

INTEGRATED (AND ORGANIC) PEST MANAGEMENT FOR FRUITS AND VEGETABLES



UtahStateUniversity
COOPERATIVE EXTENSION



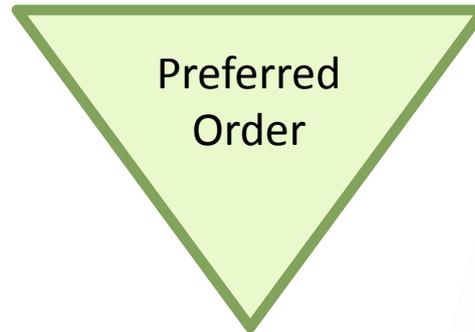
Diane Alston, Entomologist

Horticulture Spotlight Lecture Series
Red Butte Gardens, SLC, UT
April 23, 2012

INTEGRATED PEST MANAGEMENT

IPM

- ⊙ Plan ahead (use preventive strategies where possible)
- ⊙ Use multiple pest management tools
 - ⊙ Cultural
 - ⊙ Mechanical
 - ⊙ Biological
 - ⊙ Chemical
- ⊙ Treat only if needed (thresholds)
- ⊙ Environmentally, economically, and socially sustainable



KEYSTONE TO IPM - MONITORING: TARGET & TIMING

Squash bug
eggs & nymphs



- ⊙ Target susceptible life stages
 - ⊙ Usually eggs and/or young
- ⊙ Time the control for weak points in their life cycle
 - ⊙ For severe and recurring pests - early in seasonal cycle when life stages are synchronized and before substantial injury has occurred
 - ⊙ For occasional pests - wait and see if pest will be abundant

CULTURAL CONTROL: HEALTHY PLANTS

- ◎ Select plant species and cultivars adapted to the site
- ◎ Use good plant production practices
 - ◎ fertility, water, sunlight, etc.
- ◎ For annual plants, rotate location across years
 - ◎ avoid build-up of soil pests
- ◎ Stressed plants are more attractive and susceptible to pests



CULTURAL CONTROL: SANITATION

- ◎ Pick up / chop up dropped fruit
- ◎ Remove structures / sites where insects may overwinter (wood piles, garden debris, etc.)
- ◎ Prune out diseased limbs (cankers)



MECHANICAL CONTROL: TRAPS AND BARRIERS

- Traps
 - Yellow jacket wasps, slugs, spiders
- Sticky bands
 - Trees and shrubs
- Row covers
- Diatomaceous earth

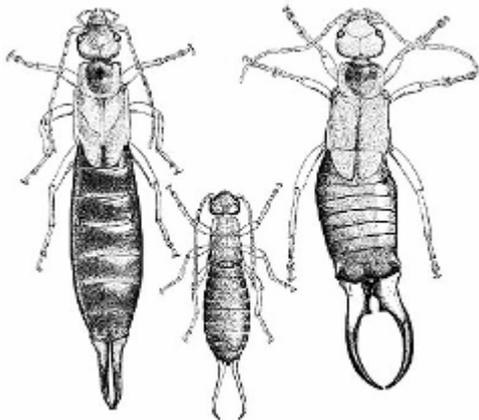


MECHANICAL CONTROL: TRAPS & EXCLUSION FOR EARWIGS

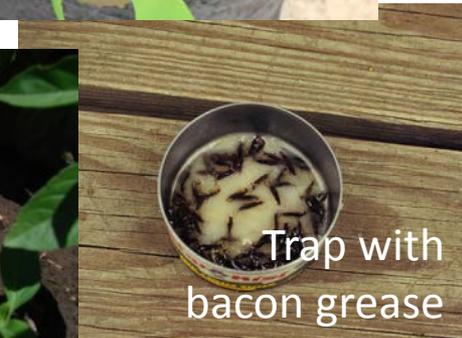
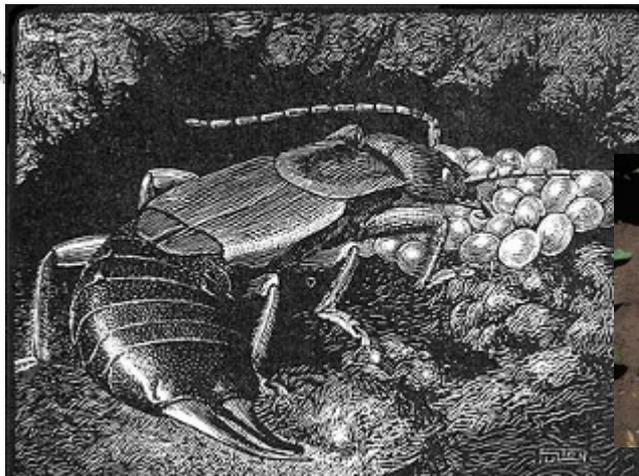
- ❑ Avoid overuse of mulch and damp debris (earwigs hide during the day)
- ❑ Traps: fat-based baits, protected refugia
- ❑ Exclusion: Tanglefoot on base of trunks, stems



