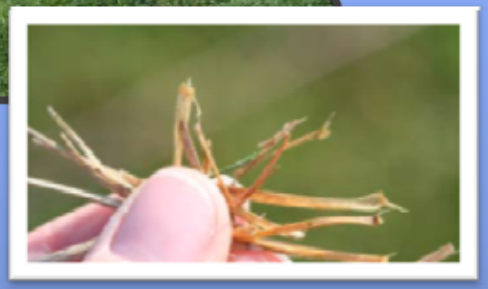
Turf Insect Management:
Billbugs, Sod Webworms, and White Grubs



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Utah Pest Control & Lawn Care Association
Annual Convention
February 12, 2009

Utah State University

UTAH PESTS fact sheet

UtahState UNIVERSITY extension

Billbugs

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What You Should Know

- Billbugs are weevils or snout beetles that vary in...
- Billbugs eat turfgrass roots just below the thatch layer.
- Heavy billbug infestations can kill grass, with peak turfgrass injury occurring in mid to late summer.
- Early billbug detection is important for the prevention of widespread turfgrass damage.
- Keeping turfgrass properly irrigated and fertilized will minimize potential billbug damage.

Plant Damage

Billbug larvae are the damaging life stage. The greatest injury to turfgrass usually appears from mid-June through late July, although billbugs can be feeding all summer. Initially, young larvae will hollow out stems and cause discoloration, but will move down to the crown and into the thatch layer as they mature. Turfgrass will look drought stressed with small brown patches appearing (Fig. 1). Eventually billbugs will consume the roots and destroy the entire root system. Blades of grass can easily be pulled away from the crown with billbug infestations (Fig. 2). Turfgrass root decline is often associated with...

Billbugs can be a serious turf... the entire U.S., with at least... occur in Utah, two species... (Denver and bluegrass billbugs)... turfgrass damage (Fig. 1). Althou... turfgrass. Billbugs are often igno... and root decline is confused with... disease, or other insects. In most... mixed as dollar spot disease or w... homs and golf courses seem to b... the billbugs because turfgrass is v... sod should be carefully exam... of billbugs.

Fig. 1. Billbug feeding... cream to tan brow...

UTAH PESTS fact sheet

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White grubs

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What You Should Know

- White grubs are the larval stage of scarab beetles.
- Several different kinds of white grubs are found in Utah.
- White grubs prefer to feed on turfgrass roots.
- Healthy turfgrass can mask white grub feeding.

White grubs are the most widespread and destructive insect pest of turfgrass. White grubs are the immature form of scarab beetles. There are several established white grub species in Utah, including masked chafers, May/June beetles, and the black turfgrass Ataenius (Fig. 1). Most recently, Japanese beetles were detected in Orem, Utah, in 2006. These white grubs feed on turfgrass roots and are capable of causing significant economic damage. However, turfgrass can be successfully managed to prevent visible white grub damage with cultural control methods.

May/June beetle[1]

Black turfgrass Ataenius[2]

Masked chafer[3]

Japanese beetle[4]

Fig. 1. White grubs are actually scarab beetles. Common scarab beetle adults are shown here (NOT TO SCALE).

Damage Symptoms

White grubs chew off the turfgrass roots near the soil surface or just below the thatch layer. Early signs of white grub damage include grass wilting or yellowing. However, the initial feeding injury often goes unnoticed until brown patches of turf start to develop. White grub feeding damage can be most apparent in the late summer when grubs are nearly fully developed. Small patches of dying turf can quickly join together if grub density is extremely high.

Grub-damaged turfgrass becomes loosely attached to the soil as the roots are consumed. Heavily damaged turfgrass can feel spongy and easily pull away from the soil surface. Drought conditions can make turfgrass injury appear worse.

Description

Adult scarab beetles are identified by size and color pattern. Adults range in size from 3/16 - 1" and can be tan, brown or black (Fig. 1). Scarab beetles are stout, oval shaped, and have clubbed antennae. Adults have a pair of hardened forewings called elytra and a pair of membranous hindwings for flight. The first pair of legs are modified to help burrow in the soil to lay eggs. Some adults are nocturnal and are only active at night.

Many of the white grub species established in Utah look similar to each other but vary in size. Mature grubs range in size from 3/8 - 2". In general, grubs are C shaped and have three pair of thoracic legs (Fig. 2). The head capsule is dark, but the body is usually creamy white in color. White grub species identification is often not necessary because the cultural control practices are similar. The arrangement of hairs and spines on the posterior end of the grub, called the raster, is a distinguishing feature between species (Fig. 3).

Fig. 2. Common white grub body characters[5]

UTAH PESTS News

Utah Plant Pest Diagnostic Laboratory and USU Extension — Vol. 11, Spring 2008

Bee Healthy in Utah

Bee health is a hot topic in the entomology world, and for anyone depending on pollinating insects. Most likely many of you have heard about widespread honeybee colony death in the United States. The collective term for this poorly understood phenomenon is called Colony Collapse Disorder

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Turfgrass IPM Advisory

UTAH PESTS

Seasonal Turfgrass Pest Update, Utah State University Extension, Fall 2008

Turfgrass Pest Management

The management of turfgrass insect pests and diseases is most effective when an integrative approach is taken. Oftentimes, cultural practices will help grasses to resist and recover from pest damage. Resistant turfgrass varieties may also be available.

