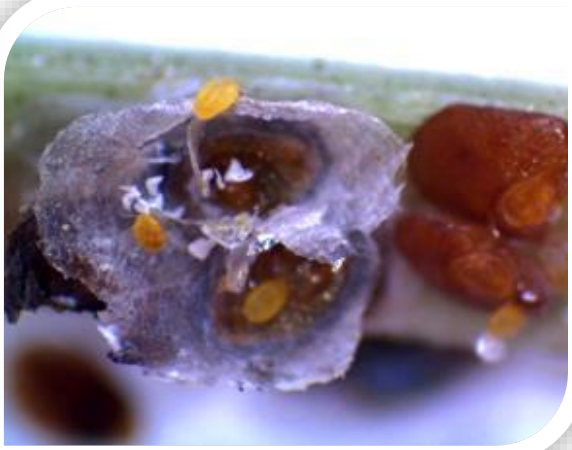
1st Defense of Season: Dormant Control

- Superior or Ultra-fine oil
  - 3-4%
  - apply at bud break
    - before flower buds open
    - ≤ ¼ inch leaf tissue
  - > 40°F
- Combine with compatible insecticide

Scale Monitoring

- Place sticky tape band around infested limbs to trap the young “crawler” stage
- May, June, July (species specific)

Sticky tape on apple limb with crawlers



Black pineleaf scale crawlers

San Jose scale crawlers

Scale Insecticides: Target Crawler Stage

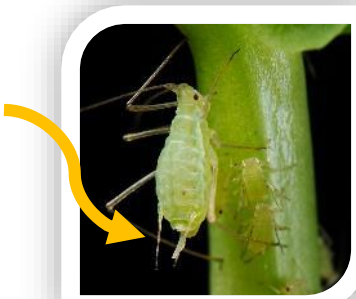
- Systemic soil drench or injection
  - Spring (Post-bloom): ~3 wk before crawlers
    - Soft Scales – imidacloprid (Merit, Bayer Advanced, others)
    - Armored Scales – dinotefuran (Safari) – ornamentals only
- Summer canopy sprays
  - June to July (varies with species; sticky bands to monitor)
    - horticultural oil, insecticidal soap, acephate (Orthene), carbaryl (Sevin), dinotefuran (Safari,) pyriproxyfen (Distance), buprofezin (Talus), azadirachtin (Azatin, Neem oil), synthetic pyrethroids (Tempo, Talstar, Suspend, others), malathion

Aphids: Common!!

Small, soft-bodied
Live in groups (colonies)
Suck phloem sap
“Tail pipes” (cornicles)

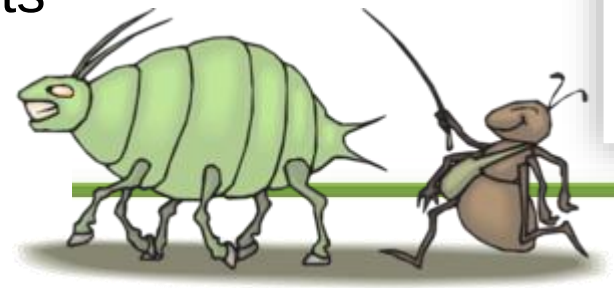
Woolly ash aphid

Rose aphid



Linden aphid

Symptoms:
Curled leaves & shoots
Sticky honeydew
Black sooty mold
Tending ants



Aphid Life Cycle Variations

- Species with broad or specific host ranges
- During the growing season:
  - crowding & food availability determine if adults are winged or wingless
    - most aphids are females
    - give birth to live young without mating
- Temperate regions = Utah:
  - most aphids produce overwintering eggs
    - autumn: winged adults fly to deciduous tree/shrub host, mate, lay eggs
    - conifer aphids are usually host specific

Aphid Biological Control

Convergent
Lady Beetle

Hover or
Syrphid Fly

Green Lacewing

Aphid Mechanical Control

Stiff spray of water every 2-3 days until aphid numbers decline

Works best if initiated before leaves are tightly curled

Aphid Cultural Control

- Avoid excess nitrogen applications
  - balance annual growth
  - avoid excessive, lush growth