European earwig
male (right)



Females brood their young



MECHANICAL CONTROL: EXCLUSION OF CABBAGE WORMS

- ◎ Caterpillars chew large holes in leaves; produce abundant frass (excrement)
- ◎ Exclusion: Row cover fabric – cover plants to prevent egg-laying



Floating
row cover



Imported
cabbage
butterfly



Cabbage
looper



BIOLOGICAL CONTROL: CONSERVE

- ⊙ Conservation and enhancement of natural enemies (beneficials)
 - ⊙ Diverse and abundant resources
 - ⊙ Food, habitat, protection
 - ⊙ Carbohydrates (nectar, plant nectaries, aphid honeydew), proteins (pollen, prey, bird droppings), water, nesting materials and sites, shelter



Syrphid fly feeding on nectar



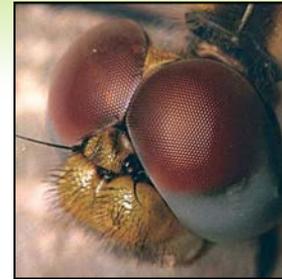
Provide structure for Polistes wasp nests

BIOLOGICAL CONTROL: ENHANCE BIODIVERSITY

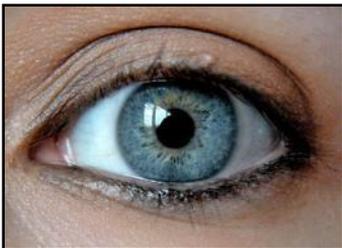
- ◎ Spatial diversity across the landscape
- ◎ Temporal diversity, throughout the season and from year to year
- ◎ Genetic diversity
- ◎ Needs to be the right kind of diversity!!



THE ATTRACTIVE GARDEN



Plant Diversity
Continuous Bloom
Nectar & Pollen
Shelter
Variety of Insect Prey
Water & Mud



Color
Texture
Design
Variety
Function

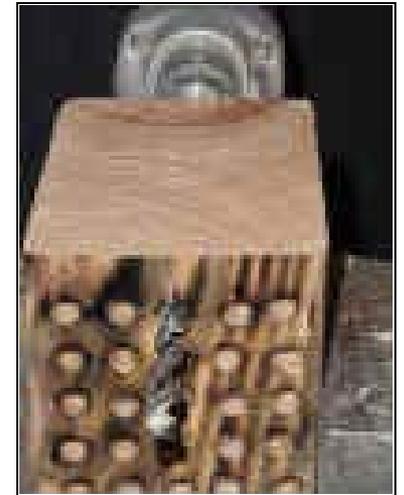


MISCONCEPTIONS ABOUT BIOLOGICAL CONTROL IN THE HOME GARDEN

- ⊙ Releasing insects is the best method
 - ⊙ Lady beetles (or lady bugs)
 - ⊙ Praying mantis
- ⊙ Predatory insects will stay in your garden after release
- ⊙ Other practices/activities don't matter



NATIVE POLLINATORS



BENEFICIAL INSECTS NEED A DIVERSE DIET & SHELTER

- ◎ Protein and carbohydrate (sugar) food sources
 - ◎ Protein
 - Insect prey, pollen, bird droppings
 - ◎ Carbohydrate
 - Nectar, plant nectaries, aphid honeydew
- ◎ Shelter & varied habitat

Flowering plants
Herbs
Wildflowers



GARDENING FOR BENEFICIAL INSECTS

Gardening for Native Bees in Utah and Beyond

James H. Cane
Research Entomologist, USDA ARS
Pollinating Insect-Biology, Management, Systematics Research

Linda Kerwin
Logan, UT

Do You Know?

- 900 species of native bees reside in Utah.
- Some wild bees are superb pollinators of Utah's tree fruits, raspberries, squashes, melons and cucumbers.
- Few of our native bees have much venom or any inclination to sting.
- Our native bees use hundreds of varieties of garden flowers, many of them water-wise.
- A garden plant need not be native to attract and feed native bees.



