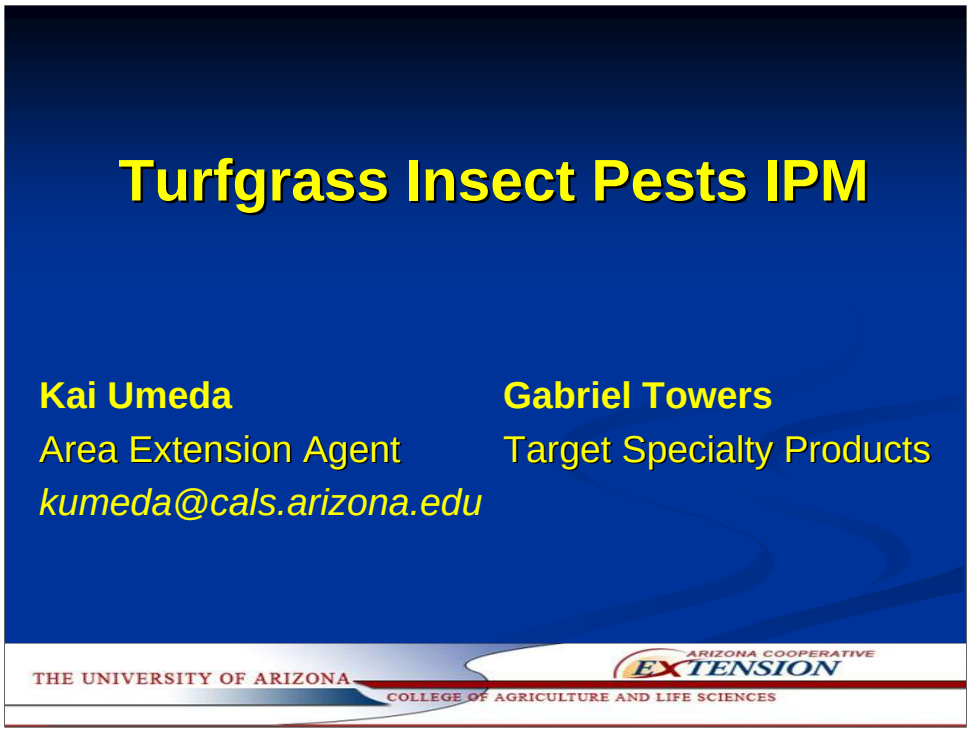


Integrated Pest Management (IPM) for insect pests in turfgrass has a foundation in understanding the biology of the pests.

This presentation provides an introduction to implementing an IPM program by learning to identify and determine what insect pest problems are in Arizona and offers how to implement fundamental IPM techniques.

Gabe Towers was a former Research Specialist with the University of Arizona Cooperative Extension in Maricopa County.

Introduction

- Arizona desert: unique climate, environment
  - Limited insect pest knowledge in turfgrass
    - Taxonomy
    - Generations/season
    - Timing of emergence/occurrence
    - Economic thresholds
    - Control strategies

There is much information about typical turfgrass insect pests in other parts of the U.S. but insects behave very differently in the hot and dry desert.

The exact species of insect pests are not the same as those of the midwest or east coast of the U.S. Pests with a single generation in the midwest may have multiple generations in the desert. The range of low to high deserts in Arizona offers a range of temperatures that insects could emerge all year around. Threshold levels where insects cause damage or when to initiate treatments has not been fully determined for most turfgrass insect pests. Many chemical control products have been introduced and have demonstrated efficacy, but precise timing for economical and environmentally safe applications have not been fully researched and determined for the desert.

Introduction

- Insecticides for turf use
  - Organophosphates (OP's)
  - Carbamates
  - Pyrethroids
  - Neonicotinoids
  - Chlorantraniliprole
  - B.t.
  - Insect Growth Regulators (IGR's)

Many old and recently introduced products with varying modes of action against insect pests have been proven to be effective when used appropriately. Research continues to better understand how all of these expensive products can be used in the most efficient and safe manner.

IPM

Integrated Pest Management

- Federal definition

  "Integrated Pest Management, or IPM, is a long-standing, science-based, decision-making process that identifies and reduces risks from pests and pest management strategies."

