Attracting & Supporting Beneficial Insects in the Landscape

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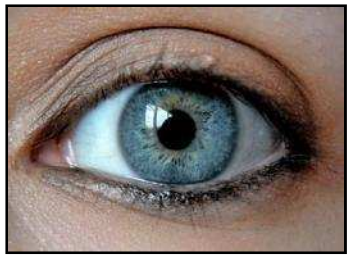
The Attractive Garden

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

Functional Biological Control

- Rely on native or natural enemies
  - Most are small in body size
- <u>Conservation of natural enemies</u>
  - Avoid toxic chemicals
  - Maintain a diverse plant environment (avoid monocultures)
    - Continuity in time & space
  - Cultivate plants that provide quality nectar & pollen
  - Tolerate some herbivorous insects
- Get a hand lens to see them!

Parasitic wasp that attacks caterpillars

Big-eyed bug nymph feeding on an insect egg

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

UTAH PESTS fact sheet

UtahState University COOPERATIVE EXTENSION

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Gardening for Native Bees in Utah and Beyond

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Pollinating Insect-Biology, Management, Systematics Research

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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 striotus*, front, firecracker 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
Abelia	CAPRIFOLIACEAE	abelia		S	
Acacia	FABACEAE	acacia	W	ST	
Acer	ACERACEAE	maple	GU	T	
Achillea	ASTERACEAE	yarrow	GUW	P	*A. millefolium* weedy
Aconitum	RANUNCULACEAE	monkshood	GU	P	
Agastache	LAMIACEAE	hyssop	G	P	**see Fig. 10**
Ajuga	LAMIACEAE	carpet bugle	G	P	
Allium	LILIACEAE	ornamental onions	GUW	P	
Althea	MALVACEAE	hollyhock	G	P	not double-flowered
Amelanchier	ROSACEAE	serviceberry	GU	S	
Amorpha	FABACEAE	false indigo	G	S	
Anchusa	BORAGINACEAE	wild forget-me-not		AP	
Anethum	APIACEAE	dill	G	A	
Aquilegia	RANUNCULACEAE	columbine	GU	P	not double-flowered
Arctostaphylos	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

Common Cast of Characters

Parasitic wasps & flies

Predaceous true bugs & beetles

Common aphid predators

Predaceous mites

Lady Beetles (Lady Bugs)

Native

Introduced

- Synchrony of predator & prey
- Continuous food source
- Shelter
- Alternative food
- Both adults & larvae are predators

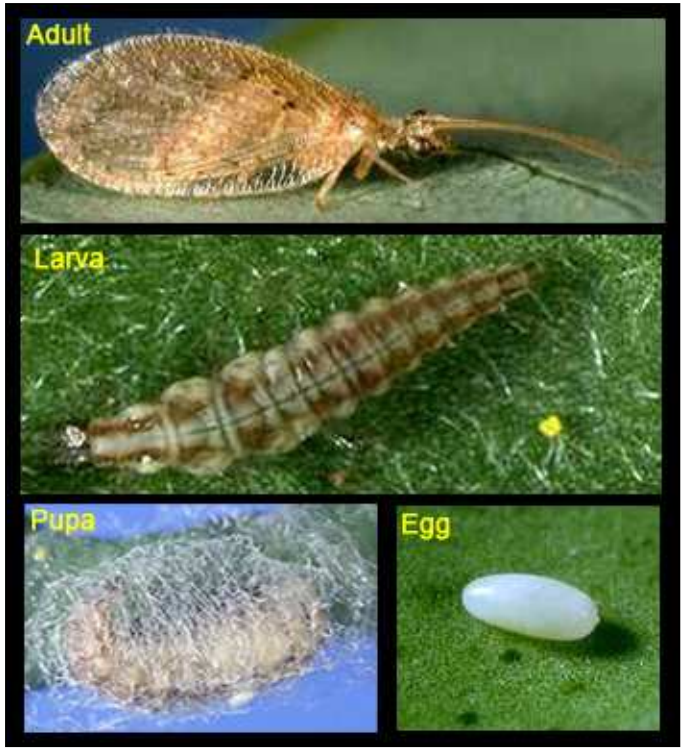
- Prey specific vs generalist
  - aphids
  - scales
  - mealybugs
- Habitat specific
  - arboreal vs. forbs