News/What to Watch For

Diagnosed insect pests in the fall of the year have included armyworms, sod webworms, cutworms, white grubs, and billbugs. Diagnosed diseases have included necrotic ring spot, fading out (*Curvularia* blight), pink snow mold, and take-all patch.

Insect and Disease Activity and Information

Necrotic Ring Spot (*Ophiosphaerella korrae*)

Favorable Conditions: cool (40-60°F) and moist conditions, may be compounded by drought and compaction.

Necrotic ring spot (NRS) primarily infects Kentucky bluegrass, though it may also be seen in annual bluegrass and tall fescue. The disease damages the roots and crowns of the grass plants and the first symptoms are small, light green patches of turf that get larger over time. Frequently the turf will survive the infection and re-grow in the center of the patches, giving them a ring-like ("frog eye") appearance.

Cultural Practices

Maintain the highest mowing height possible and follow recommended irrigation practices to prevent drought stress. Core aerate once annually to reduce thatch and avoid over application of N fertilizers.

Resistant Turfgrass Varieties

Kentucky bluegrass: Adelphi, Eclipse, Midnight, Majestic, Wabash, Monte Carlo, Baron, Blue-Tastic, Unique, Voyager, Beyond, Eagleton, Cabernet, Abbey, Award, Brooklawn.

*Fungicide Options**

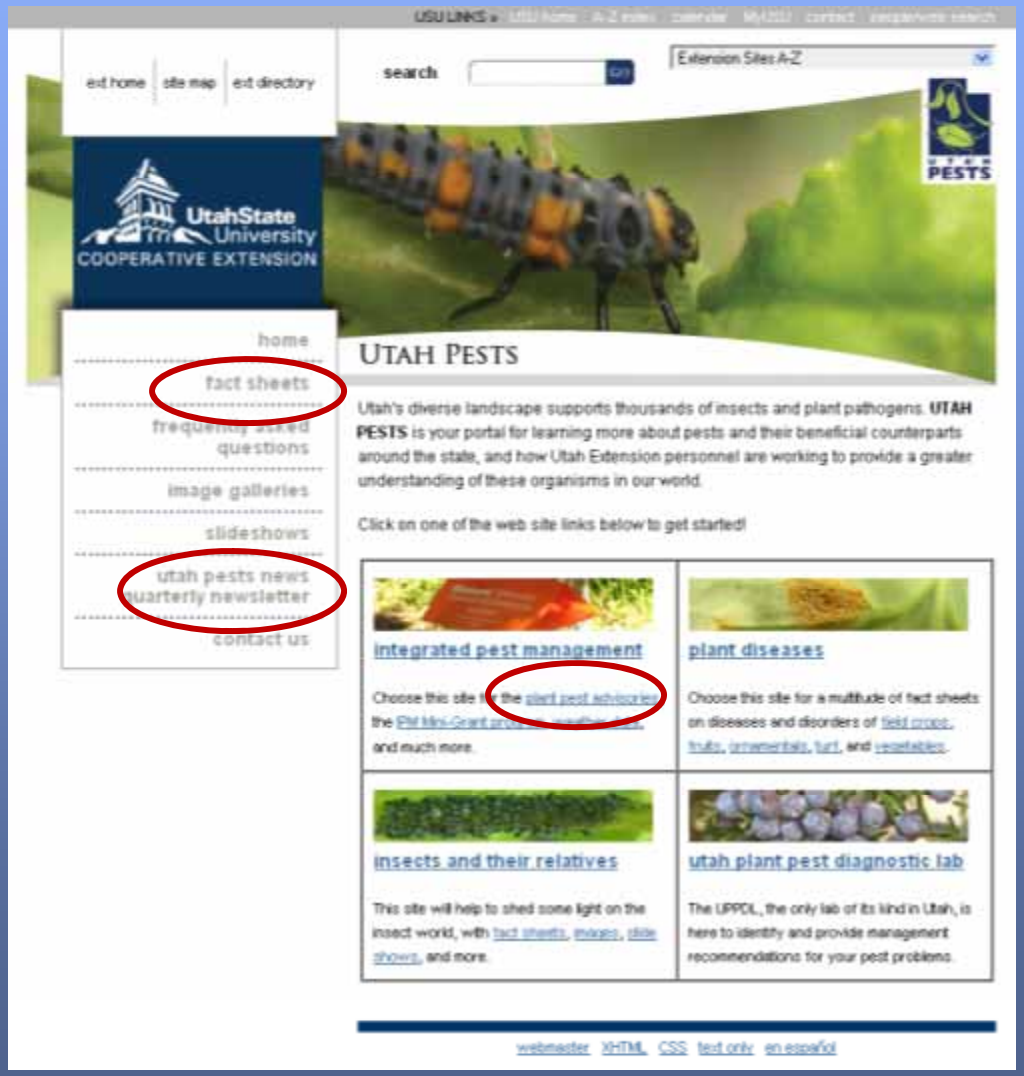
Azoxystrobin (Heritage), myclobutanil (Eagle), propiconazole (Banner MAXX, Propiconazole Pro, Fertilome Liquid Systemic Fungicide), and azoxystrobin + propiconazole (Headway).