- "IPM is a decision support system for the selection and use of pest control tactics, singly or harmoniously coordinated into a management strategy, based on cost/benefit analyses that take into account the interests of and impacts on producers, society, and environment." – *Kogan, 1998*

IPM targets pest problems but over time, the definition evolved to consider the pest within the context of its environment, economics, risks, and benefits for the producers as well as societal impacts.

Biological control is the use of predators and parasites that may be naturally occurring or introduced. Included are predaceous insects or insect-specific diseases or nematodes or vertebrate predators such as birds.

Cultural control practices are the turfgrass management techniques that include adjusting mowing heights, fertilizer applications, irrigation scheduling, etc. that may alter the turfgrass vigor to make the turfgrass more or less appealing or attractive to insect pests.

Chemical controls include the judicious use of appropriate insecticides when needed and in concert with biological and cultural practices.

Pest Control Tactics

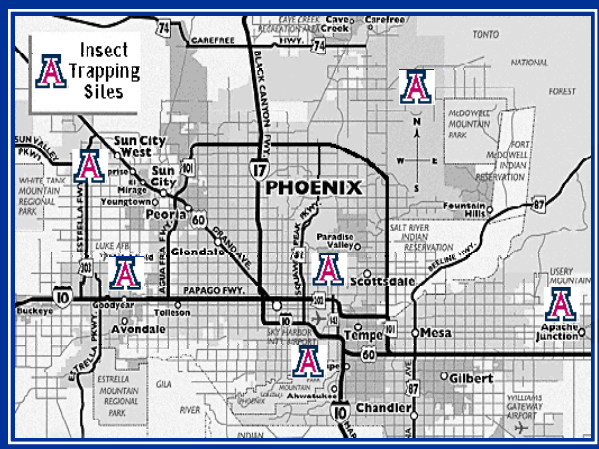
- Cultural
  - Understanding and knowledge of the pest, crop, environment
  - Monitoring and scouting
  - Thresholds
    - Damage
    - Economic

Basic understanding and having knowledge of the pest(s) is a major cultural practice. Monitoring with insect traps (including blacklight traps and pitfall traps) and lures provide accurate information about when pests occur at specific locations (on golf course, stadium, park, etc.).

Damage thresholds when significant turfgrass injury occurs to instigate cost-effective control measures. Varying degrees of damage may be tolerated by turfgrasses before requiring an insecticide application.

Cultural Control Tactic Monitoring/Scouting

Network of blacklight traps around valley since 2004



In the Phoenix area, the extent of insect pest problems in turfgrasses was not fully understood. In 2004, a network of blacklight traps was established on 6 golf courses to learn about insect pest problems.

Monitoring Collection Results

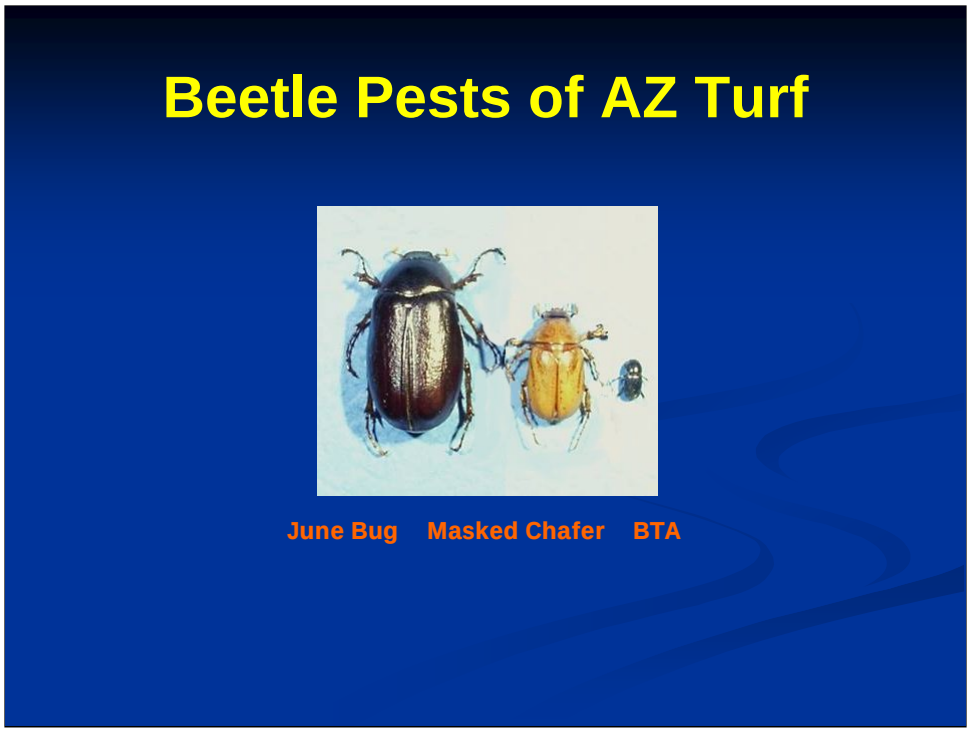
- Pests
  - Moths
    - Sod webworm
    - Armyworm
    - Cutworm
  - Beetles (white grub complex)
    - Masked Chafers
    - Black turfgrass ataenius (BTA)
    - *Aphodius*?

