Insect Pest Management for Ornamental Trees

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Topics

- Intro & Diagnostics
  - recognizing common insects & plant injury
- Japanese beetle
  - Turf and ornamental pest
- Striped mealybug
  - new pest of shadetrees in northern Utah
- Problematic bark beetles
  - Ips and Banded elm
- Lilac root weevil
- European earwig
- Scale insects
- Aphids
- IPM strategies
- *Utah Pests* On-line information
Most insects and mites are not pests

~ 1 million described insect species
Insect Life Cycles

**Complete Metamorphosis**
- Moth larva (left)
- Moth (right)

**Incomplete Metamorphosis**
- Grasshopper larva (left)
- Grasshopper (right)
Insect Feeding Types

- **Chewing**
  - Borers
  - Gall Formers

- **Piercing-Sucking**
  - Diagnosis
Scouting for Pests

- Look at the big picture
  - Pattern of plant decline/injury
    - Pest injury tends to be aggregated
    - Can injury be associated with irrigation or other pattern?
- Look at new growth
- Check for root/crown problems
- Hand lens for small insects and mites
- Scout every 1-2 weeks

Raspberry horntail injury to cane tips
Recognizing Common Insects: Beetles
(Complete Metamorphosis)

- Hard wing covering
- Most diverse group: > 250,000 spp.
- Chewing mouthparts

Larvae – grub-like
Chewing mouthparts
Beetle Injury

Trunks: tunnels, girdling

Leaves: holes, skeletonizing, notching

Roots/Crowns: tunnels, chew off fine roots
Recognizing Common Insects: Moths
(Complete Metamorphosis)

Colored scales on wings
Adults feed on nectar
Good flyers
Most are active at night

Larvae – caterpillars
Chewing mouthparts
Caterpillar Injury

Tunnels in limbs and trunks

Tunnels and holes in fruits

Holes chewed in leaves
Recognizing Common Insects: True Bugs
(Incomplete Metamorphosis)

Half wing: front is leathery, back is membranous
Inverted triangle on back
Piercing sucking mouthparts

Nymphs – mini adults without wings
Often brightly colored
True Bug Injury

Pitting and bumps: Cells killed in older fruits

Cat facing: Cells killed in young fruit

Toxin injected: Plant stunting and death (Honeylocust Plant Bug)
Recognizing Common Insects:
Aphid, Scale, Whitefly, Mealybug, Leafhopper (Incomplete Metamorphosis)

Small
Soft bodied
Wax or covering
Many produce honeydew
Piercing sucking mouthparts

Many feed in phloem
Nymphs resemble adults
Aphid, Scale, Whitefly, and Mealybug, Leafhopper Injury

Leaf curling

Limb dieback

Leafhopper burn: Speckling

Honeydew

Leaf spots from dead cells
Japanese Beetle, *Popillia japonica*
Scarab Beetle

First found in U.S. in 1916

Orem, Utah:
July 2006
(Meredith Seaver, Utah Co. MG)

Mating pair of adults

Adult feeding injury to Virginia Creeper

Trap:
Sex pheromone/Floral lure
Japanese Beetle

Primarily a turf pest – Larvae or grubs feed on grass roots

Adults have a broad host range – Skeletonize leaves – rose, fruit trees, shade trees, grape, etc.

Injury to rose

Injury to crabapple
Japanese Beetle Eradication Program

- Utah Department of Agriculture and Food Eradication Program
  - 2006: 671 adults caught
  - 2007: 2,157 adults caught
  - 2008: 101 adults caught

- UDAF approach:
  - Quarantine
  - Trapping
  - Containment
    - Foliar treatments (carbaryl & cyfluthrin)
    - Turf treatments (imidacloprid)
  - Outreach education
Japanese Beetle Management