Utah Pests is a great resource!

- Entomology & Plant Pathology resources from USU Extension
- see this talk again (and many more!)
- fact sheets, advisories, newsletters
- how to submit a sample to the UPPDL
- photo gallery, FAQ's, etc.

go to *www.utahpests.usu.edu*

Utah Pests On-line Resources



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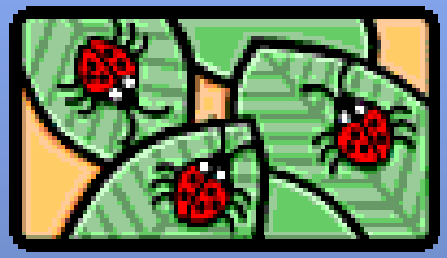
Integrated Pest Management IPM



- Plan ahead (use preventive strategies where possible)
- Accurately identify problem
- Monitor regularly
- Treat only if needed (thresholds)
- Time treatments for “weak links” in pest life cycle
- Use multiple pest management tools
  - Cultural (Variety selection/Turf mgmt.)
  - Mechanical (Aeration/Thatch reduction)
  - Biological (Conserve beneficials/Use biologicals)
  - Chemical (Effective/Least toxic)
- Keep records
- Environmentally, economically, and socially sound

Proper Diagnosis!

Most plant health problems are not caused by biotic factors (pests: insects, diseases), but by abiotic factors (irrigation, environment, culture & care)

Lawn with dry area suggestive of sprinkler pattern problem

Identification of Insect Problems

Identify type of injury:

- Chewed leaves
- Short stems
- Stems break easily
- Sawdust-like frass
- Spongy turf
- “Turf roll-back”
- Predator digging

Look for presence of insect:

- Fat caterpillars
- Brown moths
- Small, legless grubs
- Large C-shaped grubs

Time Treatments for "Weak Links" in Insect Life Cycle

White Grubs
May & June Beetles

Spring

Summer

Fall/Winter

Lay eggs late spring to summer – small larvae present in early summer

Pupate

3" to 12" deep

Turf Cultural Care

- Good lawn care (fertilize, mow, aerate, irrigation)
- Increase mowing height
- Amend soil (add OM)
- Select more tolerant turf species & varieties
- De-thatch

Mechanical

- **Thatch management**
  - Organic matter production exceeds decomposition
  - Insulates soil temperature changes
  - Can reduce cold and drought tolerances
  - Can reduce penetration of water & pesticides

> ½ in.

Aeration

- Consider if thatch >½˝
  - Soil should be moist, not saturated
  - Turf should be actively growing (30 days after)
    - Spring/after Labor day
    - May require herbicide?
  - Power raking
    - Slicing and lifting thatch
  - Core aeration prevents accumulation

Water & Light

- **Water management**
  - Water deeply and infrequently
  - Stronger root system
  - Avoid irrigation during egg-laying periods
- **Light management**
  - White grub adults attracted to lights
  - Damage under street lights/athletic fields
  - Use sodium vapor/yellow lights

Turfgrass Variety Selection

- National Turfgrass Evaluation Program (NTEP) – Paul Johnson, USU
- Start with pest-free sod
- Extensive root systems
- Endophyte-enhanced
  - Perennial ryegrasses and fescues
  - Best for leaf and stem attacking insects
  - Some tolerance to billbugs

Predators and Parasites

- Can reduce larvae (caterpillars, grubs)
- Unreliable efficacy
- Can cause concern to people

Ground beetle

Tiger beetle

Pathogens

- Bacteria, fungi, nematodes (entomopathogenic)
- Commercially available
- May need multiple applications
- May need 3-5 years to see effects

Nematode

Fungus

Major Turf Pests

- **Surface / Thatch Feeders (leaf, stem):**
  - Armyworm
  - Cutworm
  - Sod webworm
  - Mites
- **Surface / Crown Feeders (burrow into stem, crown):**
  - Billbugs
  - Subterranean webworm
- **Subsurface (root):**
  - May & June beetles
  - Black turfgrass Ataenius
  - Masked chafer
  - Japanese beetle

Billbug adults

- Weevils - snout beetle, elbowed antennae
- Wandering walkers - don’t fly
- Will “play dead” if disturbed

Billbugs in UT

- Bluegrass billbug
- Hunting billbug
- Denver billbug (Northern UT)

Bluegrass billbug

Denver billbug

Billbug larvae

- White, legless with brown head capsule
- 1-2nd instars found just below crown
- 3-4th instars found just under thatch

Billbug or grub?

