

INSECT CONTROL - THE LATEST AND GREATEST (FRUIT, ORNAMENTAL, AND TURF PESTS)



UtahStateUniversity
COOPERATIVE EXTENSION



Diane Alston, Entomologist
Utah State University

Pesticide Safety Education & Recertification Workshops
December 2012

INTEGRATED PEST MANAGEMENT (IPM)

- ◎ Sustainable
 - ◎ Economic and Environmental
- ◎ IPM Strategies
 - ◎ Cultural (plant & site management)
 - ◎ Mechanical (barriers, disruption, traps)
 - ◎ Biological (natural enemies)
 - ◎ Chemical (pesticides)
- ◎ Action Thresholds
 - ◎ Treat only when needed



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UTAH PESTS' is a group of Extension entomologists and plant pathologists that helps to solve the thousands of plant pest issues that concern Utah citizens every day. The UPPDL identifies, the IPM Program educates, and the CAPS Program investigates. Open one of the websites to get answers!

Utah Plant Pest Diagnostic Lab 
Just \$7 gets your pest problem diagnosed or insect identified.

Integrated Pest Management 
Your source for fruit, vegetable, and landscape pest problems.

Bees 
Honey bees aren't the only bees that pollinate plants in Utah.

Cooperative Agriculture Pest Survey 
CAPS protects Utah agriculture through statewide monitoring of invasive pests.

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FACT SHEETS

Lilac-Ash Borer

Ryan S. Davis
Arthropod Diagnostician

Tawn Beddes
Coeche Co. Horticultural Agent

Jay B. Karren
Extension Entomology Specialist

What You Should Know

• Lilac-ash borer (*Podosesia syringae*), a clear-winged moth common in Utah, can be a destructive pest of many species of ash (*Fraxinus* spp.), privet (*Ligustrum* spp.), lilac (*Syringa* spp.), and related species.

• Adults emerge from host trees and lay eggs in the spring; larvae feed on wood within branches, overwinter in the heartwood, and emerge as adults the following spring.

• Diversifying species used in the landscape, maintaining optimum plant health, monitoring, and preventive sprays (if necessary) are the best methods for preventing infestations.

• Only preventive treatments exist. There are no insecticides registered that can eliminate borers once larvae are inside the plant.

Description, Biology, and Habits

The lilac-ash borer (*Podosesia syringae*), belongs to a group of insects known as the clear-winged moths. The wings of most asid moths in have at least partially transparent wings (devoid of the colored scales that coat most moth and butterfly wings). Many of them mimic bees or wasps and, unlike most moths, fly during the day.

Adult lilac-ash borers mimic the common paper wasp in color, size, shape, and flight habits (Fig. 1). Both the dark colored forewings and the transparent hind wings are narrow. The slender body is black in color with yellow banding on the abdomen. The wingpan varies from 1 to 1 1/4 inches. Females are somewhat larger than males.

Lilac-ash borers are generally distributed throughout the United States and Canada. They feed primarily in the trunks and larger limbs of lilac, ash, and privet, but occasionally attack related plants in the family Cleaceae. Significant damage in Utah has been reported from ash, primarily in European, blue, and green ash, and lilacs.



Figure 1. Adult lilac-ash borer (*Podosesia syringae*).

Depending on your location in Utah, adults may emerge from infested hosts as early as late March (usually late April) and continue until mid-July (at Females emit a pheromone (chemical communication signal), which attracts males for mating, with 14 days after emergence. Within an hour of mat females are able to lay the tan, elliptical eggs in crevices, and sounds in the bark. Eggs can be 1 singly or in clusters. A single female can lay about eggs; Eggs hatch within 14 days, and the larvae (larvae) bore into the plant (Fig. 2).

Initial feeding occurs just beneath the bark and it feeds into the sapwood. Larvae continue feeding sapwood as summer progresses. Their tunnels (galleries) eventually turn upward and terminate just below the bark surface by the end of the season. Larvae enlarge their galleries as they grow, frequently in fess (sawdust-like excrement) out of the entrance. Completed galleries may be over 12 inches long 1/3 inch wide. Full grown larvae are about 1 inch and white with a brown head. Mature larvae over ter in the heartwood.

In spring, a larva will cut an emergence hole in th bark, leaving a thin flap of tissue over the hole. P (formation of a cocoon) occurs in the burrow. W

Yellowjackets, hornets and paper wasps

Erin Hoagson
Extension Entomology Specialist

Alan Roe
Insect Diagnostician

What You Should Know

• Yellowjackets, hornets and wasps are closely-related social wasps commonly found in Utah.

• All social wasps are capable of repeatedly stinging without dying if they feel threatened.