Examples of insects that were caught during the summer months from May to overseeding included flying insects – moths and beetles.

Key Pest – Chafer Beetles

White grub complex

The key pest was determined to be the masked chafer beetles, a part of the white grub complex of turfgrass insect pests.



Other beetles caught in the blacklight traps included the June bug and black turfgrass ataenius (BTA)

Beetle Pests of AZ Turf

June Bug Masked Chafer BTA

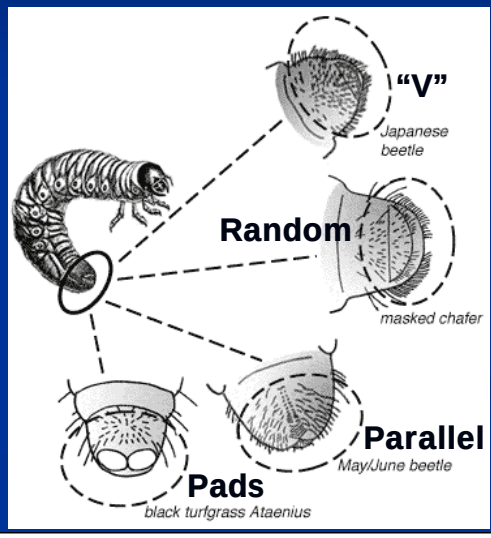
The typical “C-shaped” white grub of the 3 species look very similar.

Rastral Patterns

How to ID grubs

The arrangement of hairs on the rear end of a grub is called a rastral pattern

Each species is unique.



Grubs can be distinguishable by observing the rastral patterns.

Masked Chafer

Scattered or random bristle pattern

May/June Beetle

Parallel bristles or ‘Zipper’ pattern

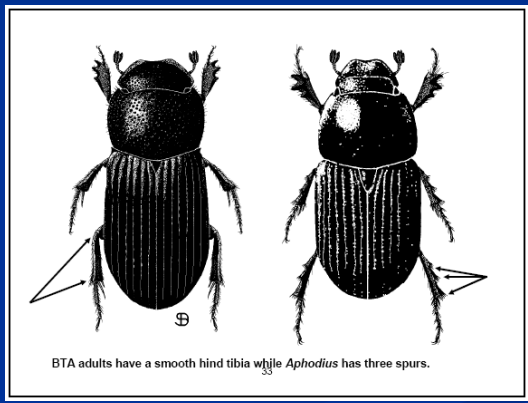
Black Turfgrass Ataenius

Another very numerous species observed in the blacklight traps was the BTA.

BTA vs. Aphodius

BTA
- turf pest

Usually perfectly black, shiny



BTA adults have a smooth hind tibia while *Aphodius* has three spurs.