Aphid Insecticides

- horticultural oil (1%) (many brands)
- insecticidal soap (many brands)
- imidacloprid (Merit, Bayer Advanced, generics)
  - systemic, post-bloom only
  - new bee protection labels
- pyrethroids (many brands)
  - bifenthrin (Talstar), cyfluthrin (Tempo), lambda-cyhalothrin (Scimitar, Battle), pyrethrin
- pymetrozine (Endeavor) – antifeedant
- acephate (Orthene) – locally systemic
- acetamiprid (Tristar)
- malathion (many brands)

Avoid Insecticide Resistance

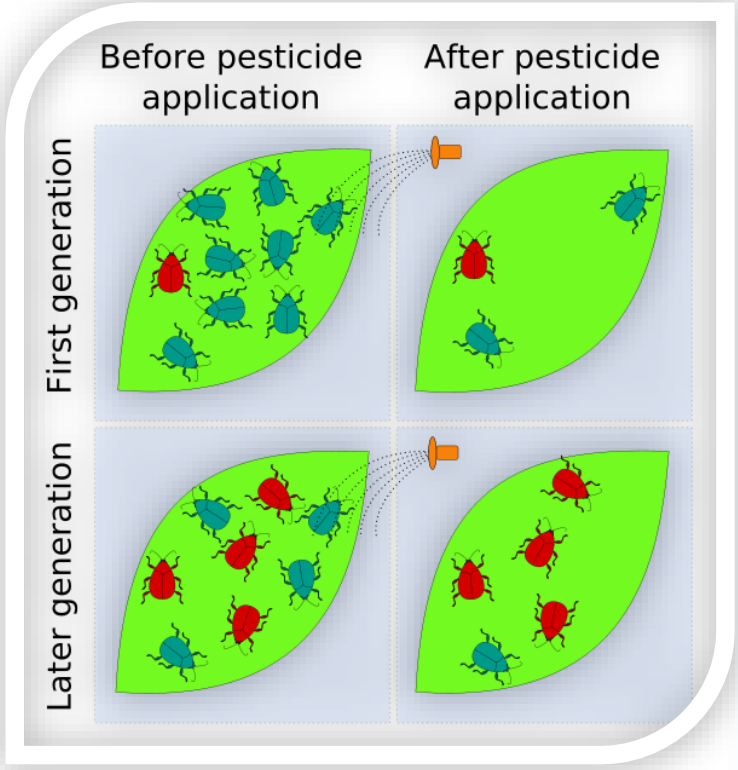
Overuse of a product can select for resistant aphids within a season

Aphid off-spring are clones (no mating)

Live birth – short generation

High birth rate

Many generations each year



Tree Borers: Difficult!!

Conditions that Promote Borers

- Drought!
- Tree stress!
  - Dry, sloping sites
    - dry soil in spring and fall (supplemental irrigation)
    - deep irrigation (2-4 inches water/month for established trees)
  - Trunk/root damage
    - construction, compaction
  - Tree crowding
- Longer, hotter growing seasons
  - More generations
- Warmer winters
  - Higher overwinter survival, more generations
- Populations established in an area
  - Foci sources for spread

Average Date of Adult Borer Activity in Northern Utah

- Bark Beetles: April & Late Sep/Oct
  - *Ips*, *Scolytus*, walnut twig beetle
- Lilac-Ash Borer: May – June
- Aspen Borer: May – June
- Flatheaded Borers: June – July
- Bronze Birch Borer: June - July
- Peachtree Borer: Late June – Sep
- Locust Borer: Aug - Sep

Greater peachtree borer moth caught in pheromone trap

Borer Insecticides

- Systemic trunk injections or soil drenches/injections
  - Merit, Admire, Safari, Acelypryn
    - Spring (May) – major flush of foliar growth
    - Follow label directions for application timing
- Protective trunk sprays
  - carbaryl (Sevin), bifenthrin (Bifen, Onyx), permethrin (Astro, Hi Yield), others
    - Timed with when adults are active; varies with borer species
    - Always follow label for registered sites, etc.