• Bees are often blamed for most stings, but about 90% of all stings are likely caused by yellowjackets.

• Most social wasps are predatory of other insects and considered beneficial.

• Although providing natural insect control, social wasps can be considered nuisance pests when near humans.

Social wasps, including yellowjackets, hornets and paper wasps, are common stinging insects in Utah (Figs. 1, 2). The wasps are related to ants and bees, which are also capable of stinging; however, yellowjackets are the most likely to sting. Less than 1% of people are allergic to wasp or bee stings; however, some people are fatally stung every year. Nearly 80% of all serious venom-related deaths occur within one hour of the sting. Most people will only experience a mild local reaction with redness, pain, swelling and itching at the sting site. If symptoms are more serious, a physician should be consulted. Some people may develop venom sensitivity after repeated stinging episodes over a short or long period of time.



Fig. 1. Yellowjacket.



Fig. 2. Bald-faced hornet.

Social Wasp General Description

- Have three well-separated body regions, a distinct waist and two pairs of clear wings.
- Care for their young and develop a caste system with different forms living together.
- Regenerate a new nest every year because only the queen overwinters; honey bee colonies overwinter together every year.
- Create their nests out of a wood and saliva paste.
- Capture prey with their legs and jaws and use stinging for defensive purposes only; this is different than solitary wasps that subdue prey with stinging (e.g., spider wasp).
- Go through complete metamorphosis (i.e., egg, larva, pupa, adult); adults and larvae have chewing mouthparts, and larvae are legless.
- Capable of multiple stings because they have "smooth" stingers; bees have barbed stingers (Fig. 3)



Fig. 3. Honey bee (left) and wasp (right) stingers.

White grubs

Erin Hoagson
Extension Entomology Specialist

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.

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 2/16 - 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 pairs of thoracic legs (Fig. 2). The head capsule is dark, but the body is usually creamy white in color. While 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. 1. White grubs are actually scarab beetles. Common scarab beetle adults are shown here (NOT TO SCALE).



Fig. 2. Common white grub body characters.

VIDEO FACT SHEETS

Using a Beating Tray

A beating tray is a large cloth frame that is used to catch insects that fall from a shaken branch. It is helpful for monitoring a large area, such as an orchard, quickly.



Paper Wasp Traps

Entomologist Diane Alston discusses the difference between native and invasive paper wasps and how to make your own traps to combat them.



Billbug Identification and Detection in Turf

Entomologist Ricardo Ramirez discusses the identifying characteristics of billbugs in turf, and demonstrates how to detect the damaging larval stage.



IPM ADVISORIES: ORNAMENTALS, TURF, FRUIT, VEGETABLES UTAHPESTS.USU.EDU/IPM

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LEARN ABOUT WINTER COVER CROPPING, DROUGHT & HONEY BEES, AND CHINCH BUGS IN TURF.

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Integrated Pest Management (IPM):
"a comprehensive approach to pest control that uses a combined means to reduce the status of pests to tolerable levels while maintaining a quality environment."

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Lots of images!
IPM recommendations
Effective pesticides

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Utah's Top 20 Arachnids



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CHEWING INSECTS: FRUIT TUNNELING, LEAF & FRUIT CHEWING, & TREE BORING



FRUIT TUNNELING - CATERPILLARS



Codling moth
(apple & pear)



Peach twig borer
(peach/nec & apricot)

- Adult is a moth; eggs laid on fruit & leaves
- Key diagnostic: “wormy fruit” or “shoot flagging” (PTB only)
- Key management: prevention – kill eggs & young larvae before they enter fruit or shoot – insecticide sprays
- Key timing: pheromone traps & degree-day model (temperature)

Tree Fruit IPM Advisory

FRUIT INSECT CONTROL

HOME ORCHARD INSECTICIDES

Codling Moth - When to Spray

Codling Moth, First and Second Generations

First generation egg hatch is still underway; continue protecting fruit until the end of egg hatch. Then, start again for the second generation.

County	Location	End of Egg Hatch (920 DD)	Start Sprays; Second Gen (1150 DD, 1-2% egg hatch)
Box Elder	Perry	June 28	July 9
	Tremonton	July 8	July 18
Cache	River Heights	July 11	July 21
	Smithfield	July 11	July 20
Carbon	Price	July 3	July 15
Davis	Kaysville	June 29	July 8
Grand	Castle Valley	June 11	June 20
Iron	Cedar City	July 1	July 11
Salt Lake	All Regions	June 23	July 3
Tooele	Tooele	June 29	July 8
Uintah	Vernal	June 29	July 10
Utah	Alpine	July 2	July 12
	American Fork	June 28	July 8
	Genola	June 27	July 7

Tree Fruit IPM Advisory

Spray Materials - Residential Applicators

Note that these treatments are only recommended if you know you have the particular pest in your trees. We recommend learning about specific pests, and scouting your trees at least once/week. Products are listed by Conventional (usually broad-spectrum pesticides that are effective, but harmful to beneficial insects), or Soft/Organic (not as effective, but safer for environment and humans). Products are listed in order of efficacy.

