Landscape IPM and Beneficial Insects

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2004 Pesticide Recertification Workshop
Landscape IPM

- IPM principles
- Major pests of rural and urban landscapes
- Beneficial insects
Integrated Pest Management

A strategic approach that seeks to effectively suppress pest populations while minimizing pest control costs and environmental disruption.

- Integrates numerous control tactics.
- Actions are taken only when necessary.

- Treatment decisions are based on information derived from site-specific scouting, crop economics, pest biology, ecology, plant genetics, toxicology, and weather.
Diagnose, Monitor, Assess, Act

1. Identify pest(s) and/or symptom(s)
2. Monitor density/incidence/severity
3. Assess pest biology/life history in relation to plant development/production
4. Target “windows of opportunity”
5. Consider pest management options/timings
6. Follow-up assessment
Common Landscape Pests

• Wood-boring insects
• Turf pests
• Aphids
• Mites
• Mormon crickets, grasshoppers
Wood-Boring Insects of Utah
Wood-Boring Insect Groups

• Beetles
  • Bark beetles – *Scolytidae* (Shothole borer, Ips beetle)
  • Flatheaded/Metallic wood borers – *Buprestidae* (Bronze birch borer, Pacific flatheaded borer)
  • Roundheaded/Longhorned borers – *Cerambycidae* (Prionus beetle, Aspen borer, Locust borer)
  • Weevils – *Curculionidae* (Poplar- and Willow borer)

• Moths
  • Clearwinged Moths - *Sesiidae* (Peachtree borer, Lilac/Ash borer)
  • Other moths (American plum borer – *Pyralidae*)
Shothole Borers & Bark Beetles

- Shothole borer
- Ambrosia beetles
- *Ips* beetles

- Attack dead, diseased, damaged, drought-stricken trees.
- 3-5 generations/yr
- Can vector fungal pathogens
Flatheaded Borers

- Bronze birch borer
- Pacific flatheaded borer

- *Oval* emergence hole
- Targets compromised wood
Prionus Beetle
Root Weevils

- Root weevil complex contains several species
- In Utah, root weevil emerges in early summer.
- Lilacs, stone fruit trees, dogwoods, peonies, cotoneasters, roses, etc.
- Adult feeding damage: notched leaf edges
- Larvae feed on roots.
Clearwing Moths

- Poplar Clearwing, Greater Peachtree Borer
- Emerges June-Sept.
- Eggs laid near crown of tree
IPM Approach for Borers

• Avoid planting trees attractive to borers, such as birch, poplars, aspen, ash, and willows.
• Maintain tree health – stressed trees are more prone to attack (drought, heat, winter injury). Water and fertilize sickly trees (long, infrequent soil-soaks).
• Paint exposed trunks white in summer, use trunk-wrap in winter/spring.
• Understand source-sink dynamics (established borer populations will spread; old neglected trees and firewood piles can harbor dense populations).
• Insecticide treatments are often an option.
Insecticides for Borers

• Trunk Treatments
  Timing is critical for adult emergence
  • Bronze birch borer/Pacific flatheaded borer: late May – June
  • Ash/Lilac borer: May 1- late June
  • Aspen borer: May-July
  • Peachtree (Crown) borer: late June – August
  • Poplar-and-Willow borer: July – Sept.
  • Shothole borers: May and Sept.
  (For southern Utah, subtract 3-5 weeks from these dates)

• Insecticides: Sevin, Thiodan*, various pyrethroids (permethrin, esfenvalerate), Merit/Bayer Advanced Garden Tree and Shrub Insect Control (imidacloprid), Orthene (acephate), Diazinon*
  • *Thiodan and Diazinon no longer available for home-use
Systemic Insecticide

- **Imidacloprid**—Merit™, Bayer Advanced Garden Tree & Shrub Insect Control™, BAG Plant Spikes™ (fertilizer + insecticide)

- Translocated *upward* from root uptake
  - Soil-translocation varies with trunk diameter and soil type (adding N may increase root uptake).
  - Target insects:
    - Soft-bodied pests on leaves and limbs (aphids, adelgids, whiteflies, mealybugs, scale, thrips, psylla, leafminers)
    - Various beetles (emerald ash borer, root weevils, grubs, flatheaded, roundheaded) – results with tree borers variable.
Common Landscape Pests

• Wood-boring insects
• Turf pests
• Aphids
• Mites
• Mormon crickets, grasshoppers
IPM for Turf

• Look for type of injury:
  - Chewed leaves
  - Short stems
  - Stems break easily
  - Sawdust-like frass
  - Spongy turf
  - Chlorosis

• Look for presence of pest:
  - Fat caterpillars
  - Brown moths
  - Small, legless white grubs
  - C-shaped white grubs
  - Furry “soil-borers”
Best Defense: Prevention

• Good lawn care (fertilize, mow, aerate, irrigation)
• Select more tolerant turf species & varieties
• De-thatch
• Beware herbicide drift, runoff (and salt poisoning)
Common Turf Pests

• **Surface / Thatch Feeders (leaf, stem):**
  – Armyworm
  – Cutworm
  – Sod webworm
  – Mites

• **Surface / Crown Feeders (burrow into stem, crown):**
  – Billbug
  – Subterranean webworm

• **Subsurface (root):**
  – May & June beetles
Sod Webworms

• “Snout moths”
  • Gray to brown caterpillars
  • Larvae feed on grass blades
  • Larvae form silken tunnels in thatch
  • Cut off grass blades, drag into tunnels
  • Small, irregular brown patches of closely cropped grass
  • Tan-brown moths fly just above turf in zig-zag pattern