Billbug life cycle

- 1 generation per year
- Overwinter as adults away from turf
  - Migrate back to turf in spring
- Some overwinter as larvae in turf
- Mate and lay eggs in the spring
- Feed all summer

Billbug damage

- Similar to drought-stressed turf
- Adults feed on stems
- Larvae feed on roots, crowns, stems

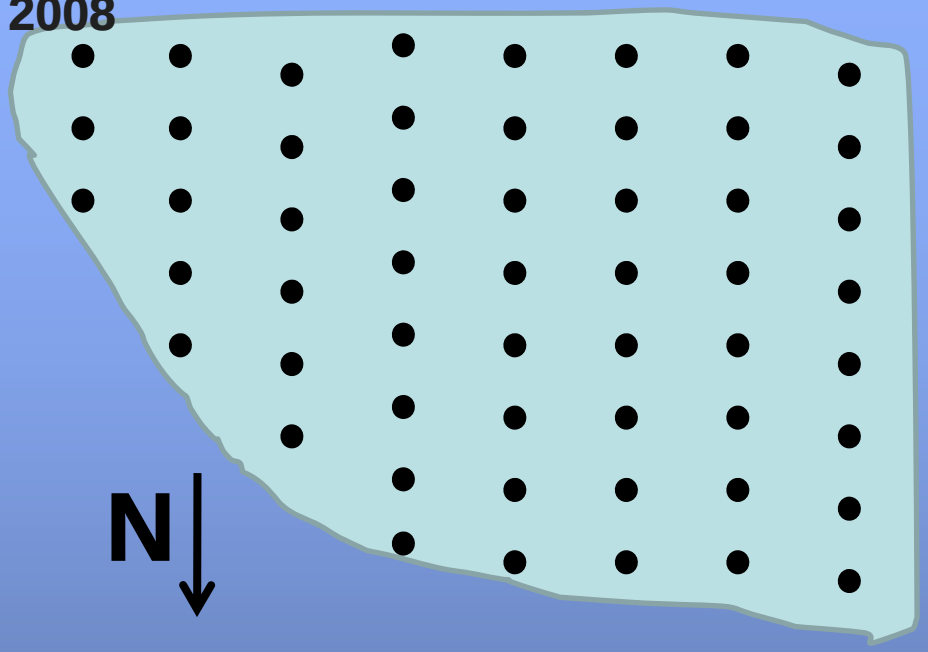
Turfgrass research

Dr. Erin Hodgson, USU Extension Entomologist

- **USU collaboration with P. Johnson/K. Kopp**
  - Greenville Farm, Logan UT
  - Define life history information for billbugs
  - Describe population dynamics
  - Refine sampling protocols

