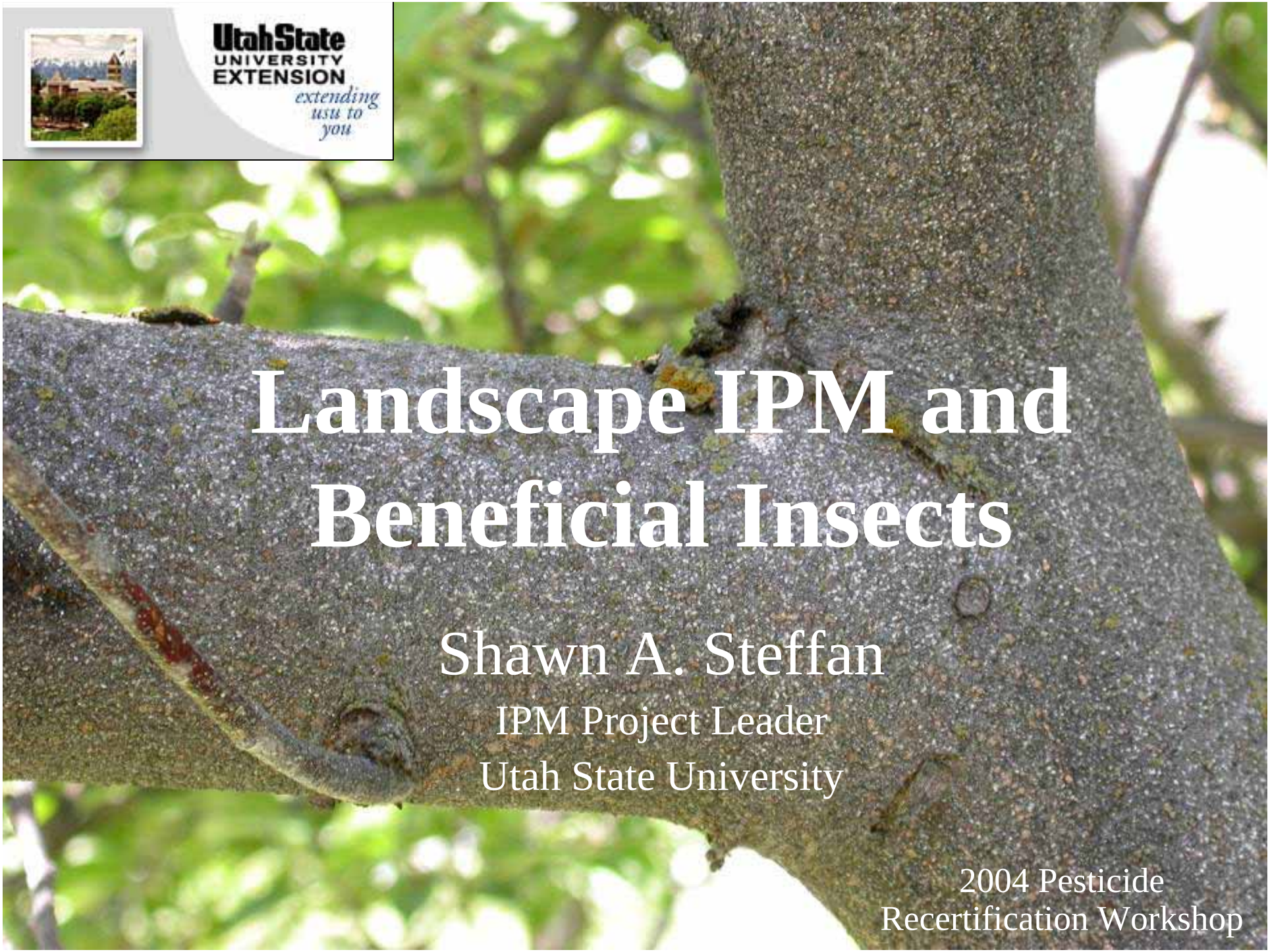


Landscape IPM and Beneficial Insects

Shawn A. Steffan

IPM Project Leader

Utah State University

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.