LACEWINGS

Green lacewing
most common

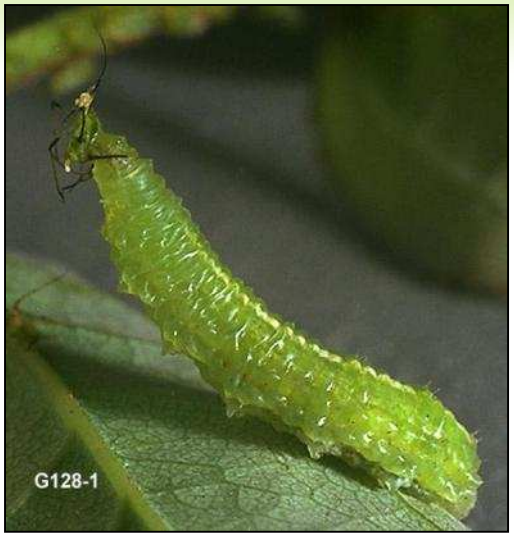
The larvae eat a wide variety of prey
- **small insects**
  - **aphids**
  - **mealybugs**
  - **thrips**
  - **caterpillars**
  - **leafhoppers**
  - **insect eggs**

Brown lacewing



Syrphid or Hover Flies

Adults mimic bees



The larvae eat a variety of small insects & insect eggs

Ground Beetles & Tiger Beetles

Eat mid-sized prey
- **caterpillars**
- **cutworms**
- **slugs**

Live on the ground

Nocturnal

Minute Pirate Bug

Adult

Nymph

Both adults & nymphs are predators

Prey

- **small insects & mites**
  - **caterpillars, leafhoppers, psylla, aphids, etc.**
  - **insect eggs**

Big-eyed Bug

Adult

Nymph

Adults & nymphs are predaceous
Eat small insects, insect eggs, & mites

Damsel Bug

Adult

Nymph

Adults & nymphs are predators
Eat small insects & eggs
Note raptorial front legs

Ambush Bug

Use camouflage and ambush to attack prey

Their bite can hurt – ouch!
Eat small to mid-sized insects
Note their menacing beak

Predatory Mites

Western predatory mite

Native species
Eat plant-feeding spider mites
Cannibalistic
Some also eat pollen & nectar

Zetzellia

Parasitic Wasps

Parasitic Flies

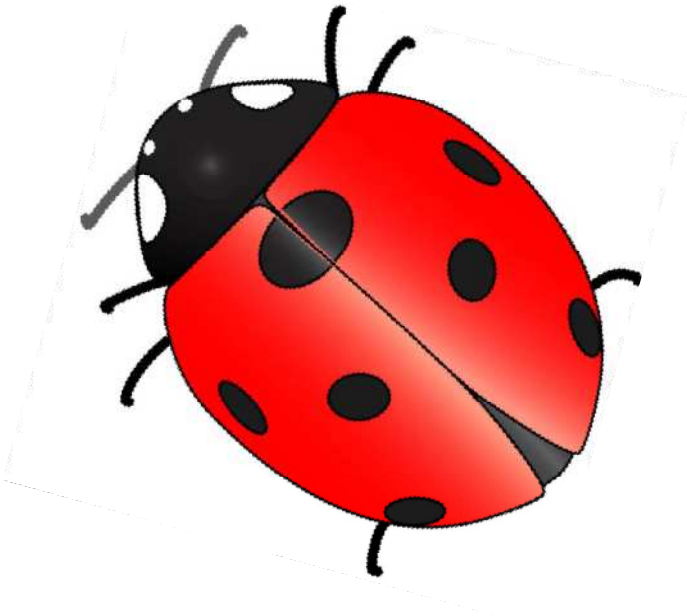
Tachinid Fly
Lay eggs on caterpillars
Fly larvae parasitize host

Insect Pathogens = Entomopathogens

Nematodes
Fungi
Protozoa
Viruses

IPM (Integrated Pest Management)

- Sustainable
  - Economic and Environmental
- Integrated Pest Management Strategies
  - Cultural (crop management)
  - Mechanical
  - Biological
  - Chemical
- Economic/Action Thresholds
  - Treat only when needed



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)

Paper wasps

European paper wasp:
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

Wasp traps

- Place around perimeter of fields, gardens, and yards 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
  - Treat & remove nests