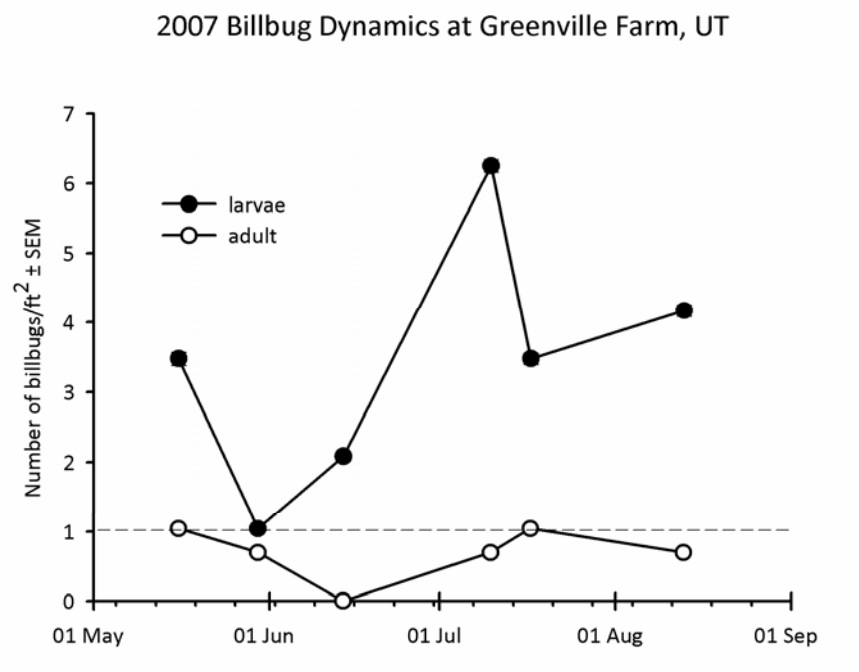


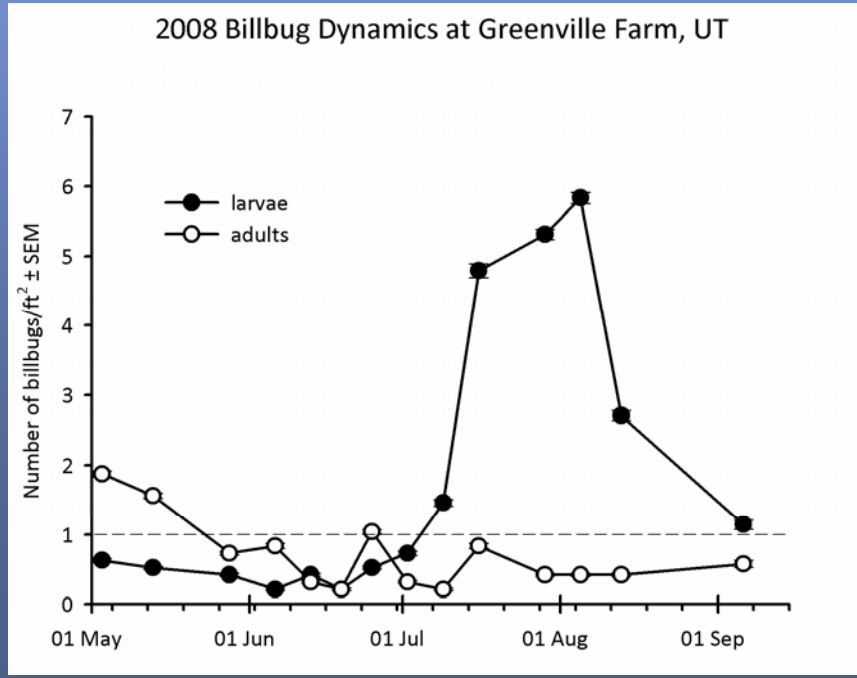
Core sampling for billbugs in 2007 and 2008



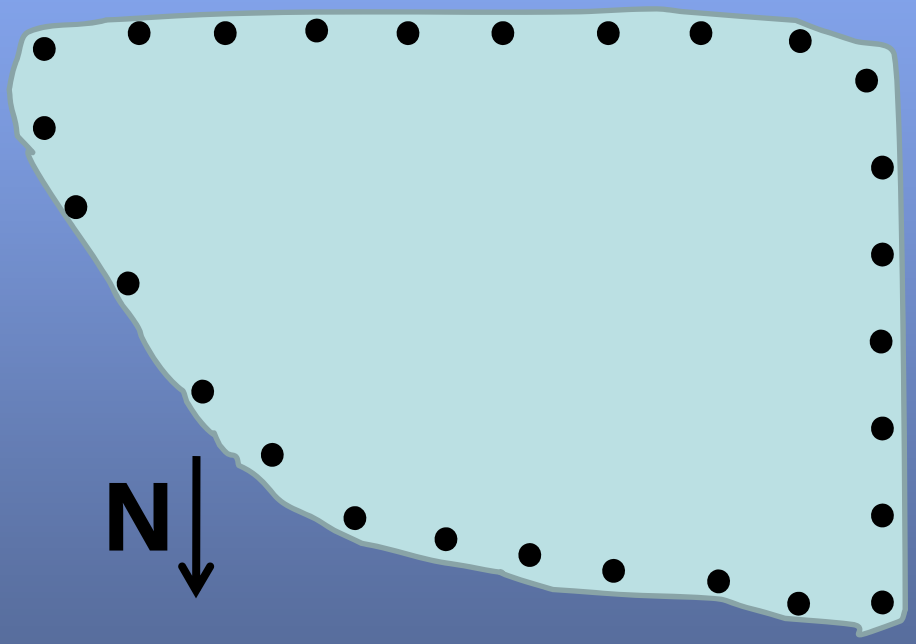
Observations in Cache Valley

- **Denver billbug is most prominent**
- **Large larvae are active in April *(suggests overwintering)***
- **Peak larval activity late July – early August**