Target Pest	Host	Chemical	Example Brands	Comments
Both codling moth AND Peach twig borer (except Cyd-X)	apple, pear	<i>Conventional</i>		acetamiprid: every 14 days carbaryl: every 14 - 21 days malathion: every 7 days gamma-cyhalothrin: every 14 days hort. oil: lasts 5-7 days for killing eggs; use at beginning of each generation; apply at 1% rate only when temperatures are below 80; follow up with a different product spinosad: every 7 days codling moth virus (codling moth only) can only be purchased online
		acetamiprid	Ortho Max Flower, Fruit, and Veg.	
		carbaryl	Sevin, Bonide Fruit Tree Spray, etc.	
		malathion	Malathion	
		gamma-cyhalothrin	Spectracide Triazicide	
		<i>Soft/organic</i>		
		hort. oil (1%)	Many products	
		spinosad	Green Light, Gardens Alive Bull's Eye, Monterey	
		codling moth virus	Cyd-X	

UT-CO COMMERCIAL TREE FRUIT PRODUCTION GUIDE

INTERMOUNTAINFRUIT.ORG

The screenshot shows the homepage of the Commercial Tree Fruit Production Guide website. At the top, there is a navigation bar with the title 'Commercial Tree Fruit Production Guide' on the left, logos for 'Colorado State University Extension' and 'Utah State University COOPERATIVE EXTENSION' in the center, and a search box and a 'Rate the Guide' button on the right. A vertical sidebar on the left contains a list of menu items: Home, Download Guide, IPM Methods, Special Management Programs, Insect and Mite Biology, Disease Biology, Pesticide Tables, Spray Tables, Orchard Floor Management, Plant Growth Regulators, Thinning and Return Bloom, Nutrition, Orchard Irrigation, Cold Effects on Fruit, Pesticide Information, and Videos. The main content area features a featured article titled 'Preparing the Orchard for Winter' with a text block and a '> Read More' link, accompanied by three images: a tree trunk, a wooden crate, and a bare tree branch. Below this is an 'About Us' section with a thumbnail of the 2012 guide cover and a paragraph describing the guide's scope. To the right of the 'About Us' section is a poll titled 'What is your most troublesome insect pest?' with four radio button options: Codling moth, Peach twig borer, Cherry fruit fly, and Other, and a 'Vote' button. At the bottom right, it says 'Powered by SurveyMonkey'.

Commercial Tree Fruit Production Guide

Colorado State University Extension Utah State University COOPERATIVE EXTENSION

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Thinning and Return Bloom

Nutrition

Orchard Irrigation

Cold Effects on Fruit

Pesticide Information

Videos

Preparing the Orchard for Winter

Check out this list of a few fall chores to keep the orchard healthy over winter and next season, like painting tree trunks, removing apple bins, and pruning diseased limbs.

[> Read More](#)



About Us

UTAH-COLORADO Commercial Tree Fruit Production Guide 2012

The Utah-Colorado Commercial Tree Fruit Guide covers pest management and general production issues for growing healthy fruit in the Intermountain West, with an emphasis on integrated pest management and sustainable agriculture.

Click on the image to the left to view the pdf version of the Tree Fruit Guide.

What is your most troublesome insect pest?

Codling moth

Peach twig borer

Cherry fruit fly

Other

Powered by [SurveyMonkey](#)

FRUIT TUNNELING - FRUIT FLIES

- Adult is a fly; lay eggs under skin of fruit
- Key diagnostic: “wormy fruit”; larva has narrow head (maggot)
- Key management: prevention – kill adult flies before they lay eggs in fruit
- Key timing: cherry fruit blush color, yellow sticky traps, DD model - *Tree Fruit IPM Advisory*



Cherry fruit fly
(cherry)



Walnut husk fly
(walnut, peach/nec)

LEAF & FRUIT CHEWING



Leafroller
(all tree fruits)



Fruitworm
(all tree fruits)

- Adult is a moth; eggs laid on leaves or limbs
- Key diagnostics: holes chewed in leaves & fruit; “tied” leaves (webbing)
- Key management: kill caterpillars while small; Bt, spinosad
- Key timing: scout for symptoms