Fig. 1. Carder bee (*Anthidium*) foraging at lavender (*Lavendula*: Lamiaceae).¹

Utah is home to more than 20 percent of the 4,000+ named species of wild bees that are native to North America. Except for bumblebees and some sweat bees, our native bees are solitary, not social, many with just one annual generation that coincides with bloom by their favorite floral hosts. In contrast, the familiar honeybee is highly social, has perennial colonies, and was brought to North America by settlers from Europe. Regardless of these differences, however, all of our bees need pollen and nectar from flowers. The sugars in sweet nectar power their flight; mother bees also imbibe some nectar to mix with pollen that they gather. Pollen is fortified with proteins, oils and minerals that are essential for the diets of their grub-like larvae back at the nest.

Our flower gardens can become valuable cafeterias for local populations of diverse native bees. In our cities and towns, native plant communities have been displaced by pavement, buildings and lawns. In the countryside, grain and hay crops likewise



Fig. 2. A pollinator garden can also be water-wise. Purple *Penstemon striatus*, front, frecklecracker penstemon (*P. eatonii*), center, and blue flax (*Linum perenne*), background, combine to make a pleasing design.¹

Garden Plant Recommendations for Wild Bees of North America

This table contains nearly 200 garden plant genera with species whose flowers are sought by wild bees of North America.

The Code column is useful for Utah gardeners. Some additional species not coded as G or U are suitable for Utah but only in the hot, southernmost climates (e.g. *Larrea* or creosote bush).

- G - grows in Utah
- U - Utah native
- W - water-wise
- F - food product

Form tells whether the usable species in the genus are

- A - annual
- P - perennial
- S - shrub
- T - tree

Plants in **bold italic>** are great choices for Utah gardeners.

Genus	Family	Common Name	Code	Forms	Notes
<i>Abelia</i>	CAPRIFOLIACEAE	abelia		S	
<i>Acacia</i>	FABACEAE	acacia	W	ST	
<i>Acer</i>	ACERACEAE	maple	GU	T	
<i>Achillea</i>	ASTERACEAE	yarrow	GUW	P	<i>A. millefolium</i> weedy
<i>Aconitum</i>	RANUNCULACEAE	monkshood	GU	P	
<i>Agastache</i>	LAMIACEAE	hyssop	G	P	see Fig. 10
<i>Ajuga</i>	LAMIACEAE	carpet bugle	G	P	
<i>Allium</i>	LILIACEAE	ornamental onions	GUW	P	
<i>Althea</i>	MALVACEAE	hollyhock	G	P	not double-flowered
<i>Amelanchier</i>	ROSACEAE	serviceberry	GU	S	
<i>Amorpha</i>	FABACEAE	false indigo	G	S	
<i>Anchusa</i>	BORAGINACEAE	wild forget-me-not		AP	
<i>Anethum</i>	APIACEAE	dill	G	A	
<i>Aquilegia</i>	RANUNCULACEAE	columbine	GU	P	not double-flowered
<i>Arctostaphylos</i>	ERICACEAE	manzanita	GUW	S	

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; reduces growth rate & health of host

Beneficial Insects & Mites

Cast of Common Characters



Parasitic wasps & flies



Predaceous true bugs & beetles



Lacewing

Syrphid Fly



Common aphid predators



Lady Beetle



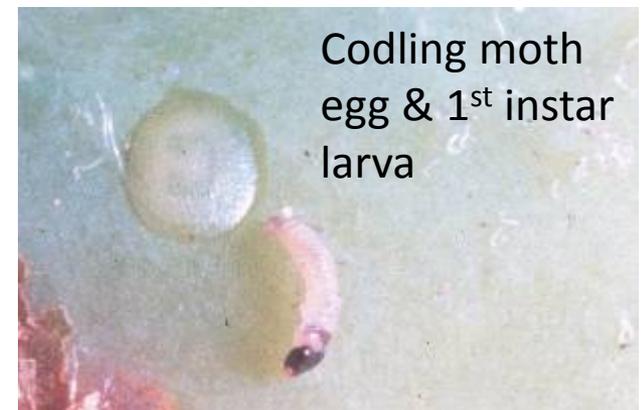
Predaceous mites

FRUIT INSECT PESTS



CODLING MOTH

- Caterpillars bore into fruit
- Moths emerge in spring
- Eggs laid on fruit & leaves
- 1st instar larva bores into fruit w/in 24 hr
- **Chemical control:** target newly hatched larva; timing based on moth trap catch info. & degree-days in your area
 - **Tree Fruit IPM Advisory**
- acetamiprid & bifenthrin (14 days), carbaryl (10-14 d), spinosad (7 d), malathion (7 d), Bt (3-5 d), CM virus (CydX; 7 d)
- **Sanitation:** pick up dropped fruit