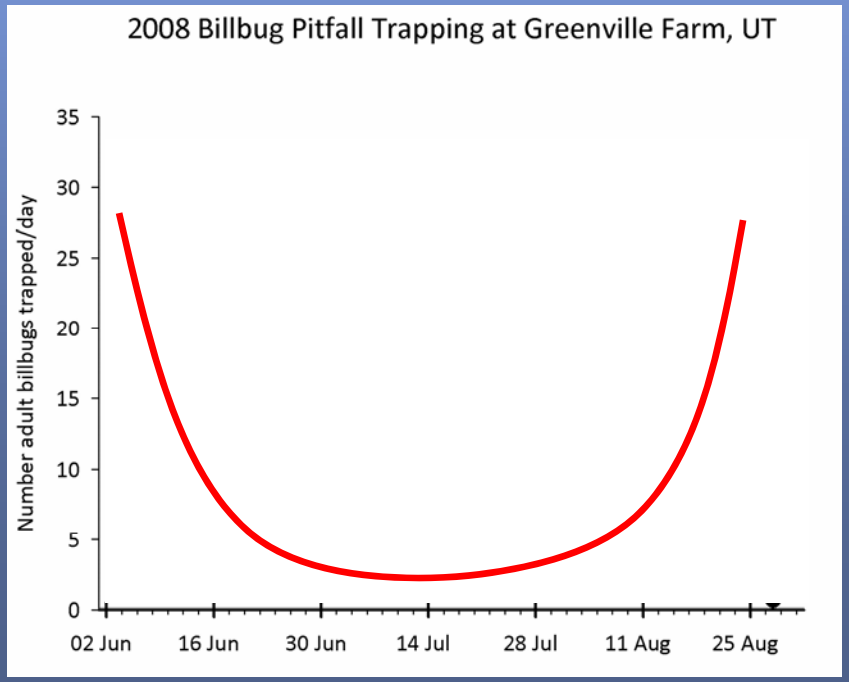


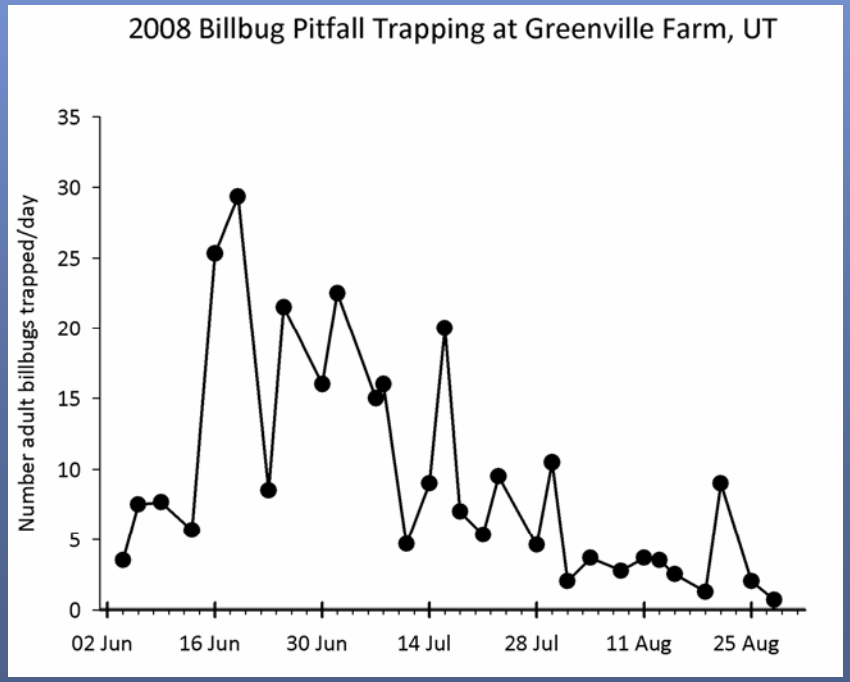
Pitfall trapping for billbugs in 2008



Observations in Cache Valley

- Adults were active April – October
- Peak adult activity mid to late June





Denver Billbug

- **Life Cycle**
  - Adults & large larvae overwinter in turf
  - Begin feeding in spring
  - Eggs laid in stems (spring to summer)
  - Overlap of old & new adults in summer

- **Damage**
  - Mid June to early August
  - Larvae feed within stems, crowns & on roots
  - Abundant frass
  - Stems break easily at crown
  - Dollar spots grow into larger patches

Billbug Control

- Target small larvae (early summer)
- Threshold: 1 larva/sq ft
- Light irrigation to move materials into crown zone
- Tolerant turfgrass varieties (endophyte)
- Insecticides:
  - Chlorantraniliprole (Acelepryn™)
  - Clothianidin (Arena™)
  - Imidacloprid (Merit™)
  - Halofenozide (Mach 2™)
  - Scimitar™, Talstar™ & Tempo™ for adults
  - Chlorpyrifos (Dursban Pro™)
  - Carbaryl (Sevin™)
  - Beneficial Nematodes -*Heterorhabditis bacteriophora* (Cruiser™) & *Steinernema carpocapsae* (Scanmask™)
  - Fungus – *Beauveria bassiana* (Botanigard™, Naturalis™)

Subterranean Sod Webworm

- Lepidoptera (moth, caterpillar)
- AKA Cranberry girdler
- Snout moth

  - Off-white to gray caterpillars
  - Larvae feed in crowns & roots
  - Larvae form silken tunnels in soil to spend the winter
  - Adults emerge in mid June, active 6-8 wk
  - Buff to brown moths fly just above turf in zigzag pattern; especially near dusk
- 1generation per year

Subterranean Sod Webworm

- **Damage**
  - Thinning turf
  - Larvae chew on crowns & roots
  - When severe, sod becomes loosely attached to the soil
  - Green frass accumulates at crowns
  - Secondary damage from birds pecking holes in turf