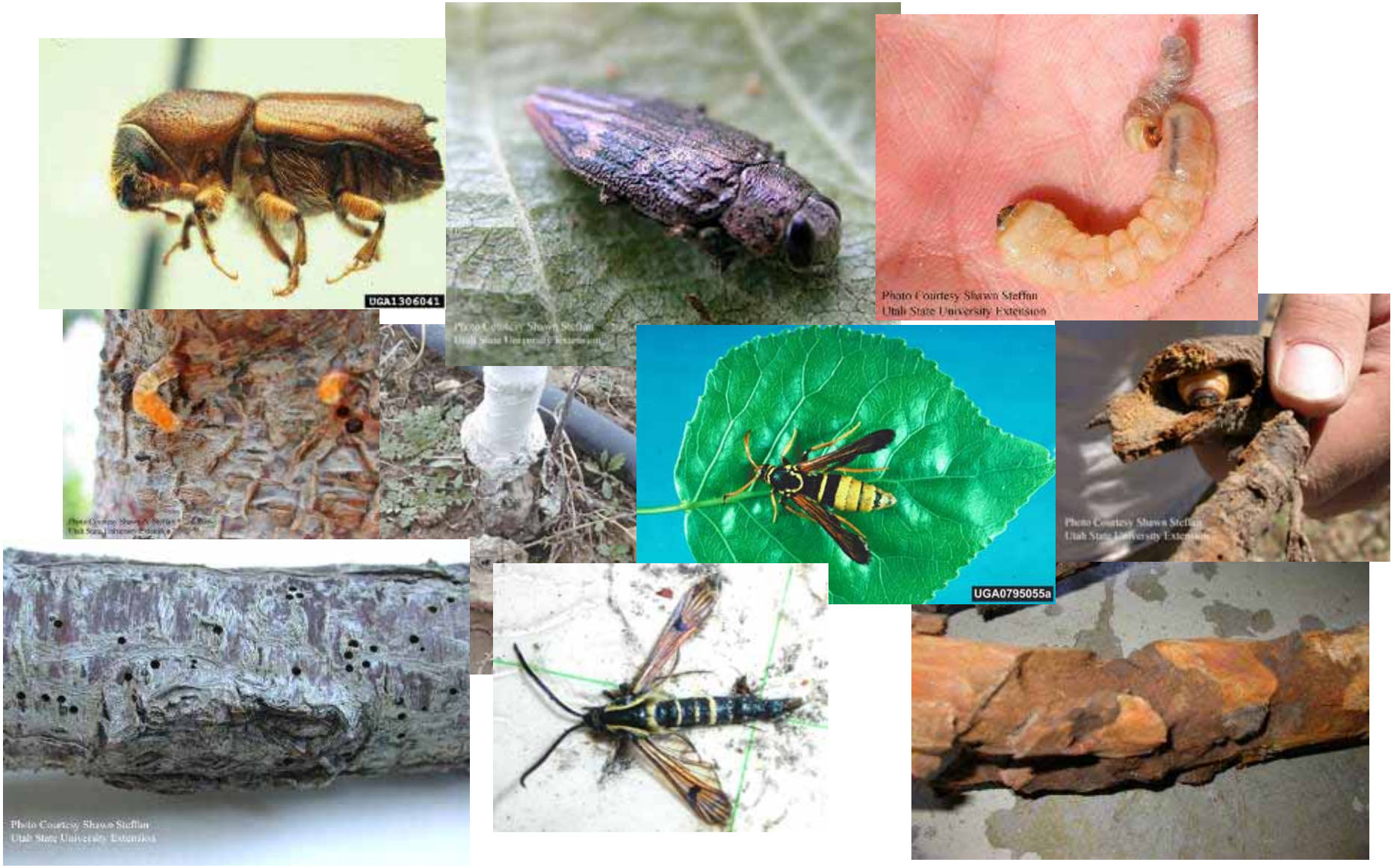
Diagnose, Monitor, Assess, Act

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

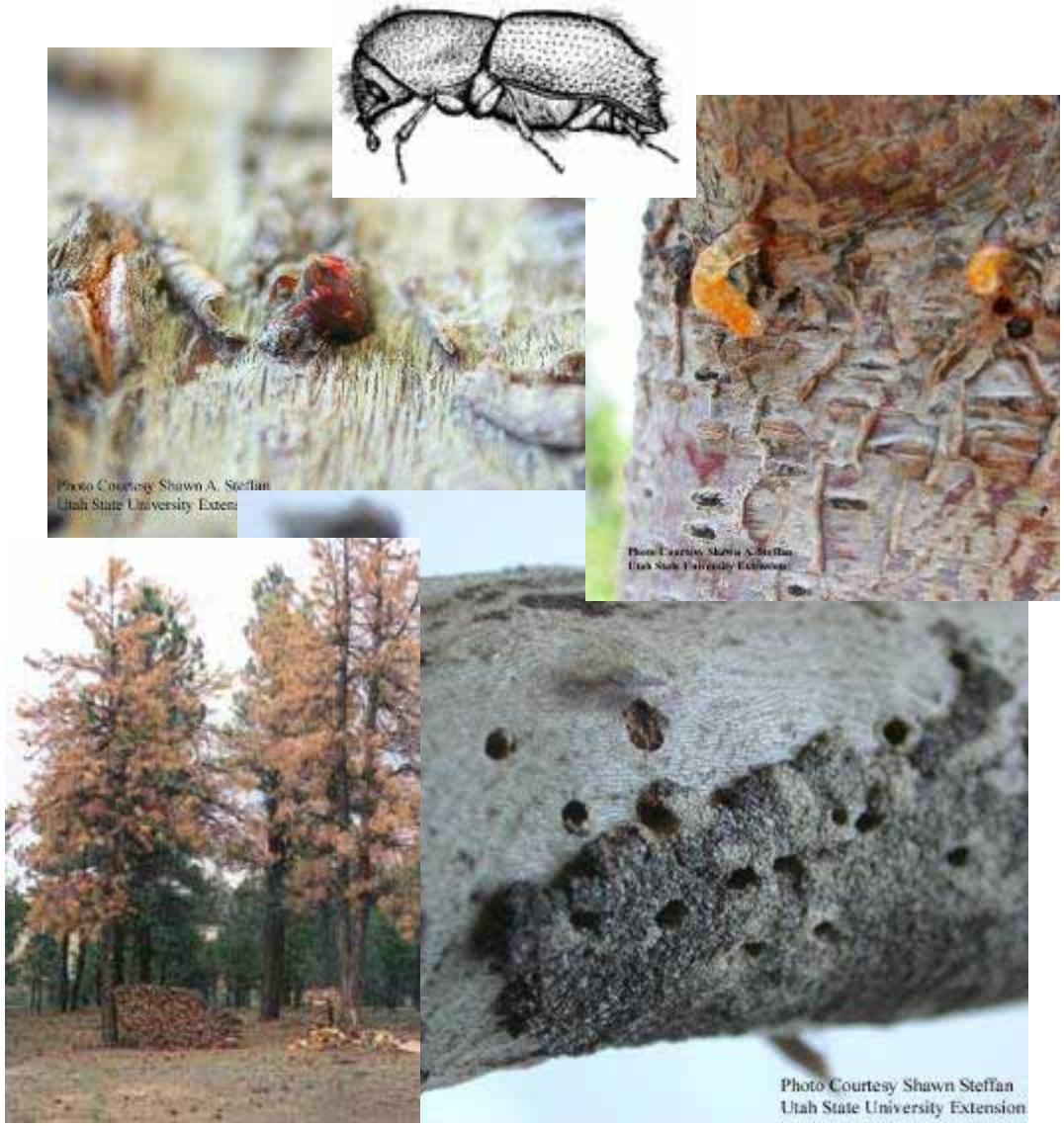
- Beetles
  - Bark beetles – *Scolytidae* (Shothole borer, Ips beetle)
  - Flatheaded/Metallic wood borers – *Buprestidae* (Bronze birch borer, Pacific flatheaded borer)
  - Roundheaded/Longhorned borers – *Cerambycidae* (Prionus beetle, Aspen borer, Locust borer)