MECHANICAL CONTROL: CODLING MOTH



Pupate inside silken cocoons on trunk
Corrugated cardboard band -
“mass-trap” to reduce population



Fruit bags to exclude codling moth eggs
Place bags over 3/4” diameter fruit

PEACH TWIG BORER



PTB larva feeding on peach shoot



- Over winter as young larvae on limbs; brown caterpillars burrow inside twigs from bloom to petal fall; 2nd & 3rd generations enter fruit, usually at the stem end
- **Delayed Dormant Spray:** Dormant oil + permethrin or gamma-cyhalothrin (by first pink) – targets twig boring OR At-Bloom Sprays: 2 Bt sprays (early & full to late bloom)
- **Fruit Protection:** same insecticides as for CM timed with trap catch and degree-day info. or apply at shuck-fall & repeat if needed
 - **Tree Fruit IPM Advisory**

WESTERN CHERRY FRUIT FLY

- Larvae feed in sweet & tart cherries; female flies lay eggs in ripening fruit; fruit doesn't become soft enough for egg-laying until it turns rosy colored
- **Cultural controls:** Landscape fabric or barrier under tree canopy
- **Chemical control:** spinosad (7 d), malathion (5 d), carbaryl (7 d), pyrethrin (3 to 5 d)



FRUIT-EATING WASPS: PAPER WASPS



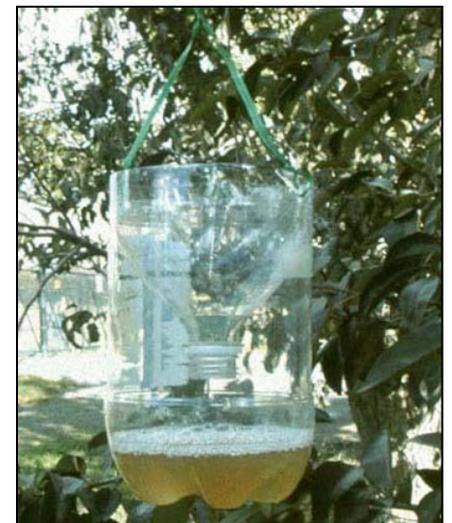
European paper wasp (fruit-eater):
Thin waist, more black than yellow,
Upside down umbrella-shaped nests



Yellow jacket:
“Chunky” body, more yellow
than black
Paper nests in ground &
under dense vegetation
Aggressively defend nest
(painful sting!)

WASP TRAPS

- ◎ Place around perimeter of garden and yard and in spots slightly away from high human activity
- ◎ Yellow jacket – predator/scavenger
 - ◎ Commercial traps with heptyl butyrate bait
 - ◎ Homemade trap with raw meat
 - ◎ Locate ground nests in area - treat with insecticides & remove
- ◎ European paper wasp – fruit-eater
 - ◎ Homemade trap - liter plastic bottle with diluted fruit juice (1 part juice: 10 parts water) – ferment juice (1/4 tsp yeast) + 1/4 tsp liquid dish detergent (add piece of ripe fruit to excel fermentation)
 - ◎ Treat & remove nests



APHIDS

- Suck fluids from leaves & stems; curl leaves; produce sticky honeydew; black sooty mold growth
- Protect young trees, older trees can tolerate more aphid feeding
- **Controls:** Dormant oil at green tip stage
- Insecticidal soap, horticultural oil, azadirachtin, malathion
- **Biological control:** lady beetles, lacewings, syrphid flies, parasitic wasps



SPIDER MITES

- Feed on leaves; produce webbing; injury appears as white speckles; severe feeding leads to bronzing
- Mites build up on broadleaf weeds (bindweed, knotweed, mallow, prickly lettuce); reproduce rapidly in hot weather
- **Cultural controls:** Avoid mowing, herbicides, drying of vegetation - prompts mites to move into trees
- Avoid multiple applications of pyrethroid insecticides (permethrin, gamma-cyhalothrin)
- **Biological control:** naturally occurring predatory mites & small lady beetle
- **Chemicals:** horticultural oil, insecticidal soap



APHID & MITE MECHANICAL CONTROL

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

Best if initiated before leaves are tightly curled (aphids) or extensive webbing & leaf injury occurs (mites)