FRUIT CHEWING

- Late-season pests; near fruit maturity
- Key diagnostics: holes chewed in fruit; frass (poop) contamination
- Key management: reduce populations, exclude, protect fruit
- Key timing: scout ripening fruit for symptoms



European earwig
(all fruits)

European paper wasp
(all fruits)



LEAF CHEWING

TOBACCO BUDWORM - BLOOMING ANNUALS



Adult is a moth; caterpillar
chews holes in buds and flowers
“Flowers never open”

Bt – *Bacillus thuringiensis* (Dipel, Thuricide, others)
Spinosad (Success, Natural Guard, Entrust, others)
- must be ingested by the caterpillar to kill it

LEAF CHEWING - SKELETONIZING



Pear Sawfly

AKA Pear and Cherry Slug
(pear, cherry, *Prunus* ornamentals)



- Key diagnostics: skeletonized leaves & slug-like larvae
- Key management: spray, if needed (often not needed)
- Key timing: summer, scout for symptoms & larvae
- Use “soft” insecticides (soap, spinosad) to avoid disrupting biological control of other insects

GRASSHOPPERS

GH eggs are deposited in undisturbed soil

- Treating as large of an area as possible is the 1st key to success (neighborhood effort)
- Treating in the early to mid summer when nymphs (young) are active, but before flying adults are present, is the 2nd key to success
- Using effective products & formulations of insecticides is the 3rd key to success



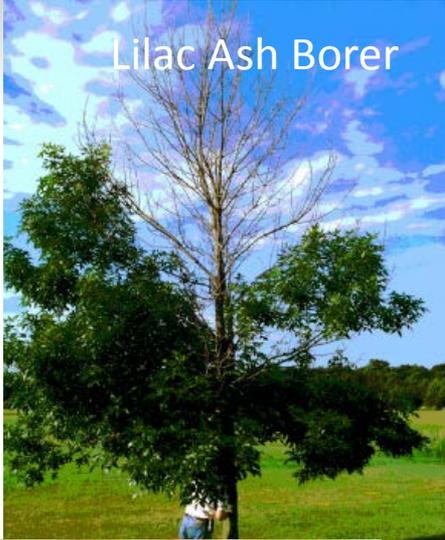
Floating row cover for late-season protection

Insecticides:

- Bait + insecticide (carbaryl, *Nosema locustae*)
- Sprays (malathion, carbaryl, permethrin, bifenthrin (check label for reg. sites))
- Dust (carbaryl)

TREE BORERS

Lilac Ash Borer



Western Ash Bark Beetle



Flatheaded Apple Borer



Aspen Borer



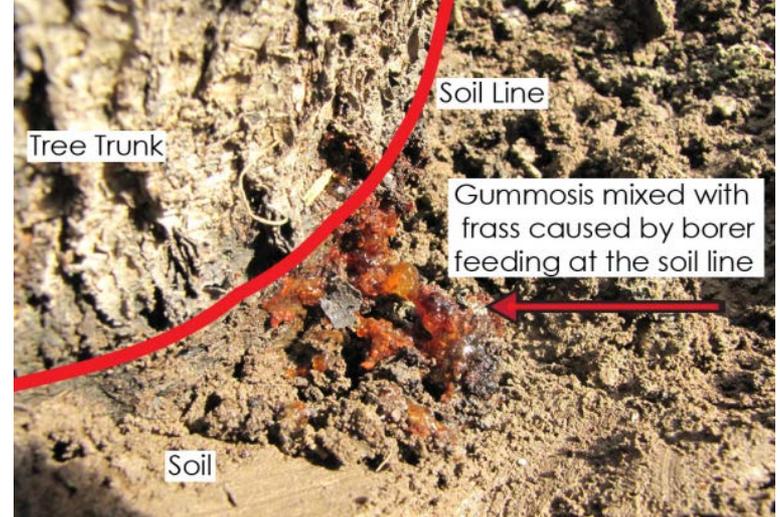
Locust Borer



UGA2107046

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TRUNK BORING - GREATER PEACHTREE BORER



Clear winged moth – caterpillar
Key diagnostics: sap, frass, holes
near base of trunk; pupal skins
Key management: trunk spray
Key timing: pheromone traps, DD model
Tree Fruit IPM Advisory

LIMB BORING - FLATHEADED BORER & BARK BEETLES



Flatheaded borer (Buprestid beetle)
Oval-shaped exit holes in limbs
Loose flaking bark, sawdust/frass
Girdle limbs, kill limbs & trees (slow)
Attack stressed, declining trees, June/July



Shothole Borer (bark beetle)
Small (shot) holes in limbs
Galleries (tunnels) with beetles
Limb dieback
Attack stressed, declining trees
Late summer/fall



INSECTICIDES FOR BORERS

- ◎ Systemic trunk injections or soil drenches/injections (ornamental trees)
 - ◎ Merit, Admire, Safari
 - Spring (May) – major flush of foliar growth
 - Variable control of flatheaded borers & bark beetles
- ◎ Protective trunk sprays (check product label for site registration)
 - ◎ Sevin, Permethrin, Asana, Warrior
 - Timed with when adults are active; varies with borer species
 - Best for bark beetles

TURFGRASS INSECTS

WHITE GRUBS



CULTURAL PRACTICES TO PREVENT TURFGRASS INSECT PROBLEMS - KEEP THE TURF HEALTHY!