• 1-3 generations per year
IPM for Sod Webworm

- Target young larvae (late spring to summer)
- Threshold: 15 larvae/sq yd
  - *Bacillus thuringiensis* (Bt) – small larvae
  - Acephate (Orthene)
  - Carbaryl (Chipco Sevin)
  - Spinosad (Conserve)
  - Azadirachtin (Ornазin)
  - Cyfluthrin (Tempo)
  - Diazinon
  - Chlorpyrifos (Dursban)
  - Beneficial Nematodes (*Steinernema carpocapsae*)
Billbugs

• Weevil beetle family
• Life Cycle (1 gen/yr)
  • Adults & larvae overwinter in turf
  • Begin feeding in spring
  • Eggs laid in stems (spring to summer)
  • Burrow in stems, crown
  • Small, legless larvae
  • Blades break at crown
  • Sawdust-like frass
IPM for Billbugs

- Target small larvae (spring and summer)
- **Threshold:** 1-5 grubs/sq ft
- Light irrigation to move materials into crown zone
- Resistant turfgrass varieties
- **Insecticides:**
  - Imidacloprid (Merit, Marathon)
  - Chlorpyrifos (Dursban Pro)
  - Diazinon
  - Beneficial Nematodes - *Heterorhabditis bacteriophora* (Cruiser) & *Steinernema carpocapsae* (Scanmask)
White Grubs
May and June Beetles
(*Phyllophaga* spp.)

- Scarab beetle family
- C-shaped white larvae
  - Brown head, long legs
  - Eat roots
  - Turf roll-back
- 1-3 year life cycle
White Grubs

- **Damage:**
  - Root feeding, plants wilt, yellow, thin
  - Irregular dead patches
  - Turf roll-back
  - Invasion by broadleaf weeds
  - Spring to early summer and late summer to fall
IPM for White Grubs

- Target small larvae (late spring-fall)
- Threshold: 3-4 grubs/sq ft
- Irrigate to move materials to grubs in the upper root zone
  - Imidacloprid (Merit, Bayer AG Lawn Insect Control)
  - Carbaryl (Chipco Sevin)
  - Diazinon
  - Pyrethroids (early summer treatments)
  - Beneficial Nematodes - *Heterorhabditis bacteriophora* (Cruiser)
Common Landscape Pests

- Wood-boring insects
- Turf pests
- Aphids
- Mites
- Mormon crickets, grasshoppers
Aphids

- Only control if honeydew is a nuisance problem or distortion of leaves is severe and aphid numbers are very high
- Delayed Dormant Spray: Dormant oil + Diazinon or Thiodan (at bud break)
- Spring and Summer control: Merit (systemic), insecticidal soap, horticultural oil, brisk water sprays
  - Prone to insecticide resistance, so rotate insecticides
- Biological control: lady beetles, lacewings, syrphid flies, parasitic wasps
Spider Mites

- Very small arthropod, not an insect
- Produce webbing, suck sap (remove chlorophyll); fine speckling of leaves
- When severe, cause bronzing or silvering of leaves; populations build quickly in hot weather.
- Controls: pressurized stream of water, horticultural mineral oil, insecticidal soap, weed control
- Don’t recommend miticides (Kelthane, Vendex) unless a rescue treatment
- Pyrethroids and dust can flare mites
- Biological control: Predaceous mites
Common Landscape Pests

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Mormon Crickets & Grasshoppers

• Mormon cricket = shieldbacked katydid (Anabrus simplex)
  – Common and well-adapted to the Inter-Mountain West

• Grasshoppers
  – Many species, and adapted to rural and semi-rural environments
Mormon Cricket Biology

• One female lays about 86 eggs/year.
• Eggs hatch when soil reaches 40° F
• Has 7 nymphal instars; requires 2-3 months to reach adulthood.
• Feed on over 400 species of plants, preferring succulent forbs and cultivated plants.
• During favorable conditions, population grows to 100 per square yard and migration begins.
The Mormon Cricket:  
Solitary and Gregarious Morphs
Effects of Drought Conditions

Infested Acres in Utah, reported by USDA-APHIS, 2003

Graph Courtesy Matt Palmer, USU Extension, Sanpete County
IPM for Mormon Crickets

- **Cooperation between UDAF and USDA**
  - Monitoring and cost-share for area-wide treatment

- **Dimilin bait**
  - Intended for younger nymphs; chitinase inhibitor.
  - Safe, cost-effective.
  - Used on 25,000 acres in Utah in 2002.

- **Carbaryl bait**
  - Effective on all stages; kills immediately, repeatedly.
  - Negative side-effects
Beneficial Insect Groups

• **Predator**: consumes (kills) two or more individuals to complete its development.

• **Parasitoid**: consumes (kills) exactly one individual to complete its development.

• **Parasite**: consumes but generally does not cause the death of one or more individuals.
Aphid parasitoid emerging from aphid mummy.
Encarsia formosa parasitizing whiteflies
Egg Parasitoid (*Trichogramma* spp.)
Typical Predator
Note Raptorial Forelegs and Pronounced Rostrum
Developmental Stages of an Assassin Bug
Predaceous Larvae/Neutral Adult
Lacewing Larva Eating Corn
Earworm Larva
Developmental Stages of the Convergent Lady Beetle
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