- Keep plants healthy
- Plant non-attractive plants:
  - lilac, forsythia, dogwood, magnolia, American holly
- If detected in turf, control larvae with insecticides:
  - imidacloprid (Merit), carbaryl (Sevin), cyfluthrin (Tempo)
- Traps can provide some adult suppression (75% catch; but can attract them into an area)
- Contact UDAF with any new site infestations
Japanese Beetle Fact Sheet on USU Extension Web Site

http://extension.usu.edu/files/publications/factsheet/ENT-100-06PR.pdf
Striped Mealybug

*Ferrisia virgata* (Cockerell)

**Indicator of Global Warming??**

**Broad host range**

In CA, concern for infestation of almonds, pistachio, citrus & grape

Honeylocust

Redbud

**Davis and Utah Counties**

Photos by JayDee Gunnell, USU Extension
Management of Striped Mealybug

- Delayed dormant oil + insecticide (pyrethroid)
  - Delay until bud break
  - Suffocate over wintering stages
- Horticultural mineral oil
- Imidacloprid (Merit)
- Synthetic pyrethroids (permethrin, bifenthrin, cyfluthrin, lambda-cyhalothrin)
Bark Beetles
(Scolytidae)

Spruce
Pine
Fir
Prunus
Elm

Drought-induced pest status
Attack old or stressed trees & seemingly healthy trees
Ips Bark Beetles

- *Ips pilifrons* – spruce
- *Ips pini* – pine
- *Ips confusus* – pinyon pine
- *Ips paraconfusus* – pine, spruce

1/8-3/8” long spines on rear
Ips Facts

- Adults colonize & reproduce in conductive (cambial) tissues
- Construct tunnels (galleries) to lay eggs & feed
- 6-8 wk life cycle; 3+ generations per year
- Attack trees under stress
- Attack smaller diameter limbs at tops of trees first
Trees at Risk for Ips Attack

- **Stressed trees:**
  - Drought-stressed, trees in dry sites
  - Newly transplanted
  - Root injuries from construction or other
  - Crowded trees

- **Trees surrounded by breeding populations of *Ips***
  - Slash (piles of prunings)
  - Stacks of green or infested wood
    - Freshly cut wood is a preferred breeding site
Management of Ips in the Landscape

- Maintain tree vigor, avoid stress (proper watering, planting site, avoid injuries)
  - 2-4” water every 2-6 weeks
  - Avoid planting in very dry sites
- Remove & dispose of infested material
  - Dispose 2-3 miles away from hosts
- Remove and treat infested material
  - Chip and spread to dry
  - Burn
  - Remove all bark
  - Cover logs with ≥10 ml clear plastic & heat to lethal temperatures
Management of Ips in the Landscape

• Apply preventive insecticide or apply to “lightly” infested trees:
  o Carbaryl (Sevin): flowable, 2% ai solution
  o Permethrin (Astro, Dragnet)
  o Treat in spring before beetle flight (April) or treat in fall (late Sep to Oct)
  o 12-18 months protection (carbaryl)
  o High-pressure sprayer (≥250 psi) for large trees
  o Apply to entire bole & larger limbs
Banded Elm Bark Beetle

*Scolytus schevyrewi*

Elm
*Prunus*
Willow
Russian Olive

Attacking American elm trees
May vector the Dutch Elm Disease fungus
Lilac Root Weevil

Drought related
Observed heavy injury to shrubs & small trees
Lilac Root Weevil
*Otiorhynchus meridionalis*

- **Common hosts:** lilac, peony, dogwood, yew, privet, cotoneaster, arborvitae, spruce, others
- **Adults chew irregular notches in leaf edges** – target with foliar insecticide (Orthene, Merit, Sevin, Azadirachtin, Pyrethroids) – in late spring with first leaf notching
- **Larvae feed on roots** – target with soil insecticide (Merit), insect-attacking nematodes, *Beauveria* fungus – late spring or early fall
European Earwig

- Primarily feed on decaying organic matter (saprophytic)
- Feed on young, tender plants; chew holes in flower petals, fruits; nuisance pest
- Adults are also predators; **nocturnal**
European Earwig

