Management of Direct and Indirect Insect Pests of Trees and Shrubs

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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 and economically sound
Major IPM Strategies for Landscape Pests

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

Ips-killed spruce trees in Garland, UT cemetery
Major IPM Strategies for Landscape Pests

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

- **For “direct pests”**
  - Tree borers, Fruit feeders
  - Hidden feeders
  - Target / Timing for susceptible life stage(s) is critical
  - Maintain active residues for critical period
  - Remove “sources”
Traps and Physical Barriers

- **Traps**
  - Yellow jacket wasps, slugs, spiders
- **Sticky bands**
- **Trees and shrubs**
Biological Control

- How can you make it work?
- Outdoor landscapes - Conservation of natural enemies
  - Avoid toxic chemicals
  - Maintain a diverse plant environment (avoid monocultures)
  - Cultivate plants that provide nectar & pollen
  - Tolerate some herbivorous

Parasitic wasp that attacks caterpillars

Big-eyed bug nymph feeding
Beneficial Insects & Mites

Cast of Characters

Parasitic wasps & flies

Predaceous true bugs & beetles

Syrphid (Hover) Fly

Lacewing

Common Aphid Predators

Lady Beetles

Predaceous Mites
Common Direct Insect Pests of Woody Ornamentals

◆ Insect Borers
  ◆ Trunk and limb borers
    ◆ Roundheaded & Flatheaded Beetles, Clearwing Moths
    ◆ Bark Beetles - Ips, Banded Elm Bark Beetle
  ◆ Root Borers - Prionus
Longhorned Beetles/Roundheaded Borers (Cerambycidae)

Aspen borer

Poplar
Cottonwood
Locust
Ash
Fruit trees
Pine

Most only attack stressed trees
Tunnel through cambium and into inner wood
Metallic Wood Boring Beetles/Flatheaded Borers (Buprestidae)

Birch
Beech
Fruit trees
Maple

Bronze Bircher Borer

Exit Holes in Bark
D-shaped exit holes

Apple Flatheaded Borer

Most only attack stressed trees
Feed just under bark in cambium - girdle trunk
Clearwing Moth Borers (Sessiidae)

Lilac Ash Borer

Western Poplar Clearwing

Greater Peachtree Borer

Ash
Lilac
Cottonwood
Poplar
Willow
Prunus

Will attack healthy trees
Tunnel into inner wood
Timing of Adult Tree Borer Activity

- **Adult flight periods for northern Utah**
  - Ash/Lilac borer – May 1– late June
  - Bronze birch borer – late May – June
  - Aspen borer – May–July
  - Peachtree (Crown) borer – late June – August
  - Locust borer – August – Sept.
  - Shothole borer – June and late Sept.
Insecticides for Preventive Trunk Sprays

- **Contact:**
  - carbaryl (Sevin), endosulfan (Thionex), pyrethroids (permethrin, bifenthrin)

- **Systemic (translocation activity):**
  - Taken up by roots & moved throughout plant through xylem & phloem
  - Can also act as a local systemic
    - imidacloprid (Merit, Marathon, Bayer Advanced Garden Tree & Shrub Insect Control)
Imidacloprid

- Merit, Marathon, Bayer Advanced Garden Tree & Shrub Insect Control
  - Soil drench, soil injection, foliar
  - Soil: translocation delay of up to 60 days or longer
  - N containing fertilizer may enhance uptake
  - Target insects: soft-bodied pests on leaves and limbs (aphids, adelgids, leafminers, leaf beetles, mealybugs, psyllids, scale); white grub larvae; roundheaded borers (suppressive), flatheaded borers (control)
  - Clearwing moth larvae are not on the label
Considerations for Using Systemics

- Long-lasting activity
- Reduced degradation by UV & water
- Minimize plant surface residues
- Minimize human exposure
- Application can be more convenient
- Delayed uptake & availability
Bark Beetles (Scolytidae)

Spruce
Pine
Fir
Prunus
Elm

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

- Bark beetle family (Scolytidae)
- Adults colonize & reproduce in conductive (cambial) tissues
- Construct tunnels (galleries) to lay eggs & feed
- 6-8 wk life cycle; up to 5 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
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
Management of Ips in the Landscape