  - Weevils – *Curculionidae* (Poplar-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

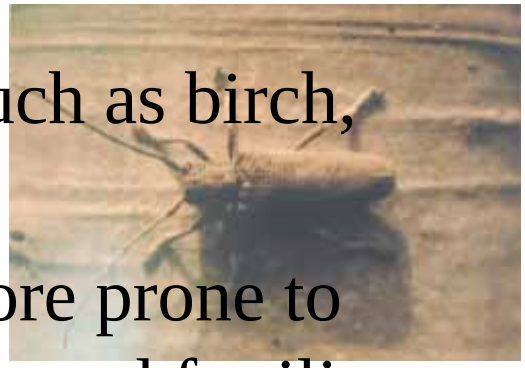
Root Weevils

- 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

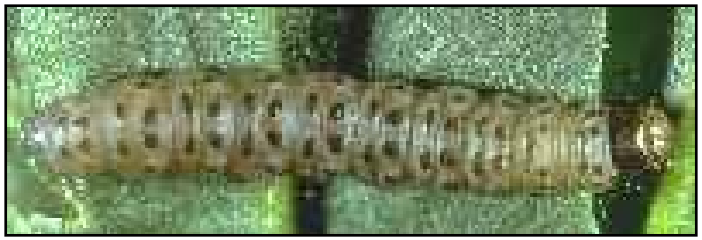
- Good lawn care (fertilize, mow, aerate, irrigation)
- Select more tolerant turf species & varieties
- De-thatch
- Beware herbicide drift, runoff (and salt poisoning)