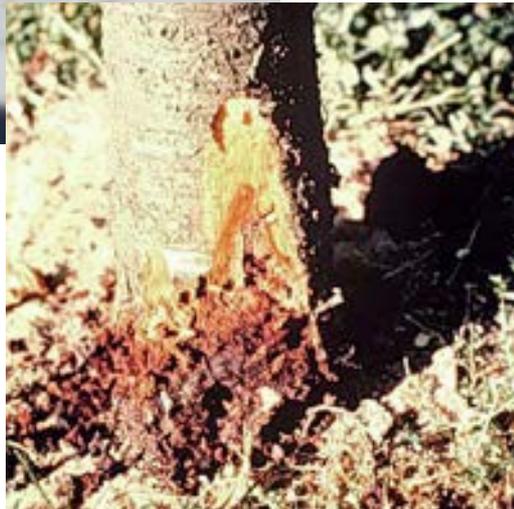
SAN JOSE SCALE

- Scales encrust limbs; can kill limbs after several years of feeding; scales and feeding spots on fruit
- **Controls:** Dormant oil at green tip or pink
- Use sticky tape in May/June to time a spray for “crawlers”
- Horticultural oil, insecticidal soap, malathion, gamma-cyhalothrin, or pyrethrin



FRUIT INSECT PESTS

TREE AND CANE BORERS



PEACHTREE (CROWN) BORER

- Female clear-winged moths lay eggs on lower trunk or in cracks in soil near the base; larvae bore into the cambium in lower trunk; trees may be girdled & die; adults begin activity in late June to early July in northern Utah
- **Control:** Trunk spray with carbaryl, permethrin, or gamma-cyhalothrin during first week of July; repeat every 2-3 weeks through August



THERE ARE MANY OTHER REASONS THAT TREES SAP OR BLEED



“Black Knot” fungus canker



Winter injury + cytospora
fungus canker

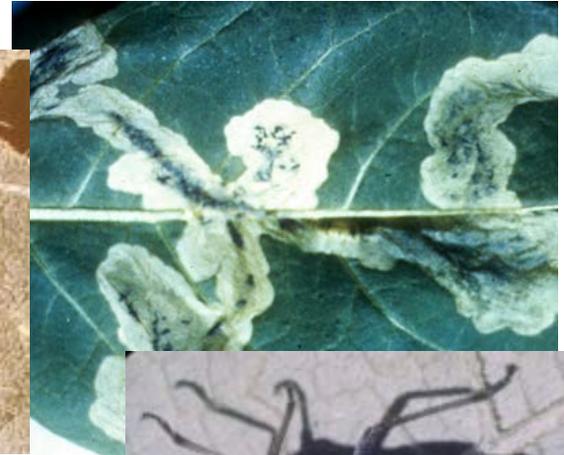
RASPBERRY HORNTAIL



- Stem-boring wasp
- Cane tips wilt; larvae tunnel within pith
- Prune & destroy infested cane tops
- Parasitic wasps attack horntail larvae
- Chemicals – treat in mid to late May: acetamiprid, carbaryl, malathion, or pyrethrin



VEGETABLE AND HERB INSECT PESTS



CORN EARWORM

- **Corn:** caterpillars feed on new silks & ear tips; reduce pollination & damage ear tips; allow entry of molds & attract other insects (sap beetles, earwigs)
- **Cultural control:** Early crops avoid injury (silk before mid July)
- Protect young silk; difficult to control worms once inside ear tip
- **Chemicals:** carbaryl, permethrin, pyrethrin, neem oil, oils applied to silks (reapply every few days)
- Bt & spinosad effective for tomato & pepper worms



TOMATO HORNWORM

- LARGE green caterpillars with horn on tail
- Feed on tomato, eggplant, potato
- Consume large amounts of foliage and buds in a short time period
- Remove by hand
- Chemicals: Bt (Dipel, Thuricide), spinosad, many others
- Parasitic wasp – white cocoons on caterpillars



CABBAGE WORMS

- Caterpillars chew large holes in leaves; produce abundant frass (excrement)
- Bt (Dipel, Thuricide), spinosad (Success, Entrust)– very effective
- Row cover fabric – cover plants to prevent egg-laying



Cabbage butterfly (above)
and cabbage looper (below)



Row cover

LEAFMINERS IN LEAFY VEGGIES

- Adults – Small flies
- Larvae – White to cream maggots
- Winding trails on leaves, white blotches
- Scout regularly, >1 mine/leaf
- Natural enemies (Paper wasp)
- Row covers
- Spinosad (Success, Entrust) insecticide