Borer IPM

- Prevention!!
  - Maintain tree health / prevent stress
    - Planting site, irrigation, protection
- Sanitation!
  - Promptly prune and remove affected limbs and trees
  - Properly dispose of infested wood
    - Chip, tarp, burn, dispose ≥3 miles host trees
- Insecticides (preventive)
  - Timed for adult flight periods
    - Systemics: in place before egg-laying
  - Good coverage, soak bark

Purple Robe locust succombed to locust borer

Insecticide Classes

IRAC* - www.irac-online.org

- Mode-of-Action
  - Site of action within the insect
  - Similar chemistry within a class
  - Understand efficacy of chemicals; which insects will be susceptible; characteristics, such as residual, application method
- Goal: To select most effective chemistries for a pest & <u>prevent development of resistance</u>

*Insecticide Resistance Action Committee

Garden & Landscape Insecticides

Class	Examples	MOA	Pest spectrum	Residual	Signal word
Carbamate (1A)	carbaryl	Nerve (AChE)	C,B, G, RM	Week (s)	Caution to Danger
Organophosphate (1B)	acephate malathion diazinon	Nerve (AChE)	C,S,B	Week (s)	Caution to Danger
Pyrethroid & Pyrethrin (3A)	bifenthrin cyfluthrin esfenvalerate permethrin	Nerve (Na channel)	C,S,B,N/St	Day (s) - Week	Caution to Warning Toxic to beneficials
Neonicotinoid (4A)	acetamiprid dinotefuran imidacloprid	Nerve (Nic ACh)	C,S,B	Weeks – Months Systemic	Warning Toxic to bees in pollen/nectar
Spinosyn (5)	spinosad spinetoram	Nerve (Nic ACh)	C,T,P,E	Days – Week (s)	Caution

Pest spectrum:
Chewing, **S**ucking, **B**orers, **N**uisance/**St**inging, **G**rasshoppers, **R**ust **M**ites, **T**hrips, **P**sylla, **E**arwigs

Garden & Landscape Insecticides

Class	Examples	MOA	Pest spectrum	Residual	Signal word
IGR (JH – 7, Chitin - 16)	pyriproxyfen buprofezin	Insect growth	S,A	Weeks	Caution
Mite growth inhibitor (10)	clofentezine hexythiazox etoxazole	Mite growth	SM	Weeks	Caution
Bacillus thuringiensis (11)	Bt kurstaki Bt israelensis Bt tenebrionis	Microbial - insect midgut	caterpillars mosquitos beetles	Days	Caution
Diamide (28)	chlorantranili-prole	Nerve & muscle (Ryano)	C,B	Weeks – Months Systemic	None Commercial only

Pest spectrum:
Chewing, **S**ucking, **B**orers, **N**uisance/**St**inging, **G**rasshoppers, **R**ust **M**ites, **T**hrips, **P**sylla, **E**arwigs, **A**nts, **S**pider **M**ites

New Invasive – in Utah

Velvet Longhorned Beetle
(former name: Chinese Longhorned Beetle)