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 (Ornazin)
  - 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

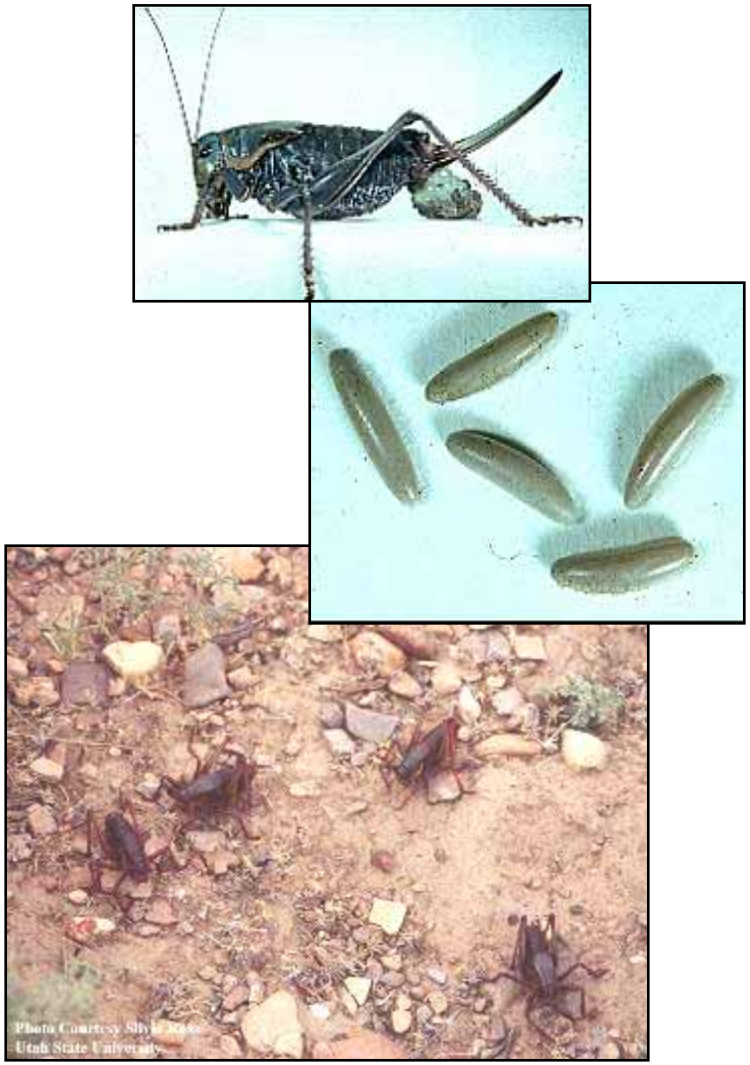
- Wood-boring insects
- Turf pests
- Aphids
- Mites
- **Mormon crickets, grasshoppers**