Aphodius
- Pest ???
- Probably NOT

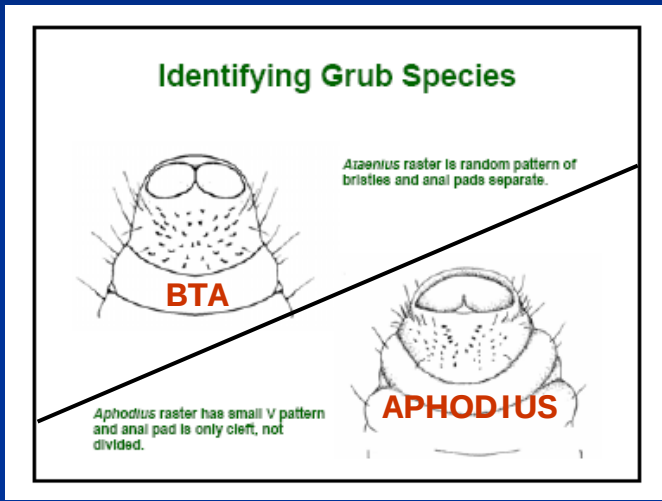
Often golden colored, some have gold/dark stripes

BTA appears very similar to the *Aphodius* species of beetles.

They are differentiated by the spurs on the hind legs of the *Aphodius*.

Aphodius are not turfgrass root feeders and are not pests but are beneficial organic matter feeders.

BTA vs. Aphodius Rasters



Grub Damage

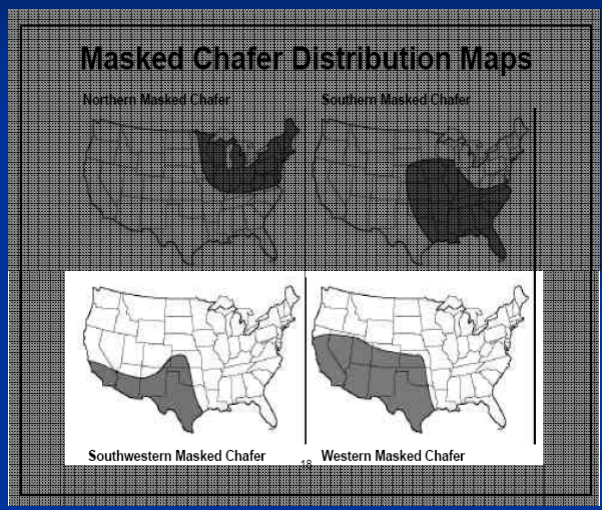
Direct grub damage caused by root feeding presents dying and dried-out appearance.

Grub Damage

Extremely heavy populations of grubs can severely damage roots and allow turfgrass to be “pulled up like carpeting”.

Secondary grub damage is caused by vertebrate pests that dig and destroy turf to hunt and feed on grubs.

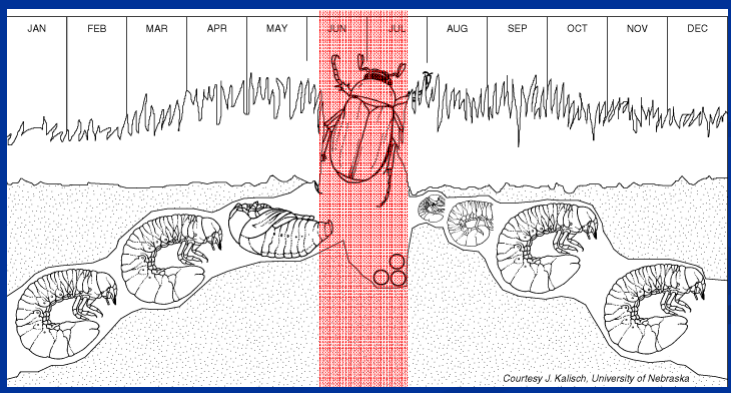
Key Pest – Chafer Beetles



The masked chafer species probably invading turfgrasses in Arizona are the western and/or the southwestern masked chafer.

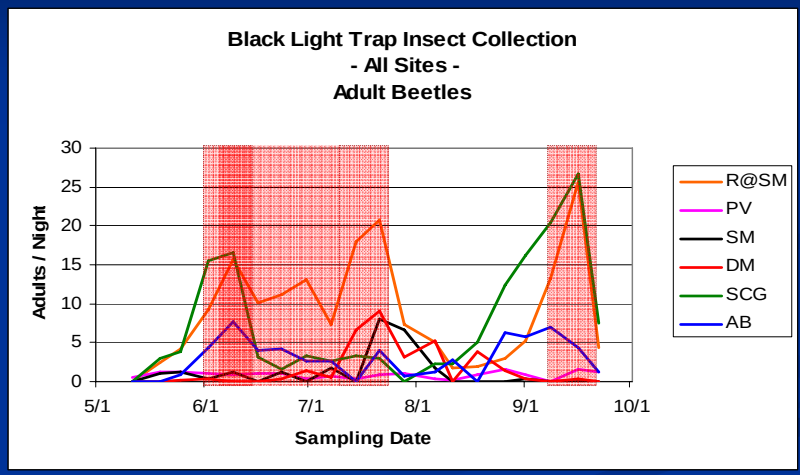
Key Pest – Chafer Beetles

Lifecycle:



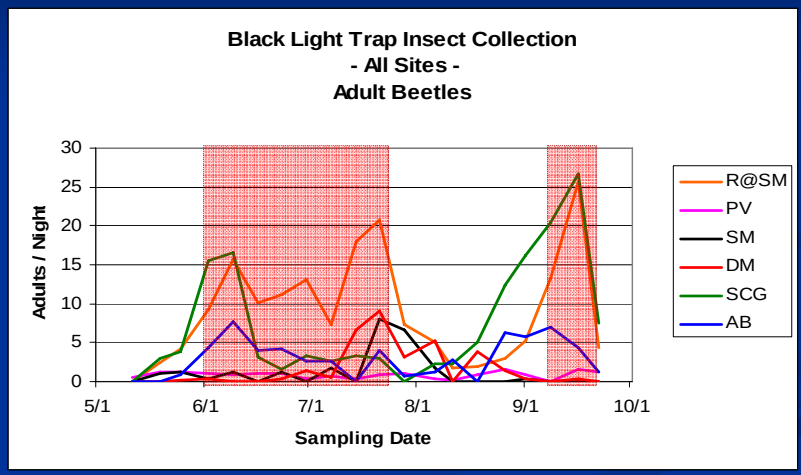
Typical lifecycle of chafer beetles is a single adult generation emerges in June/July that lays eggs that hatch within a month. Emerging early instar larvae feed on turfgrass roots and causes damage. Large larvae overwinters, pupates then emerges next year.

Monitoring Collection Results



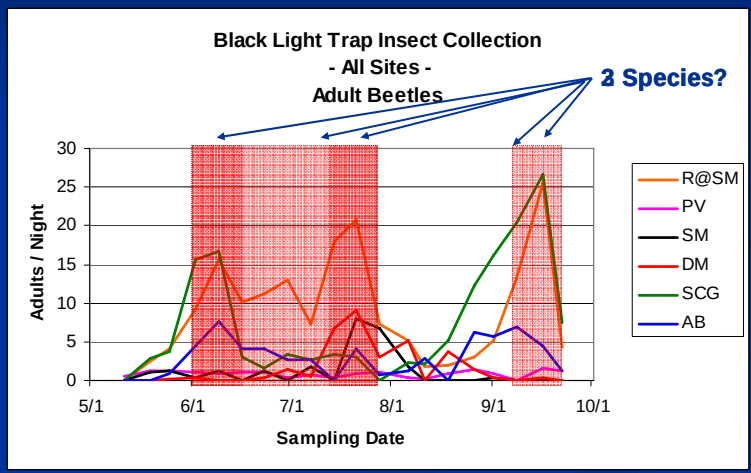
Blacklight trapping in the Phoenix area yielded varying masked chafer beetle populations. Some had very little and others showed seasonal population differences, not a typical single June/July adult emergence. Variation of infestation among sites indicated importance of site-specific monitoring. As many as 3 peaks were observed in early June, mid-July, and again in September.

Monitoring Collection Results



The June to mid-July peak observance of adults could be a prolonged period of a single emergence. September could be a totally separate second emergence period.