Native: Asia & Eastern Europe

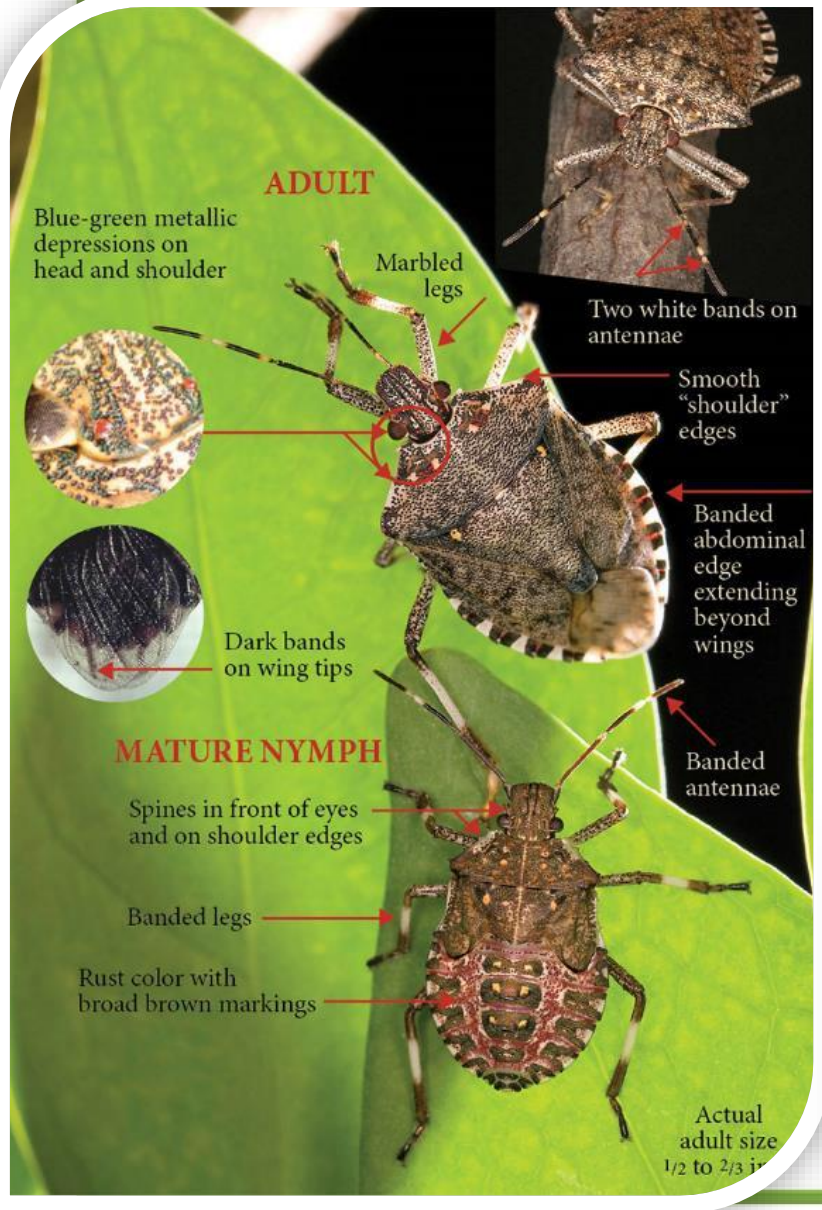
Adults lay eggs on bark, larvae tunnel into the wood to feed, potentially killing the tree

Trapped in multiple locations along the Wasatch Front (introduced on wood packing material)

Attacks orchard trees (apple) & wide range of forest and landscape trees: cottonwood, willow, mullberry

Potentially a pest of live trees and dry wood (structures)

New Invasive – in Utah



Brown Marmorated Stink Bug

Invades homes/buildings in the winter – a major nuisance pest

Extremely broad host range: field crops, fruits, vegetables, fruiting ornamentals

Can cause substantial economic crop loss

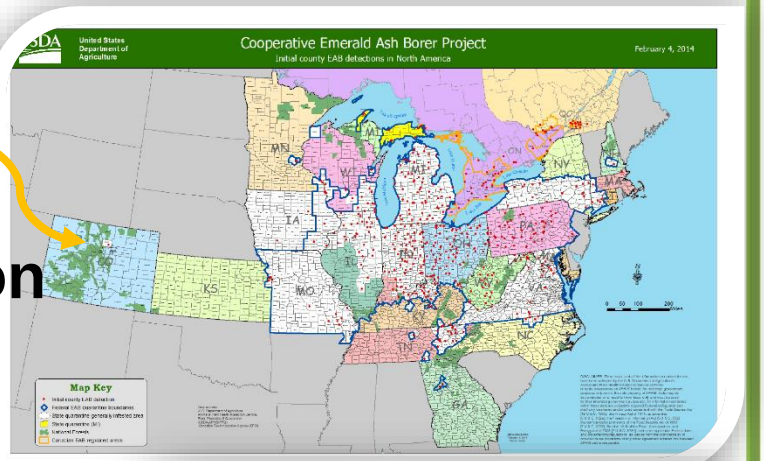
Difficult to control with insecticides

Trapped in Salt Lake and Utah Cos. in 2012 & 2013

Look alike:
Rough stink bug
(native to Utah)