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

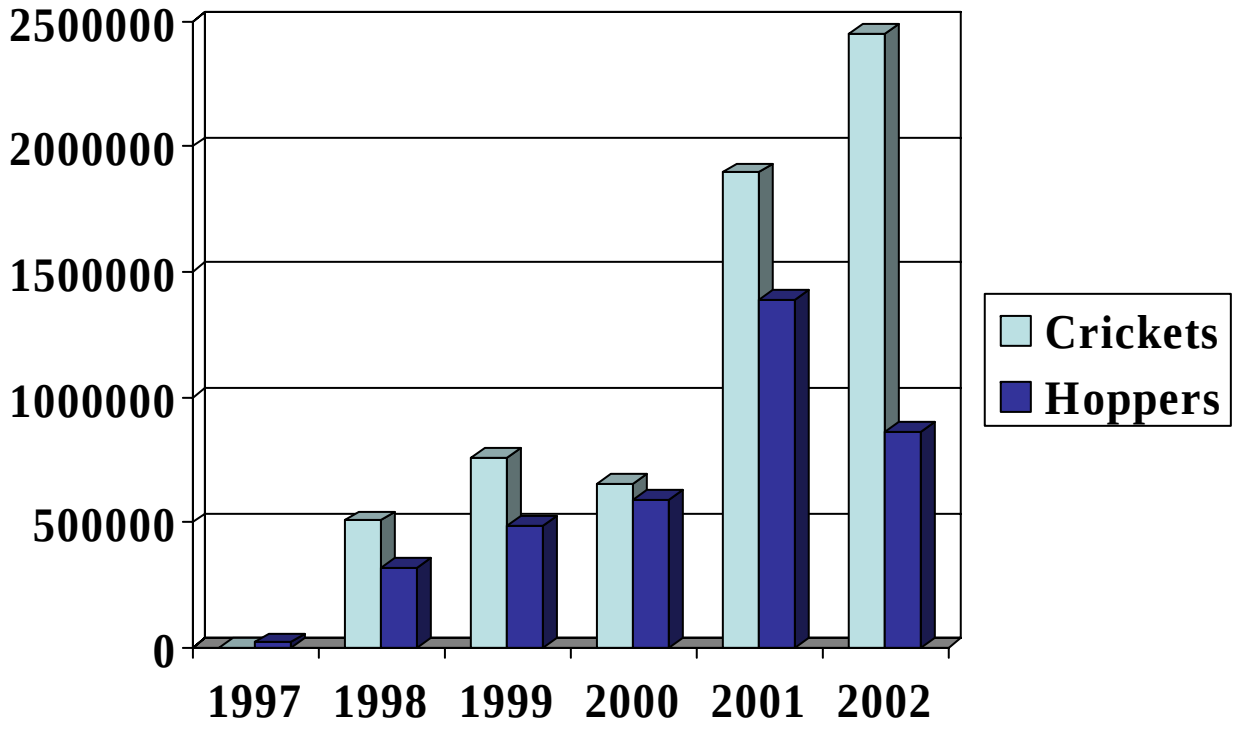
- One female lays about 86 eggs/year.
- Eggs hatch when soil reaches 40° F
- Has 7 nymphal instars; requires 2-3 months to reach adulthood.
- Feed on over 400 species of plants, preferring succulent forbs and cultivated plants.
- During favorable conditions, population grows to 100 per square yard and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

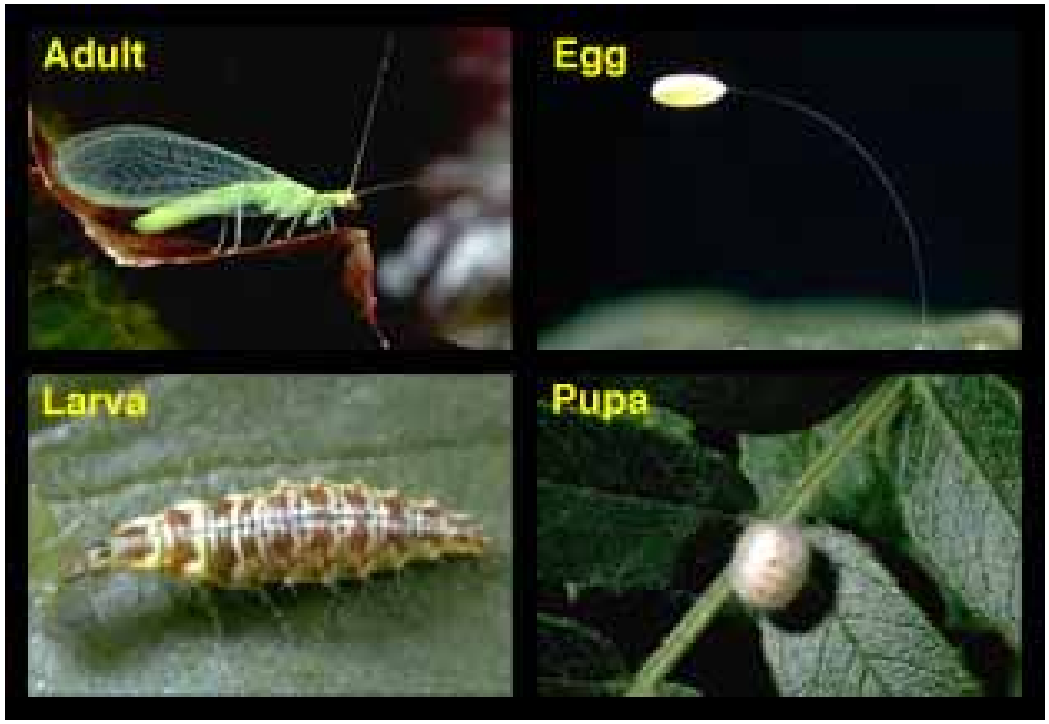
Egg Parasitoid (*Trichogramma* spp.)

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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Contact Information

- Shawn A. Steffan, 435-797-0776
- steffan@biology.usu.edu
- Dept. of Biology, 5305 Old Main Hill, Utah State University, Logan, UT 84322-5305

- www.extension.usu.edu/cooperative/ipd