- Cultural & mechanical controls:
  - avoid overuse of mulch and damp debris where they hide during the day; place and remove rolled newspaper; attractant traps: tuna can with bacon grease

- Chemicals:
  - Permethrin, cyfluthrin; target young in nests

- Tanglefoot on base of trunks, stems

Tuna can trap with bacon grease
Scale Insects

- Soft scales feed in phloem, produce sticky honeydew

- Armored scales feed on mesophyll of plant cells, do not produce honeydew

- Multiple years of scale feeding can kill limbs; cause dieback
Scale Biology

- 1-2 generations per summer
- Overwinter as eggs or young nymphs
- Females are sessile
- Males have wings
- “Crawler” stage is the best target for control

Oystershell scale female surrounded by crawlers
Scale Management

- Delayed Dormant spray is effective for soft scales & some armored scales:
  - Dormant oil + Pyrethroid (at first bud break)
- Use sticky tape in late spring to early summer to time a spray for “crawlers”
- Soft scales:
  - imidacloprid (systemic), thiamethoxam, horticultural oil, insecticidal soap
- Armored scales:
  - pyrethroids or others timed with crawlers
Aphids

- Suck sap from phloem tubes in leaves and stems
- Curl leaves, produce sticky honeydew that promotes growth of black sooty mold, reduce plant vigor at high densities
- Populations increase rapidly, low numbers can be tolerated
- Only control if honeydew is a nuisance problem or distortion of leaves is severe and aphid numbers are very high
- Many generations per summer
Aphid Management

- **Delayed Dormant Spray:**
  - Dormant oil + Pyrethroid (at bud break)

- **Spring and Summer control:**
  - Hard spray of water, horticultural oil, insecticidal soap, imidacloprid (systemic), spinosad, flonicamid, azadirachtin, pyrethroids, others

- **Biological control:**
  - Lady beetles, lacewings, syrphid flies, parasitic wasps
Insecticide Resistance Management

- Rotate chemical classes / modes of action
  - Within a generation
  - Between generations within a season

Many pest species of aphids are parthenogenic

Aphid giving birth to live nymph
Integrated Pest Management (IPM)

- Plan ahead (use preventive strategies where possible)
- Use multiple pest management tools
  - Cultural
  - Mechanical
  - Biological
  - Chemical
- Treat only if needed (thresholds)
- Environmentally, economically, and socially sound
IPM Strategies

- Plant selection & planting site selection
- Irrigation – design for plant needs
  - Amount & application method
  - Group plants with similar needs
- Plant nutrition – prevent stress!
- Preventive controls for chronic pests
  - Sanitation
  - Traps, exclusion barriers
  - Oil sprays
  - Spring application of systemic or residual insecticide

Ips-killed spruce trees in cemetery, Garland, UT
IPM Strategies

- For “secondary pests”
  - Aphids, Scale, Leaf feeders
  - Exposed feeders
  - Use “soft” (selective) controls
  - Natural biological control is more prevalent

- For “primary pests”
  - Tree borers, Fruit feeders
  - Hidden feeders
  - Target/Timing for susceptible life stage(s) is critical
  - Maintain active residues for critical period

- Conserve natural enemies by avoiding toxic, broad-spectrum insecticides
Traps and Physical Barriers

- Traps
  - Yellow jacket wasps, slugs, spiders

- Sticky bands
  - Trees and shrubs
Biological Control

• How can I make it work?

• Outdoor landscapes - Conservation of natural enemies
  o Avoid toxic chemicals
  o Maintain a diverse plant environment (avoid monocultures)
  o Cultivate plants that provide nectar & pollen
  o Tolerate some herbivorous insects

Parasitic wasp that attacks caterpillars

Big-eyed bug nymph feeding on an insect egg
Beneficial Insects & Mites

*Cast of Characters*

- Parasitic wasps & flies
- Predaceous true bugs & beetles
- Syrphid fly
- Lacewing
- Common aphid predators
- Predaceous mites
- Lady beetle
New & Revised Utah Pests Fact Sheets