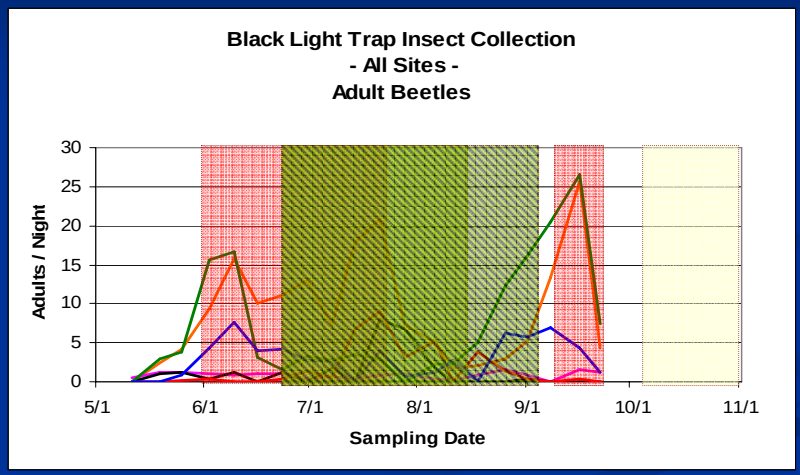
Monitoring Collection Results



Appearance of 3 peaks of adult emergence could indicate different scenarios such as: 1) only 1 masked chafer species with a long season of emergence from June to September; 2) 2 species with a summer and a fall emergence period; or 3) 3 species that begin emerging in June, July and in September.

Monitoring Collection Results

Timing of soil insecticide application(s)



A prolonged emergence period from early June to overseeding in September creates a dilemma for when to use chemical control measures. Soil-active insecticides should be applied 3-4 weeks after the “peak” flight of beetles so that it is timed for emergence of hatching instars. Soil-applied insecticides (neonicotinoids) generally may offer control for about 6-8 weeks. A September egg hatch would not be treated by the early summer insecticide application so they overwinter and emerge as adults in the next year.

Trapping and monitoring is important for each location to understand specific beetle flights and grub infestations.

Other flying pests observed in the blacklight traps included the sod webworm adults.

Sod Webworm

(Larvae)

Spots. No lines.

Typical larvae observed in turf

Lifecycle in the desert region has not be fully defined.

Cutworm

(Adult)

Dirty, Dusty, Mottled.
Flat Wings.

There are many species of cutworms.

Cutworm

(Larvae)

Stripes.

Billbugs

(Adults)

Antennae from base of snout.

'M' pattern on back.

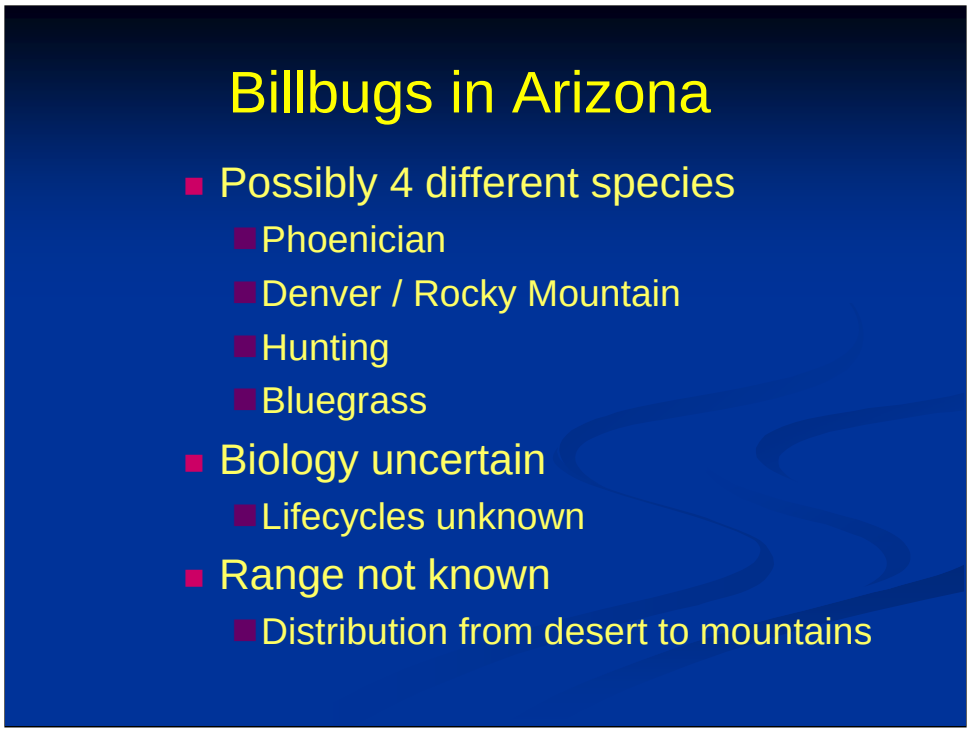
There may be as many as 4 different billbug species in Arizona turfgrasses. "Weevil-like" adult beetles have a snout.