- ⊙ Apply fertilizer in the proper amounts and at the right time
- ⊙ Irrigate deeply and infrequently
- ⊙ Mow grass at a height of 1 ½ in or higher
- ⊙ Select a well-adapted turf variety
- ⊙ Amend soil with organic matter
- ⊙ Aerate and de-thatch as needed



Which thatch layer is sustainable?

WHITE GRUBS

- ◎ Immature stage of scarab beetles
- ◎ Eat turfgrass roots
- ◎ 3 kinds established in UT
 - ◎ May/June beetle
 - ◎ Masked chafer
 - ◎ Black turfgrass Ataenius
 - ◎ Japanese beetle – Orem eradication program



May/June beetle



Black turfgrass
Ataenius



Masked chafer



Japanese beetle

Not to scale!

WHITE GRUBS

- ⊙ When mature, grubs range from 3/8 to 2 inches long
- ⊙ C-shape when at rest
- ⊙ 3-pairs of legs (obvious)
- ⊙ Life cycle length
 - ⊙ Several gens per yr – black turfgrass Ataenius
 - ⊙ 1 gen per yr – masked chafer
 - ⊙ 1 gen every 2-3 yr – May/June beetle
- ⊙ Brown turf patches apparent in late summer
- ⊙ Damaged turf feels “spongy”
- ⊙ Turf pulls up easily from roots