Invasive – not in Utah, yet…

Boulder, CO

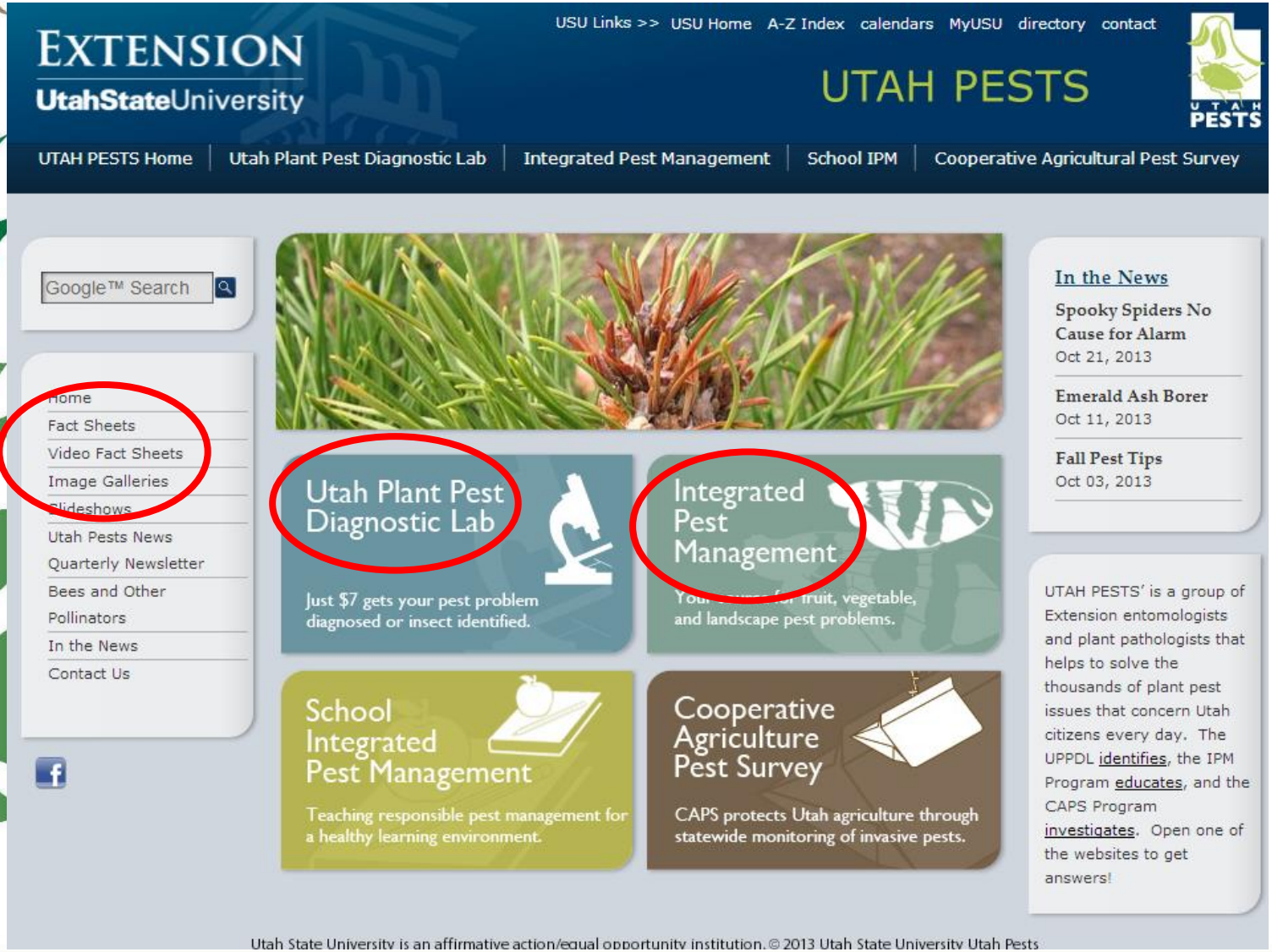


Emerald Ash Borer is on our doorstep

- Native to Asia
- Flatheaded beetle
- Larvae feed on inner bark disrupting water & nutrient transport
- First found in the U.S. in MI in 2002
- Killed millions of ash trees in SE MI alone
- Attacks mature trees

Utah Pests Online Resources

www.utahpests.usu.edu



Fact Sheets

UTAH PESTS fact sheet — UtahState University COOPERATIVE EXTENSION

Published by Utah State University Extension and Utah Plant Pest Diagnostic Laboratory ENT-165-12 July 2012

Bark Beetles

Ryan S. Davis, Arthropod Diagnostician, and Darren McAvoy, Extension Forestry Associate

WHAT YOU SHOULD KNOW

- Bark beetles are a significant cause of tree mortality in the forest and urban environment.
- To protect high-value trees around homesites, use preventative trunk sprays of carbaryl, permethrin, and bifenthrin prior to beetle flight.
- Soil- and trunk-applied systemic insecticides (e.g., imidacloprid and dinotefuran) do not sufficiently protect trees from bark beetle attack.

BIOLOGY

Bark beetles are one of the most destructive forest pests in the world. They are different than the larger longhorned and roundheaded/metallic woodboring beetles commonly infesting the inner wood of trees. The largest bark beetle, the red turpentine beetle (*Dendroctonus valens*), reaches only 8.3 mm in length. Because of their tiny size (Fig. 1), bark beetles are not effective tree killers as individuals. Instead, primary bark beetles work together, sending pioneer beetles to search for stressed or dying trees. When pioneer beetles find a weakened tree, they bore into and feed

Fig. 1. Average size of an adult bark beetle compared to a penny[1].

Fig. 2. Typical top-down dieback pattern
intested by Ips beetles[2].

on the thin phloem layer just unde
As they feed, chemicals from the