Sub. Sod Webworm Control

- Target young larvae (summer to early fall)
- Threshold: 10-15 larvae/sq ft
- Increase mowing height
  - *Bacillus thuringiensis* (Deliver™) – must be ingested by small larvae
  - Spinosad (Conserve™)
  - Azadirachtin (Ornazin™)
  - Chlorantraniliprole (Acelepryn™)
  - Clothianidin (Arena™)
  - Imidacloprid (Merit™)
  - Halofenozide (Mach 2™)
  - Scimitar™, Talstar™, Tempo™)
  - Acephate (Orthene™)
  - Carbaryl (Sevin™)
  - Diazinon
  - Chlorpyrifos (Dursban Pro™)
  - Beneficial Nematodes (Biosafe™, Biovector™Exhibit™)

White Grubs

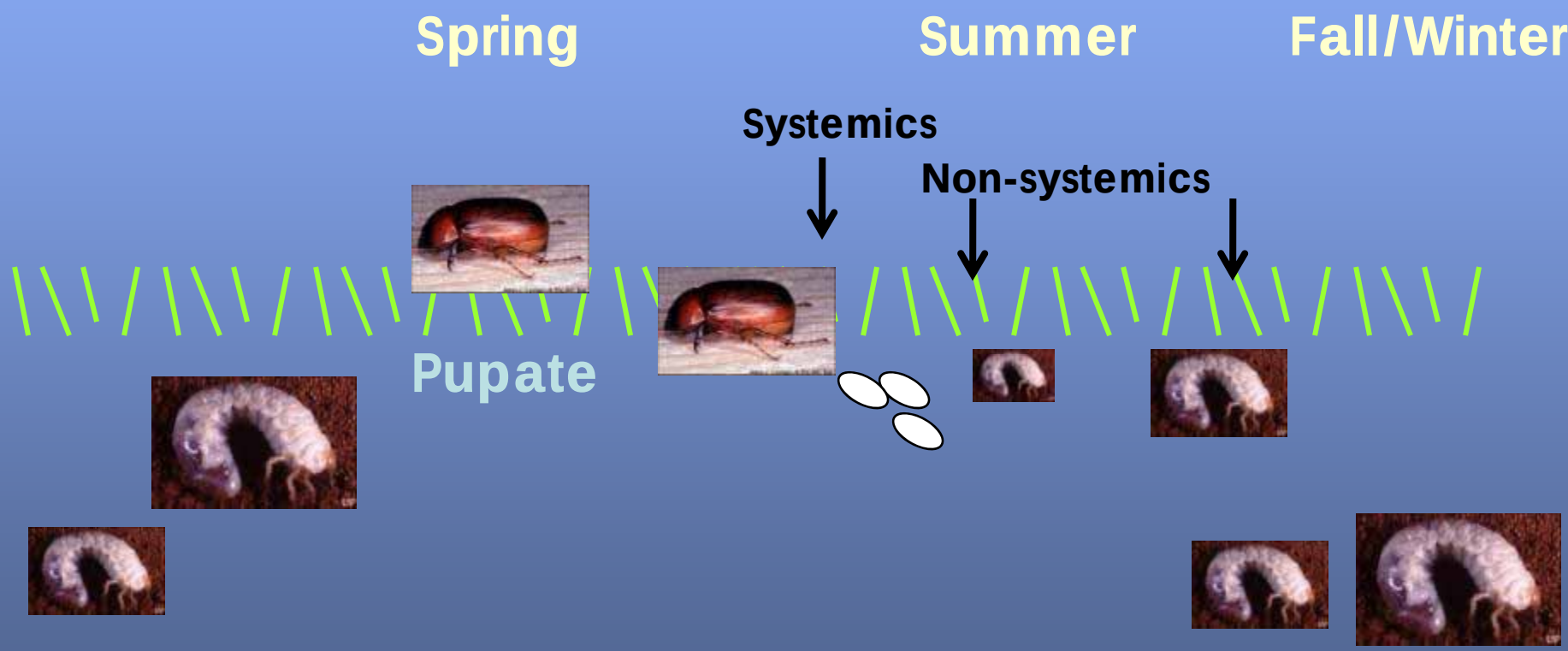
May and June Beetles (*Phyllophaga*)

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

White Grubs

- **Damage:**
  - Root feeding, plants wilt, yellow, thin
  - Irregular dead patches
  - Turf not anchored to soil, “turf roll-back”
  - Invasion by broadleaf weeds
  - Secondary damage from small mammals & birds
  - Most apparent in late summer when grubs are larger

White Grubs
1-3 year life cycle



Can spend 1-2 years as 2nd to 3rd instar larva

2nd-3rd instars move 3” to 12” deep for winter

White Grub Control

- **Target eggs & small larvae (late spring to early summer)**
- **Target larvae before they dig deep for the winter (late summer to early fall)**
- **Thresholds:**
  - **May/June beetles: 3-5 grubs/sq ft**
- **Irrigate to move materials to grubs in the upper root zone**
  - Chlorantraniliprole (Acelepryn™)
  - Clothianidin (Arena™)
  - Imidacloprid (Merit™)
  - Halofenozide (Mach 2™)
  - Carbaryl (Sevin™)
  - Chlorpyrifos (Dursban Pro™)
  - Diazinon
  - Trichlorfon (Dylox™)
  - Beneficial Nematodes -*Heterorhabditis bacteriophora (Cruiser™), Steinernema carpocapsae (Scanmask™)*
  - Fungus – *Beauveria bassiana* (Botanigard™, Naturalis™)