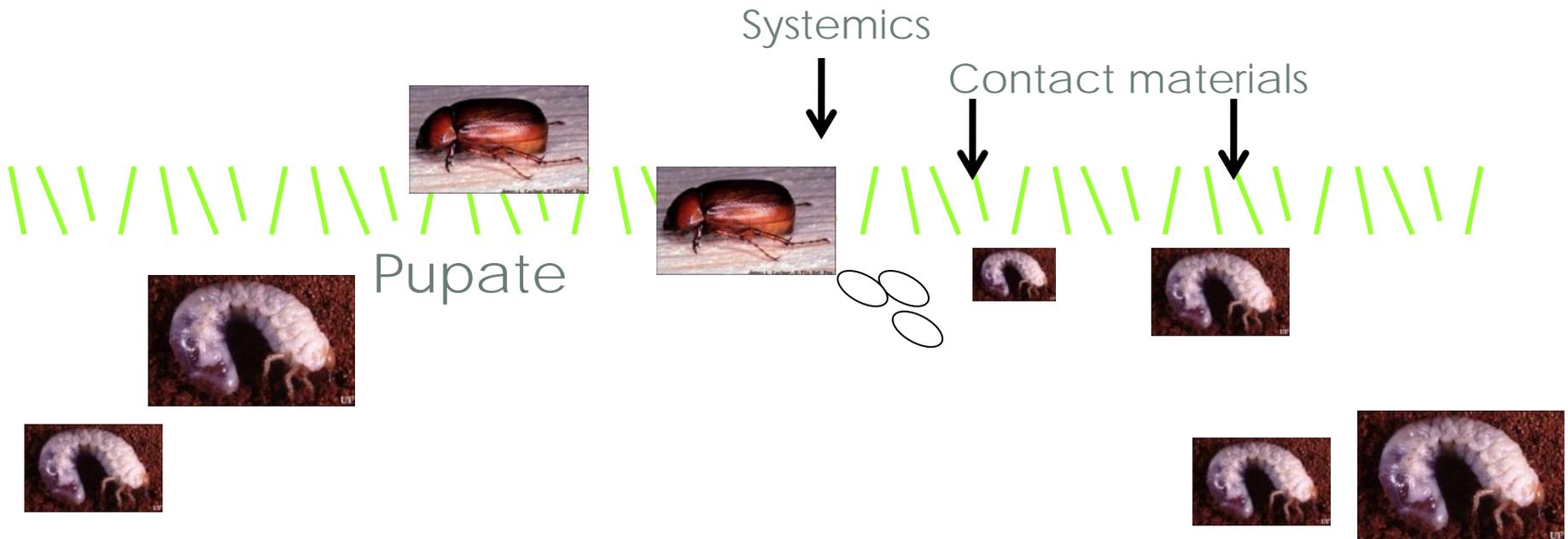
WHITE GRUBS

1 TO 3-YEAR LIFE CYCLE

Spring

Summer

Fall/Winter



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

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

WHITE GRUB MANAGEMENT

- ◎ Apply systemic insecticides in early summer before eggs hatch to allow adequate time for plant up-take
 - ◎ Acelepryn (chlorantraniliprole)
 - ◎ Arena (clothianidin)
 - ◎ Merit (imidacloprid)
- ◎ Apply contact insecticides in mid summer through early fall before the grubs move deeper in the soil zone to spend the winter
 - ◎ Broad-spectrum
 - Dylox (trichlorfon)
 - Sevin (carbaryl)
 - ◎ Selective, reduced-risk
 - Concern (azadirachtin)
 - Mach 2 (halofenozide)



TURFGRASS INSECT MANAGEMENT



Published by Utah State University Extension and Utah Plant Pest Diagnostic Laboratory ENT-138-10 September 2010

Turfgrass Cultural Practices and Insect Pest Management

Diane Alston, Entomologist • Kelly Kopp, Turfgrass Specialist

Do You Know?

- Good cultural practices and prevention of stress are critical to keeping turfgrass healthy and pest-free.
- Good turfgrass management is dependent on optimal timing of cultural and pest control treatments.
- There are four main insect pest groups that attack turfgrass in Utah.

There are a number of insects that can cause aesthetic and economic loss to turfgrass in Utah – in home lawns as well as in athletic fields and on recreational lands. Good turfgrass cultural practices are the primary way to prevent insect infestation and turfgrass damage.

CULTURAL PRACTICES TO PREVENT TURF INSECT PROBLEMS

Refer to Fig. 1 for optimal timing of turfgrass cultural practices.

Mowing

As a rule, regular grass mowing height should be 2 to 3½ in. to promote root growth and stress tolerance of turfgrasses. Mow regularly to avoid removing more than one third of the desired leaf length at any one time. Clippings should be recycled back into the lawn as a source of nutrients and organic matter. Consider raking turfgrass areas to remove residual clippings and encourage upright growth of the leaves after a long winter under snow cover.

Fertilization

Nitrogen is of primary concern in turfgrass fertilization. In the early spring, apply 1 pound of slow-release nitrogen fertilizer per 1000 ft² of lawn area. This will help the grass recover from winter stress and damage. It will also be especially helpful for areas that have suffered damage due to diseases such as pink and gray snow mold. In a slow-release form, nitrogen fertilizer will provide a consistent source of nutrients as the growing season begins. Apply a second pound of slow-release nitrogen fertilizer per 1000 ft² of lawn area in late spring to early summer. This will allow the grass to enter into the warmest

- ⊙ Before applying insecticides, reduce thatch layer to $\leq \frac{1}{2}$ in or aerate turf to increase penetration
- ⊙ Apply $\frac{1}{2}$ to $\frac{3}{4}$ in water to move insecticides into the root zone
- ⊙ Repeat irrigation every 4-5 days to continue chemical movement into the soil
- ⊙ Long-lasting clean-up of white grubs often requires several years of treatment

Cultural Practices	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Irrigation				Apr - Oct								
Northern Region				Apr - Oct								
Southern Region			Mar - Nov									
Aeration/Cultivation			Mar - May						Sep - Oct			
Northern Region			Mar - May						Sep - Oct			
Southern Region	Jan - May											
Fertilization				Apr		Jun				Oct		
Northern Region				Apr		Jun				Oct		
Southern Region												
Mowing			Mar - Nov									
Northern Region			Mar - Nov									
Southern Region			Feb - Nov									
Seeding/Overseeding				Apr - May						Sep - Oct		
Northern Region				Apr - May						Sep - Oct		
Southern Region				Apr - May						Sep - Oct		

Fig. 1. Turfgrass cultural practices and timing of application for northern and southern Utah.