converted into attractive chemic
to other beetles of the same spec
suitable host was found.

Beetles that detect the air
chemicals will fly to the stressed t
into the phloem, create a mating
chamber, mate, and hollow-out
gallery laying eggs as they progr
many beetles attack the same tr
period of time allowing them to c
defenses (e.g., resin in pines). This
attack. After egg hatch, immatur
(larvae) (Fig. 12) begin feeding o
the parental gallery, girdling the
girdling is the same as killing a tre
scoring its entire circumference w

UTAH PESTS fact sheet — UtahState University extension

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Lilac-Ash Borer

Ryan S. Davis, Arthropod Diagnostician
Taun Beddes, Cache Co. Horticultural Agent
Jay B. Karren, Extension Entomology Specialist

What You Should Know

- Lilac-ash borer (*Podosesia syringae*), a clear-wing moth common in Utah, can be a destructive pest of many species of ash (*Fraxinus* spp.), privet (*Ligustrum* spp.), lilac (*Syringa* spp.), and related species.
- Adults emerge from host trees and lay eggs in the spring; larvae feed on wood within branches, overwinter in the heartwood, and emerge as adults the following spring.
- Diversifying species used in the landscape, maintaining optimum plant health, monitoring, and preventive sprays (if necessary) are the best methods for preventing infestations.
- Only preventive treatments exist. There are no insecticides registered that can eliminate borers once larvae are inside the plant.

Description, Biology, and Habits

The lilac-ash borer (*Podosesia syringae*), belongs to a group of insects known as the clear-winged moths. The wings of most sesiid moths in have at least partially transparent wings (devoid of the colored scales that coat most moth and butterfly wings). Many of them mimic bees or wasps and, unlike most moths, fly during the day.