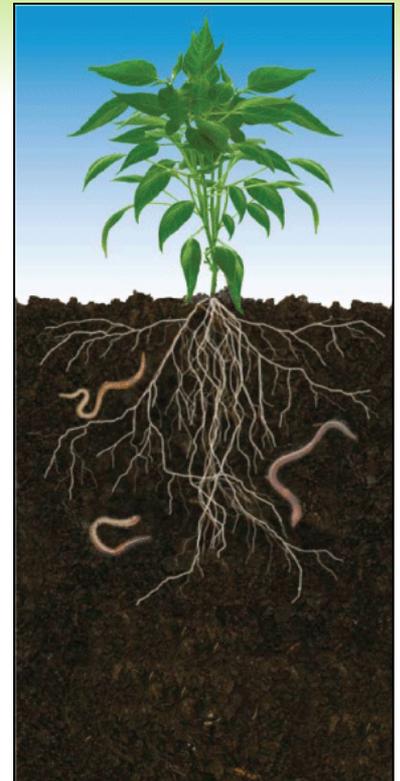
SQUASH BUG

- Adults & nymphs suck fluids from plant leaves, stems & fruit
- “Sudden wilt” – disruption of xylem vessels
- Congregate in plant debris under plants
- **Cultural controls:** Remove garden debris in fall, nearby woodpiles or other protected sites (adults over winter)
- **Hand pick or destroy eggs & nymphs**
- **Chemicals:** spray when first detect nymphs, drench undersides of leaves & stems
- kaolin clay (Surround), malathion, carbaryl, neem oil



PROTECT, CONSERVE & PROMOTE NATIVE INSECTS

- ◎ Diverse, healthy garden with flowering plants
 - ◎ Continuity in food & shelter in space & time
- ◎ Quality pollen & nectar
 - ◎ Wildflowers, herbs, fruit trees
- ◎ No toxic pesticides
 - ◎ Use cultural & mechanical pest management practices
 - ◎ Use selective, “soft” pesticides
- ◎ Tolerate some plant-feeding insects
 - ◎ Natural enemies must have food to survive



Start from the bottom up – healthy soil

USU EXTENSION PEST MANAGEMENT TEAM



Dr. Ricardo Ramirez
Entomologist



Dr. Claudia Nischwitz
Plant Pathologist



Marion Murray
IPM Project Leader



Ryan Davis
Arthropod Diagnostician



Dr. Cory Stanley
Entomologist



Dr. Diane Alston
Entomologist

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Just \$7 gets your pest problem diagnosed or insect identified.

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

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

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

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 of the websites to get answers!

utahpests.usu.edu

FACT SHEETS

UTAH PESTS fact sheet Utah State University extension
 Published by Utah State University Extension and Utah Plant Pest Diagnostic Laboratory ENT-19-07 May 2007

Yellowjackets, hornets and paper wasps

Erin Hodgson, 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.

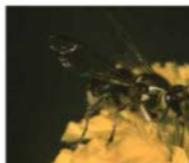


Fig. 2. Bald-faced hornet

Social Wasp General Des

- Have three well-separated body regions: waist and two pairs of clear wings.
- Care for their young and develop a caste system.
- Regenerate a new nest every year because queens overwinter; honey bee colonies together every year.
- Create their nests out of a wood and mud.
- Capture prey with their legs and jaws for defensive purposes only; this is different from bees that subdue prey with stinging.
- Go through complete metamorphosis: pupa, adult; adults and larvae have chelicerae, and larvae are legless.
- Capable of multiple stings because their "smooth" stingers; bees have barbed stingers.



Fig. 1. Yellowjacket.



Fig. 3. Honey bee (left) and wasp

UTAH PESTS fact sheet Utah State University extension
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White grubs

Erin Hodgson, 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.

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 Athanidius (Fig. 1). Most recently, Japanese beetles were detected in Orem, Utah, in 2004. 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.



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 its 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. Not all adults are nocturnal and are only active at night.

Many of the white grub species established in Utah are 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. 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. 2).



Fig. 2. Common white grub body characters

UTAH PESTS fact sheet Utah State University extension
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European Earwig (Forficula auricularia)

Diane G. Alston, Entomologist • Andrew Tebeau, Graduate Student

Do You Know?