SUCKING BUGS



APHIDS



Woolly ash aphid

Symptoms:

Curled leaves & shoots

Sticky honeydew

Black sooty mold



Rose aphid



Linden aphid

Small, soft-bodied
Live in groups (colonies)
Winged & non-winged
“Tail pipes” (cornicles)

LEAF DISTORTION - FRUIT TREE APHIDS

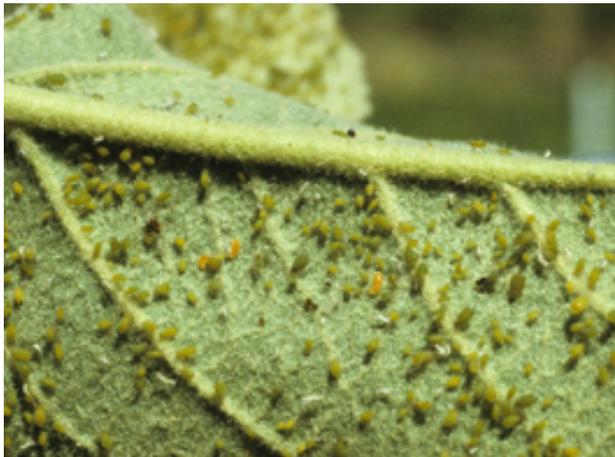


Green peach aphid



Rosy apple aphid

Green apple aphid



Black cherry aphid



Over winter as
eggs on limbs

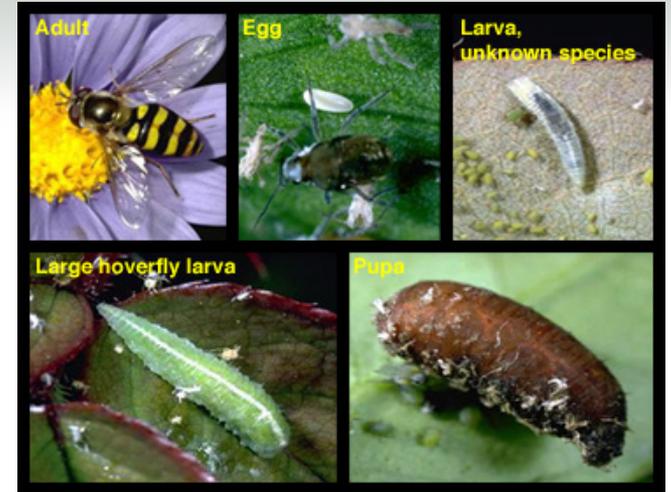
Delayed dormant
oil spray

Biological control!

APHID NATURAL CONTROL



Convergent
Lady Beetle



Hover Fly



Green Lacewing Adult



Eggs



Larva

APHID MECHANICAL CONTROL

Stiff spray of water every 2-3 days
until aphid numbers decline

Best if initiated before leaves are
tightly curled

Prone to develop resistance to
insecticides rapidly





APHID INSECTICIDES

- ⊙ Dormant and Summer Horticultural Oils (many brands)
- ⊙ Insecticidal Soap (many brands)
- ⊙ Imidacloprid (Merit, Bayer Advanced, generics)
 - ⊙ Systemic: local & upward mobile
 - ⊙ Foliar spray, root drench, injection
- ⊙ Flonicamid (Aria)
 - ⊙ Antifeedant, Systemic
- ⊙ Pymetrozine (Endeavor)
 - ⊙ Antifeedant
- ⊙ Malathion

SCALE INSECTS



European
Elm
Scale

Soft Scales



Lecanium
Scale



Oystershell
Scale

Armored Scales



Black
Pineleaf
Scale

SCALE INFESTATION SYMPTOMS



Twigs & limbs encrusted in scale insect bodies

Chlorotic leaves

Necrotic spots on leaves & fruit



Limb dieback when scales are abundant

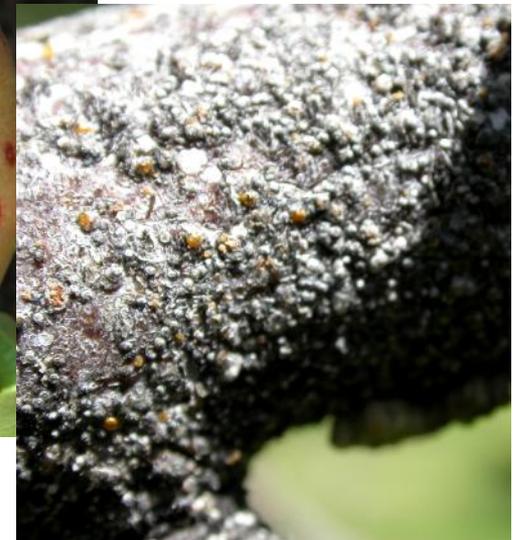
Soft Scales: honeydew (because feeding in tree phloem)

SCALES ON FRUITS & LIMBS



San Jose Scale (all tree fruits)

Feeding spots & scales on fruits
Scales encrust twigs & limbs



Delayed dormant oil

Insecticides in late
spring to early summer
when “crawlers” are
active

Tree Fruit IPM Advisory

SCALE MECHANICAL CONTROL

- ◎ Prune out infested limbs
- ◎ Place sticky bands to trap the young “crawler” stage
 - ◎ Primarily a monitoring tool