Cutworms & Armyworms

- Lepidoptera (Noctuid moths)
- Healthy turf can resist attack
- Larvae feed on leaves & crown
- Target young larvae in summer
- Threshold: 5 larvae/sq yd

Mites

- Banks Grass Mite
- Clover Mite
- Twospotted Spider Mite
  - Feed on leaves
  - Remove sap, chlorophyll
  - Cause speckling, silvering, bronzing
- Dry conditions, drought stress
- Spring to summer

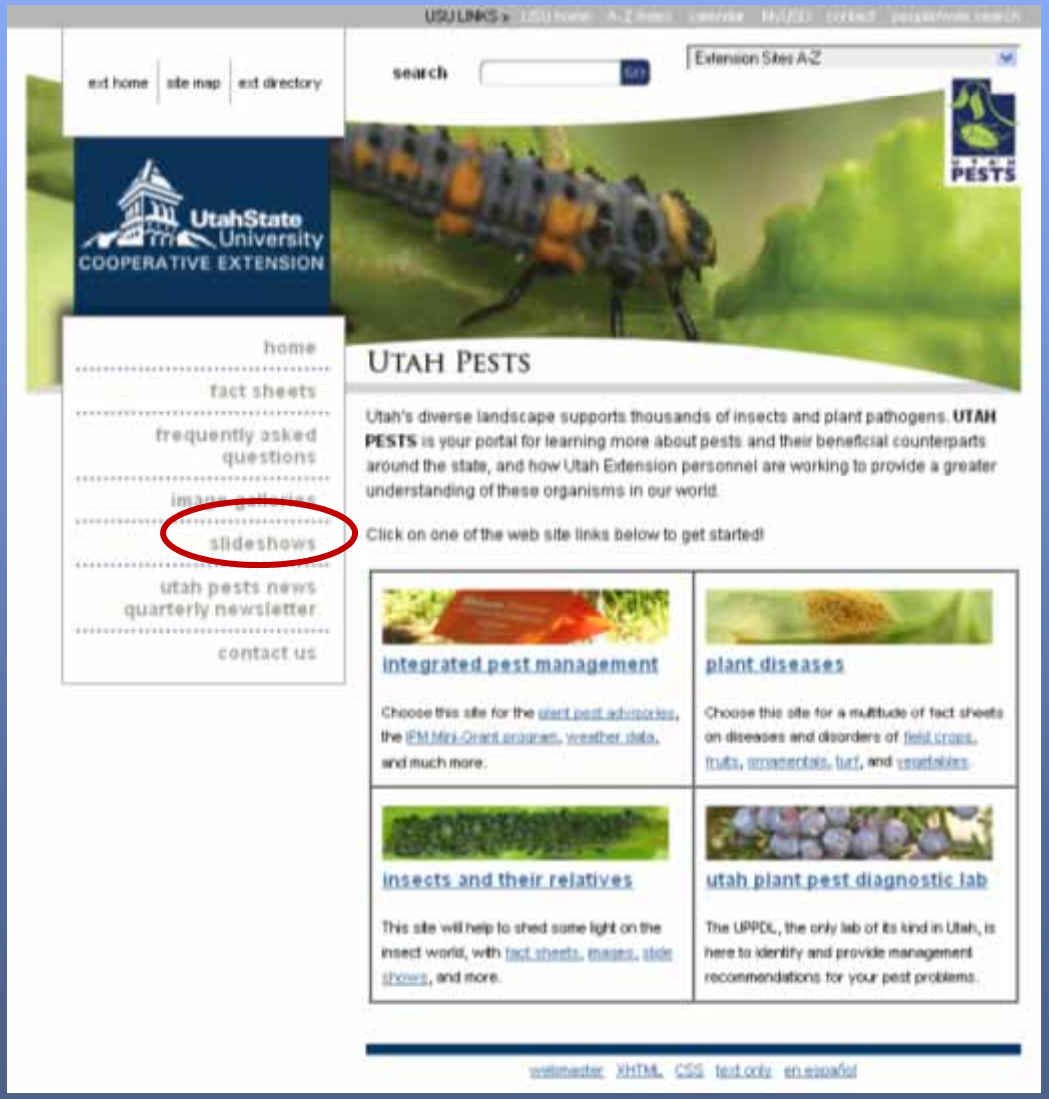
Mite Control

- Soap (1-2%)
- Stiff stream of water; irrigate
- Miticides:
  - Abamectin (Advantage™, Avid™)
  - Dicofol (Kelthane™)
  - Bifenthrin (Talstar™)
- Predaceous mites

Where can you view this & other pest management slideshows?

One-stop shopping for Utah pest management information

www.utahpests.usu.edu



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- Dr. Erin Hodgson, USU Extension Entomologist
  - For sharing billbug & turfgrass research results

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