Adult lilac-ash borers mimic the common paper wasp in color, size, shape, and flight habits (Fig. 1). Both the dark colored forewings and the transparent hind wings are narrow. The slender body is black in color with yellow banding on the abdomen. The wingspan varies from 1 to 1 1/8 inches. Females are somewhat larger than males.

Lilac-ash borers are generally distributed throughout the United States and Canada. They feed primarily in the trunks and larger limbs of lilac, ash, and privet, but occasionally attack related plants in the family Oleaceae. Significant damage in Utah has been reported from ash, primarily in European, blue, and green ash, and lilacs.

Figure. 1. Adult lilac-ash borer (*Podosesia syringae*)[1].

Depending on your location in Utah, adults may emerge from infested hosts as early as late March (but usually late April) and continue until mid-July (Table 1). Females emit a pheromone (chemical communication signal), which attracts males for mating, within 7 to 14 days after emergence. Within an hour of mating, females are able to lay the tan, elliptical eggs in cracks, crevices, and wounds in the bark. Eggs can be laid singly or in clusters. A single female can lay about 395 eggs. Eggs hatch within 14 days, and the larvae (immatures) bore into the plant (Fig. 2).

Initial feeding occurs just beneath the bark and later extends into the sapwood. Larvae continue feeding in the sapwood as summer progresses. Their tunnels (galleries) eventually turn upward and terminate just beneath the bark surface by the end of the season. Larvae enlarge their galleries as they grow, frequently pushing frass (sawdust-like excrement) out of the entrance hole. Completed galleries may be over 12 inches long and 1/3 inch wide. Full grown larvae are about 1 inch long and white with a brown head. Mature larvae overwinter in the heartwood.

In spring, a larva will cut an emergence hole in the bark, leaving a thin flap of tissue over the hole. Pupation (formation of a cocoon) occurs in the burrow. When

UTAH PESTS fact sheet — UtahState University COOPERATIVE EXTENSION

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Important Pests of Ornamental Aspen

Fred A. Baker, Forest Pathologist • Diane G. Alston, Entomologist • Claudia Nischwitz, Plant Pathologist

Iron chlorosis of aspen leaves (forestryimages.org).

ahead, and root-prune or cut the roots around the selected trees in the year before digging for transplantation. This practice greatly increases the success of tree transplantation.

The most common pests and problems of aspens in ornamental situations in the Intermountain West are discussed below, along with suitable measures for their control. These problems may also occur in natural stands of aspen.

Nutrient Problems

Iron Chlorosis or Deficiency

Iron chlorosis or iron deficiency is perhaps the most common problem affecting ornamental aspens. Leaves turn pale yellow between the veins, and become more pale during the summer. These symptoms appear about mid-June, or when the weather becomes hot. In some cases, small dead spots may form on the leaves between the veins, but seldom across the veins. Eventually, leaves on the ends of the branches, and sometimes the branches die. Dead branches should be pruned from the tree.

Video Fact Sheets

Billbug Identification and Detection in Turf

Entomologist Ricardo Ramirez discusses the identifying characteristics of billbugs in turf, and demonstrates how to detect the damaging larval stage.

Using a Beating Tray

A beating tray is a large cloth frame that is used to catch insects that fall from a shaken branch monitoring a large area, such as an orchard, quickly.