Billbugs

(Larvae)

Stout Legless. Feed @ crowns.
NOT WHITE GRUBS.

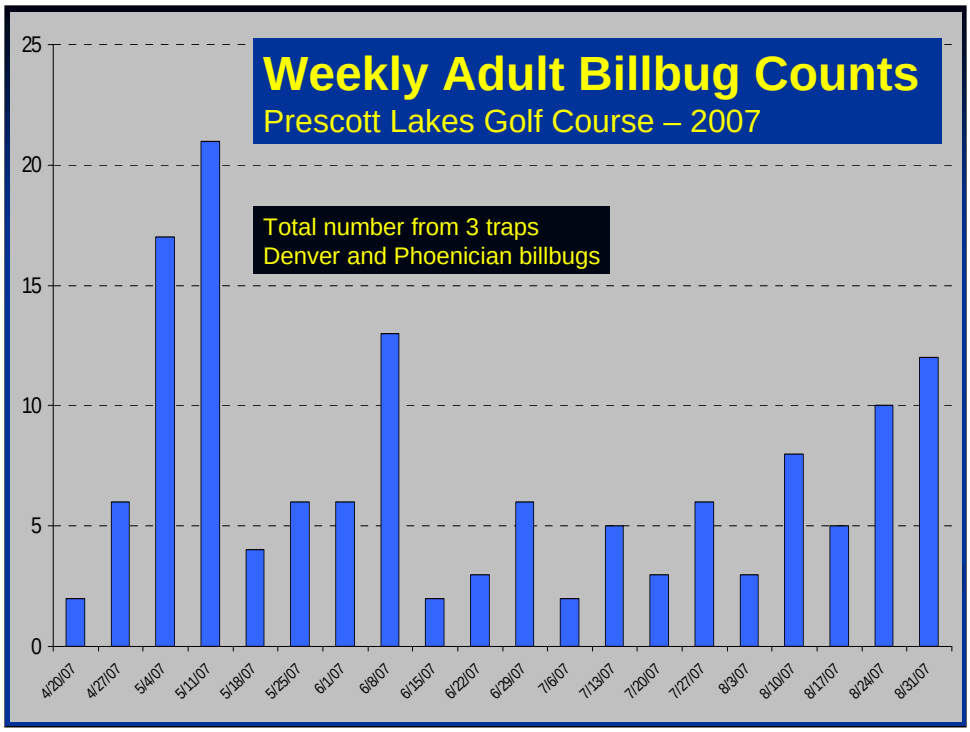
Billbug larvae are distinguishable from grubs. Legless, not “C-shaped”, distinct head capsule, creamy white body.



There are many unknowns about billbugs in Arizona turfgrasses.

Observed in Phoenix area to Prescott. Prescott has primarily Denver/Rocky Mountain billbug and some Phoenician billbug.

Simple pitfall trap with buried 1-1/2 inch PVC pipe with slit to catch falling adults as they crawl in turf. Trapped in 2 liter bottle with ethanol or “cheap” vodka.



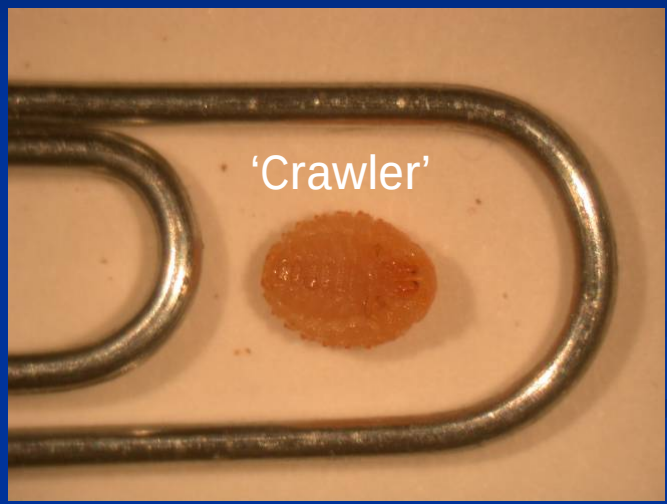
Peak observance of adult billbugs in May with constant presence throughout the summer in Prescott.