- The European earwig is an omnivore; it feeds on detritus, fungi, plants, and insects.
- Earwigs can injure the buds, leaves, flowers, and fruits of a broad range of plants, including fruit, vegetables, and ornamentals; they can be a nuisance pest by entering buildings.
- Earwigs are active at night and seek protected shelter during the daytime.
- Optimal management is a balance of protecting plants from injury while reaping benefits from biological control and organic matter decomposition.

The European earwig (Order Dermaptera, which means "skin wings" to describe their leathery wings) (Fig. 1) is native to Europe, western Asia, and parts of Africa. The common name "earwig" comes from a myth that the insect would climb into the ears of humans and chew into the brain, but this is false. The European earwig was first introduced into Utah in the early 1900s. Establishment and population growth have been remarkably successful in northern Utah. It has become an insect of concern and interest because of its abundance and omnivorous feeding behaviors that make it both a pest and beneficial insect.



Fig. 1. European earwig adult and nymphs.

FEEDING HABITS AND INJURY

The diverse diet of earwigs includes primitive plants (mosses, lichens, and algae), vascular plants, fungal spores, small invertebrate animals, and decaying organic matter. As opportunistic predators, they provide a benefit by preying upon plant pests such as aphids,

scabies, caterpillars, maggots, and mites. In contrast, their herbivorous eating behavior makes them a common pest in agricultural crops, home gardens, and landscapes; they often require intervention to reduce their damage to plants. They can also be a nuisance when they seek shelter in homes and workplace buildings.

The European earwig can feed upon and damage a broad range of agricultural products that may include tree fruits, berries, vegetable fruits, leafy vegetables and herbs, grasses, grains, and ornamentals. They prefer ripe fruits over firm, premature fruits. Earwigs feed on the buds, flowers, fruits, and leaves causing direct plant damage, reduced crop yields, and aesthetic injury (Fig. 2). They will occasionally damage a variety of stored food products.



Fig. 2. Clockwise from top left: injury to peach fruit, earwig inside split pit of peach fruit, injury to new growth of ornamental tree, and injury to a peach tree. (Lorenz 1994)

LIFE HISTORY

Two biotypes of the European earwig occur in the U.S., which differ by location (western vs. eastern states), life history, and European origin. In the western U.S., the European earwig has two or more generations per year, and populations tend to build to their highest densities in mid to late summer.

Adult - Overwintering, Dispersal, and Damaging Stage

- Long, flattened brown body with a red-brown head; 1/2 to 3/4 inch long.

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The videos below were created by USU Extension specialists to highlight identification and management of common insects and diseases found in Utah.

Pests of Fruits and Vegetables codling moth trapping and organic control controlling earwigs with traps trapping and identification of spotted wing drosophila	Nuisance Pests boxelder bug control trapping for paper wasps	Forage and Field Pests alfalfa sweep net sampling
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Pests of Fruits and Vegetables

Codling Moth Traps

Codling moth, the "worm" in apples, is the most common pest of apples in Utah. Entomologist Diane Alston shares some home remedies for trapping this pest and protecting fruit.



0:00 / 0:00

YouTube

4-7 min how-to videos

homemade insect traps

low toxicity pest management options

insect identification

insect monitoring

UTAH PESTS NEWSLETTER



UTAH PESTS News

Utah Plant Pest Diagnostic Laboratory and USU Extension

Vol. VI, Winter 2012

Pheromone Technologies to Manage Prionus Root Borer



requires 3 to 5 years, and most of it is spent below-ground as larvae chewing on roots. In Utah, the beetle has been found in sweet cherry, apricot, and peach orchards, especially along the mountain benches where soils are sandy. Porous soils are more conducive to the movement of larvae as the largest instars (mature larvae) can reach more than 4 inches in length and up to ¾ inch in width – one big grub! In studies conducted in fruit orchards in Box Elder County, it was found that younger, smaller larvae feed on smaller diameter roots toward the outer edges of the root zone, and tend to move inwards and upward as they develop and feed on larger roots. The majority of larvae in the tree

The larvae of *Prionus californicus*, a long-horned or round-headed beetle (Cerambycidae), feed on the roots of trees and shrubs, including those of fruits, ornamentals, and natives. It is also a pest of hops in the Pacific Northwest. Feeding damage causes decreased nutrient uptake, water stress, reduced tree growth, and loss of fruiting wood and scaffold limbs. In fruit orchards with high populations of prionus, significant tree decline and mortality may result. There have been few effective controls for the pest. Soil fumigation and fallowing orchard soils for 5-6 years are expensive, reduce site productivity, and have shown variable efficacy.