Tangletrap & duct tape
sticky band



Black pineleaf scale crawlers



San Jose scale crawlers

SCALE INSECTICIDES

- ◎ Dormant Oil Spray (2-4%)
 - Spring – at bud break – smothers overwintering scales
- ◎ Systemic soil drench or injection
 - Spring (May)
 - Soft Scales – imidacloprid (Merit, Bayer Advanced, others)
 - Armored Scales – dinotefuran (Safari)
- ◎ Target Crawlers
 - June to July (varies with species; sticky bands to monitor)
 - horticultural oil, insecticidal soap, carbaryl (Sevin), dinotefuran (Safari,) pyriproxyfen (Distance), buprofezin (Talus), azadirachtin (Azatin, Neem oil), synthetic pyrethroids (Tempo, Talstar, others), malathion

LEAFHOPPERS



Apple, Cherry
Grape
Rose
Virginia creeper
Many others

White stippling on leaves
Nymphs on underside of leaves
Flying adults – “whiteflies”

LEAFHOPPER MANAGEMENT



- ◎ Target mid- to large-sized nymphs (check undersides of leaves)
 - ◎ Adults difficult to kill – fly easily when disturbed
 - ◎ Older nymphs have wing pads
- ◎ horticultural oil, insecticidal soap
- ◎ kaolin clay (Surround) – repellent
- ◎ acetamiprid (Assail, Ortho)
- ◎ carbaryl (Sevin)
- ◎ malathion (many brands)
- ◎ imidacloprid (Merit, Bayer, many brands)
- ◎ dinotefuran (Safari) (ornamentals only)

FRUIT DISTORTION – EARLY-SEASON



Apple



Peach



Nectarine – thrips

Kill cells in developing fruit, lead to scarred, malformed fruit

Cat-facing insects:

Lygus bug



Green stink bug



Conspere stink bug



Thrips



FRUIT DISTORTION – LATE-SEASON



Boxelder bug

Mass on ripe fruit
All fruits (esp. peach)

Stink bugs also injure
fruit late in the season

- Key diagnostics: fruit dimpling & puckering; corky flesh
- Key management: spray, if needed, when observed
- Key management: “Contact” insecticides

MITES



SPIDER MITES



Honeylocust
Spider Mite



Spruce
Spider
Mite



Two Spotted Spider Mite



Symptoms:
White & chlorotic stippling
Webbing

MITE MECHANICAL CONTROL

Stiff spray of water every 2-3 days
until mite numbers decline

Initiate as soon as you notice stippling

Monitor:

White beating tray

- look for tiny mites crawling on the tray
- leaves tend to look “dirty”



MITICIDES

- ⊙ Horticultural Oil (1%)
- ⊙ Insecticidal Soap
- ⊙ Etoxazole (Tetrasan) – mite growth inhibitor
- ⊙ Pyridazinone (Akari, Nexter, others) – reduces mite respiration
- ⊙ Acequinocyl (Kanemite, Shuttle, others) – reduces mite respiration
- ⊙ Bifenazate (Floramite, Acramite) – unknown MOA

ERIOPHYID MITES

BLISTER AND RUST MITES

Pear and Apple
Others

Leaf Blister Mites

Bumps or blisters
on leaves – mites
feed within blisters



Rust Mites

Russeting on fruit &
leaves



Mites are tiny, worm-like
Need microscope to see them



BLISTER AND RUST MITE CONTROL

- ◎ Wettable sulfur* or carbaryl (Sevin)
 - ◎ In spring, at budbreak
 - ◎ In early fall, when leaves begin to change color, but before they drop
- ◎ Target overwintering adults just before or after they seek shelter in buds

*Do not mix sulfur with dormant oil – causes foliage and flower burn

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Slideshows

Home > Slideshows

The PowerPoint slideshows below were presented by Utah State University Extension personnel (and other participants) at various outreach events. Click on a topic or scroll down to browse. Most slideshows open in Adobe Acrobat Reader, and the file size is shown.

Insect Slide Shows:

Beneficial Insects	Health-Related	Tree Fruit & Small Fruit
Field & Forage	Home Yard and Garden	Turf
General	Landscape Ornamentals	Vegetable
Greenhouse/Nursery	Nuisance	

Plant Disease Slide Shows

Pesticides Slide Shows

Workshop Slide Show Compilations:

- [First Detector Training](#)
- [Distance Diagnostics in Utah Training](#)
- [UTAH PESTS In-service Training: Ornamentals and Turf](#)
- [UTAH PESTS In-Service Training: Tree Fruits](#)
- [Fire Blight Workshop](#), sponsored by USU and Utah State Horticultural Association

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