Iris Borer

- Larvae feed at base of leaves and hollow-out rhizomes
- Pale pink in color, 1 ½ inches long
- Overwinter as eggs, larvae become full grown by mid-summer
- One generation per year
Management

• Sanitation of debris with egg in late summer
• Spring application of contact insecticide before larvae burrow into leaves

Stalk Borer

• Larvae feed in stems of various plants (> 200 species including daisy, gladiolus, hollyhock, iris, peony, rose, etc.)
• Once in plant, can NOT be controlled
• Caterpillars are marked with light stripes laterally
• Eggs are laid in summer (August) on grasses and weeds, hatch following spring
• One generation per year

Management

• Sanitation of debris with eggs in fall
• Spring application of contact insecticide before larvae burrow into leaves
**European Earwig**

- Adults and nymphs feed on flowers, leaves, silk, etc., especially dahlia, carnations, marigold, zenia.
- Omnivore (plants and insects)
- Adults are ½ inch long with pincers
- One generation per year

**Management**

- Contact insecticides applied directly to earwig nymphs and adults

**Leafminers**

- Larvae of flies, small moths, beetles, and sawflies
- Larvae tunnel within leaves creating mines
- Many hosts including chrysanthemums, marigold, and gerbera
- Multiple generations per year
Management
• Timing is critical for contact insecticides
• Systemic insecticides are most effective

White Grubs
• Larvae (grubs) of various beetle species
• Larvae feed on roots and organic matter
• Typically, one generation per year (some exceptions)
Management

- Soil insecticides are necessary, post-treatment irrigation in needed
- Preventative and Corrective treatments

Wireworms

- Larvae of click beetles
- Larvae tunnel into seeds and roots
- Larvae are elongate, hard bodied and light brown

Black Vine Weevil

- Adults feed on leaves
- Larvae (legless) feed on roots
- Overwinter as larvae
- Hosts = Wide range of many shrubs especially yews (Taxus)
**Management**

- Soil insecticides are necessary, post-treatment irrigation in needed
- Preventative and Corrective treatments

**Insects That Suck Fluids or Cell Contents**

- Most insects that have a beak have sucking mouthparts (exceptions are weevils)
- Beak or rostrum equipped with Stylets
- Stylets are straw-like structures that puncture, inject toxins, and draw out fluids
- Powerful muscles in head to suck fluids

- Honeydew-watery, sweet feces
- Sooty mold fungus
**Azalea lace bug**  
*Stephanitis pyriodes*

- Adults and immatures feed
- Overwinter as adults and eggs (north)
- Multiple generations per year
- Adults and 5 nymphal stages

*Azalea Lace Bug Ecology*

- Azaleas in the full sun and isolated seem to more damaged
- Natural enemies were more abundant in complex than simple habitats
- Natural enemies were mostly predators (spiders and lacewings adults and immatures)
- Natural enemies preferentially consume more immatures than adults
- Wings as a shield

**Integrated Pest Mgt of Azalea lace bug**

- Avoid planting azaleas in full sun locations were there is no overstory (islands)
- If planting new plants, choose plant less susceptible varieties
- Apply an insecticide to the underside of leaves or use an insecticide that is systemic (Merit) or Orthene

**Whiteflies**

- Several species
- Many have multiple hosts
- White dusty appearance
- Adults readily fly if disturbed
- Honeydew and sooty mold

**Stephanitis pyriodes**

- Suck plant sap
- Stippling
- Feed through the stomates on the underside of leaves
- Feeding more common on older foliage (never stems)
- Significant variation among varieties
**Aphids or Plant lice**

**Scale Insects**

Numerous species

- Soft scales versus Armored scales
- Crawlers (immature, dispersing stage)
- Crawlers are most vulnerable life stage

**Soft Scales**

- Most abundant group
- Very prolific crawler production
- Survive on stems or leaves
- Mobile as immatures
- Phloem feeders
- Honeydew/sooty mold

**Armored Scales**

- More cryptic
- Populations slower in developing/slow decline in host
- No honeydew or sooty mold
- Mobile only as crawlers
Scale Management is different for each group

<table>
<thead>
<tr>
<th>Treatment target</th>
<th>Soft scales</th>
<th>Amored scales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crawlers</td>
<td>Pyrethroids, insecticidal soap, IGR's</td>
<td></td>
</tr>
<tr>
<td>Adults in summer</td>
<td>Systemics (neonicotinoids, acephate, disulfoton)</td>
<td>Oils Di-syston or Safari</td>
</tr>
<tr>
<td>Adults in winter</td>
<td>Dormant oil</td>
<td>Dormant oil</td>
</tr>
</tbody>
</table>