Rove Beetles

Predatory. Good guys.
Despite posture, harmless, no stinger.

Rove beetles are nuisance pests on golf course greens. Beneficial organic matter feeders that don't injure turfgrass.

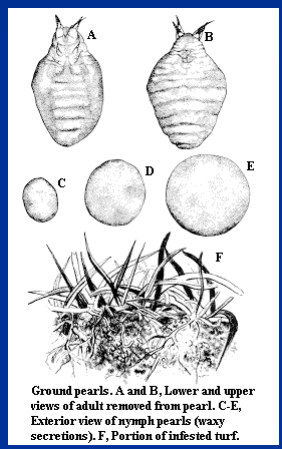
Pearl Scales (ground pearls)



Crawler stage observed in May in Phoenix area.

Pearl Scales (ground pearls)

Pearl Scales (ground pearls)



Ground pearls. A and B, Lower and upper views of adult removed from pearl. C-E, Exterior view of nymph pearls (waxy secretions). F, Portion of infested turf.

'Pearls'

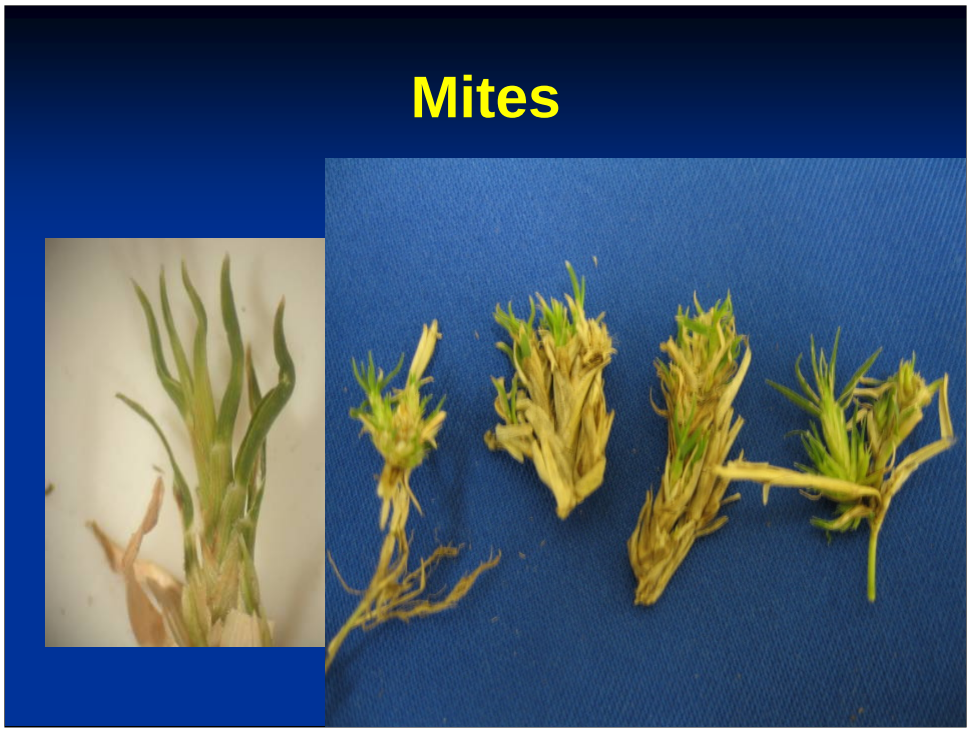
Pearl encased insect attaches to roots and feeds.

Pearl Scales (ground pearls)

Feeding moves outward in circular pattern. Some turfgrass and weeds regrow in center. Pearls are prevalent in soil along outer edge of circle.

Insecticides have not proven to be effective when applied in May to the soil.

Research continues with repeated applications over several years.



Witch’s broom effect caused by bermudagrass mites.

Mites

Foundation of IPM in turf is understanding the insect pest problem. Monitoring and surveying is the most economical and simplest strategy to know what pests occur when and where then control tactics could be instigated.

Further information is available at the University of Arizona Turfgrass Research, Extension, and Education website.