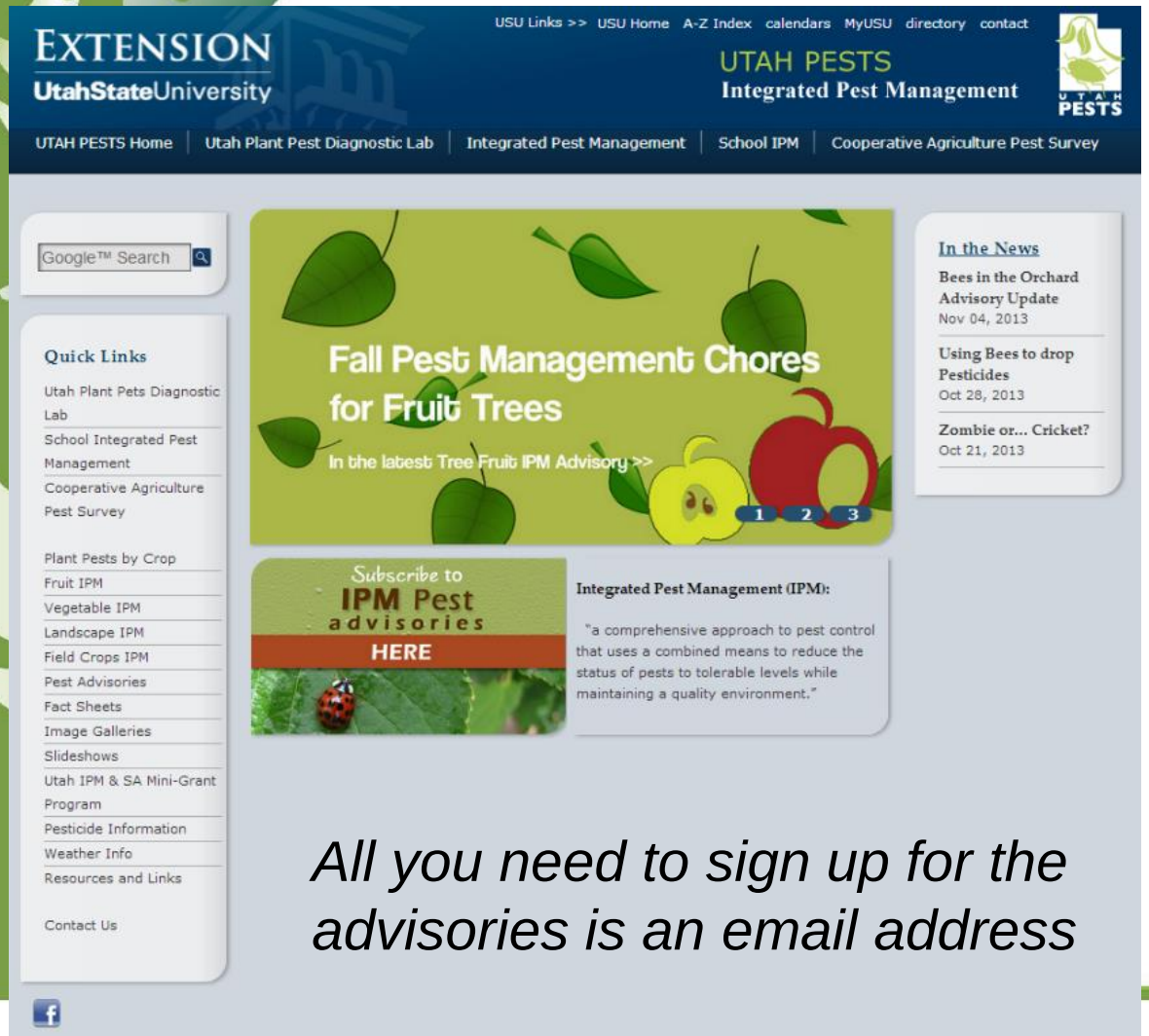
Paper Wasp Traps

Entomologist Diane Alston discus
make your own traps to combat them.

IPM Advisories:

Ornamentals, Turf, Fruit, Vegetables

utahpests.usu.edu/ipm



All you need to sign up for the advisories is an email address

Free subscription
Timely info on pest activity
- -insects
- -mites
- -diseases
- -nutrient deficiencies
- -environmental stress

Lots of images!
IPM recommendations
Effective pesticides

Pest Diagnostics

Utah Plant Pest Diagnostic Lab

utahpests.usu.edu/uppdl

This slideshow is posted

Landscape Ornamental Slideshows

Other Resources

- Pacific Northwest Insect Management Handbook
  - online, free
  - http://pnwhandbooks.org/insect/
  - also Disease and Weed editions
- University of California IPM Guides
  - Pests of Landscape Trees & Shrubs
    paperback, $31.50
  - http://anrcatalog.ucanr.edu/