Natural enemies help to regulate scale populations

Using systemic, oils or IGR’s may reduce the impact on natural enemies

Thysanoptera (Thrips)

- A complex of species
- All thrips have fringed wings
- Some species vector viruses

Western flower thrips

- Damage causes speckling or flecking on foliage or flowers.
- Attacks numerous plant species
**Western flower thrips**

**Predators**

**Chemicals**

Imidacloprid

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**Mites**

- Arachnida not Insecta
- Tick-like body form*
- Eight legs on adults, six on immatures
- Plant feeders and predators
- Piercing - Sucking (chelicerae) mouthparts

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**Not all are spider mites**

- Tetranychidae (spider mites)
- Tenuipalpidae (false spider mites)
- Tarsonemidae (broad mites)
- Eriophyidae (gall or stunt mites)

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**Gall Mites**

- Elongated body form
- Four legs
- Deformed growth or galls

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**Mite Management**

- Use miticides first, and insecticides labeled for mites (pyrethroids) as a rotation
- Most miticides are comparable in efficacy but target certain life stages
  - All life stages: Akari, Judo, Shuttle, Floramite, Ultiflora
  - Immature and adult: Pylon, Avid, Triact70, sulfur
  - No adult activity: TetraSan and Ovation
Mite Management

- Use restrictions are important for resistance management

- Fewer studies on broad mites than other species
  - Akari, Kelthane, Judo

Rose Chafer

- Adults feed (skeletonize) on leaves and flowers
- Adults elongate, about ½ inch long with grey/brown wings
- Adults are active in June
- One generation per year

Management

- Contact insecticide applied to active adults
- Insecticidal soaps can be effective but ONLY last < 24 hours

Japanese Beetle

- Adults feed (skeletonize) on leaves and flowers
- Adults broadly-oval, about ½ inch long with coppery/brown wings
- Adults are active in June-September
- Attacks > 300 species of plants
- One generation per year
Management

- Systemic insecticides soil drenched or injected
- Trans-laminar products applied to foliage prior to or during adult activity
- Contact insecticides applied directly to active adults (in afternoon, under sunny conditions)
- Replace susceptible or install non-susceptible hosts!
**Gypsy Moth**

- Larvae (caterpillars) defoliate leaves
- Larvae have FIVE pairs of blue dots on dorsal (top) side of thorax
- Attacks > 300 species of plants
- One generation per year

**Management**

- Timing of control strategy is critical for maximum efficacy
- *Btk* is most effective against 1\(^{st}\) and 2\(^{nd}\) instars
- Various other contact insecticides perform well on older larvae (3\(^{rd}\) – 6\(^{th}\) instars)
- GPSO provides excellent control of egg masses from Sept. – 3 days prior to egg hatch

**European Pine Sawfly**

- Larvae (caterpillars) are gregarious and defoliate only mature leaves (previous years growth)
- Hosts = Pines including red, Scots, Jack, Mountain, and Mugo.
- One generation per year
Biology

• Adults are wasplike
• Adults lay egg in Sept. – Oct. near tips of branches
• Eggs overwinter, hatch in spring

Management

• Insecticidal soaps work well for low population densities
• Various contact insecticides, including biorational and conventional, perform well

Emerald Ash Borer

• Adults are larger and brighter green than any other Agrilus spp. (e.g., Bronze birch borer)
• Slender, elongate, 0.3 – 0.5” long, metallic green
• Larvae feed (mine) in cambial area of ash (green, white, black, blue, velvet, pumpkin)

Life Cycle

June – September  early June – October
late May – September  November – late May
Biology

- Eggs are laid on the bark surface or in crevices on the trunk or branches
- Eggs typically hatch in 7-10 days
- After hatching, young larvae chew through the bark and into the cambial region
- Larvae thereafter feed on the phloem and outer sapwood for several weeks

Biology

- Larvae create S-shaped feeding galleries that wind back and forth, extending over 7.5 – 12” in length
- Galleries are typically packed with fine frass
- In some instances, woodpeckers feed on larvae

Biology

- EAB overwinters as full-grown larvae in shallow chambers excavated in the sapwood
- Pupation occurs in late April – early May
- Newly eclosed adults remain in pupal chamber for 1-2 weeks
- As adults emerge, they create D-shaped exit holes that are 1/8 in diameter
Distribution and Hosts

- Indigenous to Asia and is known to occur in China, Korea, Japan, Russia, and Taiwan
- Chinese literature reports a high incidence on numerous ash species
- EAB has killed > 20 million ash trees

Control Options?

- All native ash trees appear to be susceptible!
- Systemic insecticides and bark spray applications appear to provide good control when applied preventatively

Additional Information

www.entomology.wisc.edu/emeraldashborer