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

Scolytus schevyrewi

Elm
Prunus
Willow
Russian Olive

Attacking American elm trees
May vector the Dutch Elm Disease fungus
Giant California Prionus

- Adult flight peaks in mid-July
Prionus Larvae

Photo Courtesy Shawn Steffan
Utah State University Extension
Crown & Root Injury

Prunus (Sweet Cherry)
Apple
Willow
Cottonwood
Common Indirect Insect Pests of Woody Ornamentals

- **Sucking (Soft-Bodied) Insects**
  - Aphids
  - Scale
  - “New” mealybug on honeylocust & redbud
  - Cooley spruce gall adelgid
  - Spider mites

- **Chewing Insects**
  - Lilac root weevil
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

Apple aphid curls leaves

Giant willow aphid feeds on limbs

Sooty mold
Aphid Biology

**Alternate hosts**

Woody overwintering host

Aphid eggs on tree limbs

Woody or herbaceous summer host

Only females, bear young live

Continual, overlapping generations

**Fruit tree aphids**

- plum, peach, rosy apple, cherry
- Spirea
- Dogwood
- Woolly elm
- Woolly alder
- Honeysuckle
- Rose
- Woolly maple
- Poplar
- Ash
- Cottonwood
Aphid Biology

Single host

Produce overwintering eggs in colder climates

Birch aphid

Cinara conifer aphid

Apple
Birch
Poplar
Cottonwood
Walnut
Conifers
Sycamore
Maple
Pecan
Hackberry
Elm
Aphid Management

- **Delayed Dormant Spray:** Dormant oil + Pyrethroid (at bud break) - targets eggs
- **Spring and Summer control:** hard spray of water, horticultural oil, insecticidal soap, imidacloprid (systemic), Conserve, Aria, azadirachtin, Orthene, pyrethroids, others
- **Biological control:** lady beetles, lacewings, syrphid flies,
Insecticide Resistance Management

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

Aphid giving birth to live nymph
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;
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

Oystershell scale female surrounded by crawlers
Scale Management

- Delayed Dormant Control 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: Merit (systemic), Precision, Flagship, horticultural oil, insecticidal soap
- Armored scales: pyrethroids or
“New” Mealybug

Honeylocust
Redbud

Davis and Utah Counties

Photos by JayDee Gunnell, USU Extension
Cooley Spruce Gall Adelgid

- Form galls on new growth of spruce; also attack Douglas fir - cause needle swelling, necrosis and shedding
- Adults lay eggs on new “candle” growth in spring; young feeding at base of needles form the galls
- 2-year alternating life
Cooley Spruce Gall Adelgid Management

- Insecticide treatment at egg hatch: **Merit, Thionex, permethrin**
- Check the base of new needles for woolly nymphs
- Avoid planting spruce and Doug fir together
- Prune off green/purple galls
Spider Mites

- Very small size; infested plants appear “dirty”; produce webbing, suck sap (remove chlorophyll); leaf speckling
- When severe, cause bronzing or silvering of leaves; populations build quickly in hot weather
- Feed on many species of

Two spotted spider mites
Leaf bronzing “Mite burn”
Spider Mite Management

- Biological control: Predaceous mites
- Soft Controls: pressurized stream of water, horticultural oils, insecticidal soap
- New miticides:
  - Acequinocyl (Kanemite, Shuttle)
  - Bifenazate (Floramite)
  - Pyridazinone (Akari, Nexter, Sanmite)
  - Chlorfenapyr (Pylon)
Lilac Root Weevil
Otiorhynchus meridionalis

- Common hosts: lilac, peony, dogwood, yew, privet, cotoneaster, arbovitae, 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-parasitic nematodes, Beauveria fungus – late spring or early fall

Adult & leaf notching
Needle notching on spruce
Larvae feeding on crown & roots
New Invasive Insect Pest to Utah

Mating pair of adults

Japanese Beetle Trap

Adult feeding injury to Virginia Creeper

First detection in Utah: July 2006 in Orem

Wide host range: Shade & Fruit trees, Roses
USU Extension Pest Management Slideshows

http://extension.usu.edu/ipd

One-stop shopping for Utah pest management information

http://extension.usu.edu/ipm