The insect pupates near the soil surface and adults emerge from approximately June through September in northern Utah. Adults are short-lived (several weeks) large, brown beetles, and are active primarily at twilight (crepuscular). Males can fly up to several hundred yards and have strongly serrated antennae to detect a sex pheromone released by females. Recently, entomologists identified the pheromone chemical and synthesized a mimic of the primary component, 3,5-dimethyldodecanoic acid (Rodstein et al. 2009).

Researchers, including ourselves (Barbour et al. 2011), have tested this pheromone in

What's Inside

Using the Jar Test

Scandlers Seed Bugs

Honey Bee Navigation

CAPS Update: Spotted Wing Drosophila

Monitoring Alfalfa Weevil

Cluster Flies in Indoor Settings

Growing Healthy Plants

News and Publications

News Highlights

NEW UTAH PESTS

FACT SHEETS

The following can be found on our website:

Beneficial True Bugs: Big-eyed Bugs

Booklice and Their Relatives

Bumble Flower Beetle

Home Orchard Guide 2012

Important Pests of Ornamental Aspen

Spotted Wing Drosophila Monitoring

Spruce Health in Utah Landscapes

Spanish translations:

Bed Bugs, Damsel Bugs, Termites

Free, quarterly newsletter
Current pest topics
New research results
Useful resources
Sign up to subscribe at utahpests.usu.edu

PEST ADVISORIES (INTEGRATED PEST MANAGEMENT)

ipm.usu.edu

Free subscription
Timely info on pest
activity

- insects
- mites
- diseases
- nutrient deficiencies
- environmental stress

Lots of images!
IPM recommendations
Effective pesticides

The screenshot shows the Utah State University Cooperative Extension website for Integrated Pest Management. The header includes navigation links like 'USU Links >> USU Home', 'A-Z Index', 'calendars', 'MyUSU', 'directory', and 'contact'. The main navigation bar lists 'UTAH PESTS Home', 'Utah Plant Pest Diagnostic Lab', 'Integrated Pest Management', 'Bees', 'CAPS', and 'Plant Diseases'. A central banner features a slideshow titled 'IPM for GREENHOUSE & NURSERY CROPS' with a sub-header 'Preventing Winter Injuries' and a description: 'This slideshow covers common greenhouse pests in Utah'. To the right, a 'Recent Plant Pest Info' section lists updates for 'Fire Blight, Powdery Mildew: Advisory Update' (Apr 20, 2012), 'Cankerworm, Spruce Weevil: Landscape Advisory Update' (Apr 18, 2012), and 'Dormant Sprays: Advisory Update' (Apr 13, 2012). A sidebar on the left contains a search bar and a list of categories including Fruit IPM, Vegetable IPM, Landscape IPM, Field Crops IPM, Pest Advisories, Fact Sheets, Image Galleries, Slideshows, Utah IPM & SA Mini-Grant Program, Pesticide Information, Weather Info, Resources and Links, and Contact Us. A bottom banner encourages users to 'Subscribe to IPM Pest advisories HERE' with a ladybug image. The footer states: 'Utah State University is an affirmative action/equal opportunity institution. © 2012 Utah State University Integrated Pest Management'.

PEST DIAGNOSTICS

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UTAH PESTS
Utah Plant Pest Diagnostic Lab



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Google™ Search

- Home
- Fact Sheets
- Frequently Asked Questions
- Image Galleries
- \$7.00 Diagnosis
- Recent Pests
- Alfalfa Hay Testing
- Tick Survey
- Contact Us

Current Pest Issues

- Top 20 Insects
- Top 20 Arachnids
- Bed Bug Travel Tips
- Hobo Spiders

Utah's Top 20 Arachnids



1 2 3

Submit a Sample



Fact Sheets



1

Events

- Sep 18, 2011
What Works! 2011
- Sep 20, 2011
Planning for a Low-Cost Holiday Season
- More Events...

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LOOK FOR THIS SLIDESHOW AND OTHERS AT UTAHPESTS.USU.EDU

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UTAH PESTS Home Utah Plant Pest Diagnostic Lab Integrated Pest Management Bees CAPS Plant Diseases

Google™ Search

- Home
- Fact Sheets
- Frequently Asked
- Questions
- Image Galleries
- Slideshows
- Video Fact Sheets
- Utah Pests News
- Quarterly Newsletter
- Contact Us



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

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

Over 100
slideshows posted

This one posted
under
“Home Yard and
Garden”