Selective, Lower Toxicity Insecticides

- Suffocants
  - horticultural mineral oil
- Cuticle disruptors
  - insecticidal soap, diatomaceous earth
- Particle films & Repellents
  - kaolin clay (Surround), capsaicin (hot pepper wax)
- Anti-feedants & Growth regulators
  - azadirachtin (Aza-Direct, others), iron phosphate (Sluggo, others), insect & mite growth inhibitors
- Biologicals
  - botanicals [pyrethrins (Pyganic), rotenone]
  - microbials [spinosad (Success, Entrust), Bt (Dipel, others), Beauveria (Botanigard, others), beneficial nematodes]
- Inorganic minerals (can be disruptive to some beneficials)
  - lime sulfur, sulfur, copper

Broad-spectrum, Non-selective Insecticides

- Carbamates
  - carbaryl (Sevin)
- Organophosphates
  - malathion
- Synthetic Pyrethroids
  - bifenthrin, cyfluthrin, esfenvalerate, permethrin
- Neonicotinoids (can be disruptive, generally more sublethal than lethal) – systemic activity
  - imidacloprid (Bayer Advanced Garden), acetamiprid (Ortho Max)

Utah Pests Online Resources

utahpests.usu.edu

FACT SHEETS

UTAH PESTS fact sheet

UtahState University extension

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Yellowjackets, hornets and paper wasps

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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.

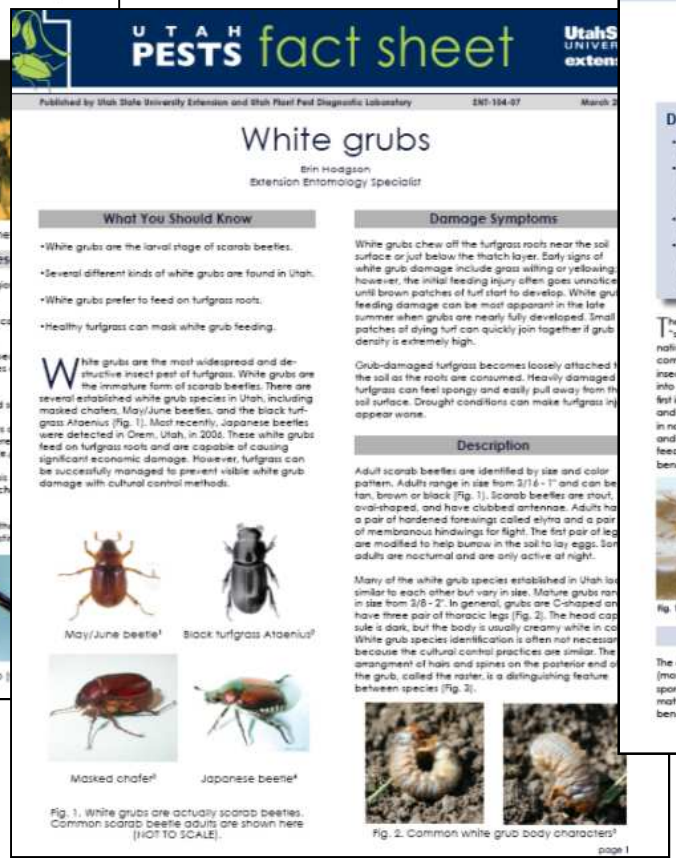
Fig. 1. Yellowjacket.[1]

Fig. 2. Baldfaced hornet

Social Wasp General Des

- Have three well-separated body regio waist and two pairs of clear wings.
- Care for their young and develop a co different forms living together.
- Regenerate a new nest every year be queen overwinters; honey bee colonies together every year.
- Create their nests out of a wood and
- Capture prey with their legs and jaws for defensive purposes only; this is differe wasps that subdue prey with stinging je
- Go through complete metamorphosis pupa, adult); adults and larvae have ch mouthparts, and larvae are legless.
- Capable of multiple stings because th "smooth" stingers; bees have barbed st

Fig. 3. Honey bee (left) and wasp



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 unnotice until brown patches of turf start to develop. White gru 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 t the soil as the roots are consumed. Heavily damaged turfgrass can feel spongy and easily pull away from th soil surface. Drought conditions can make turfgrass inj 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 ha a pair of hardened forewings called elytra and a pair of membranous hindwings for flight. The first pair of leg are modified to help burrow in the soil to lay eggs. Son adults are nocturnal and are only active at night.

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

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

page 1

UTAH PESTS fact sheet

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European Earwig
(Forficula auricularia)

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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 fruits, 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, scales, 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, earwigs inside split pit of peach fruit, injury to new growth of ornamental tree, and injury to a flower.

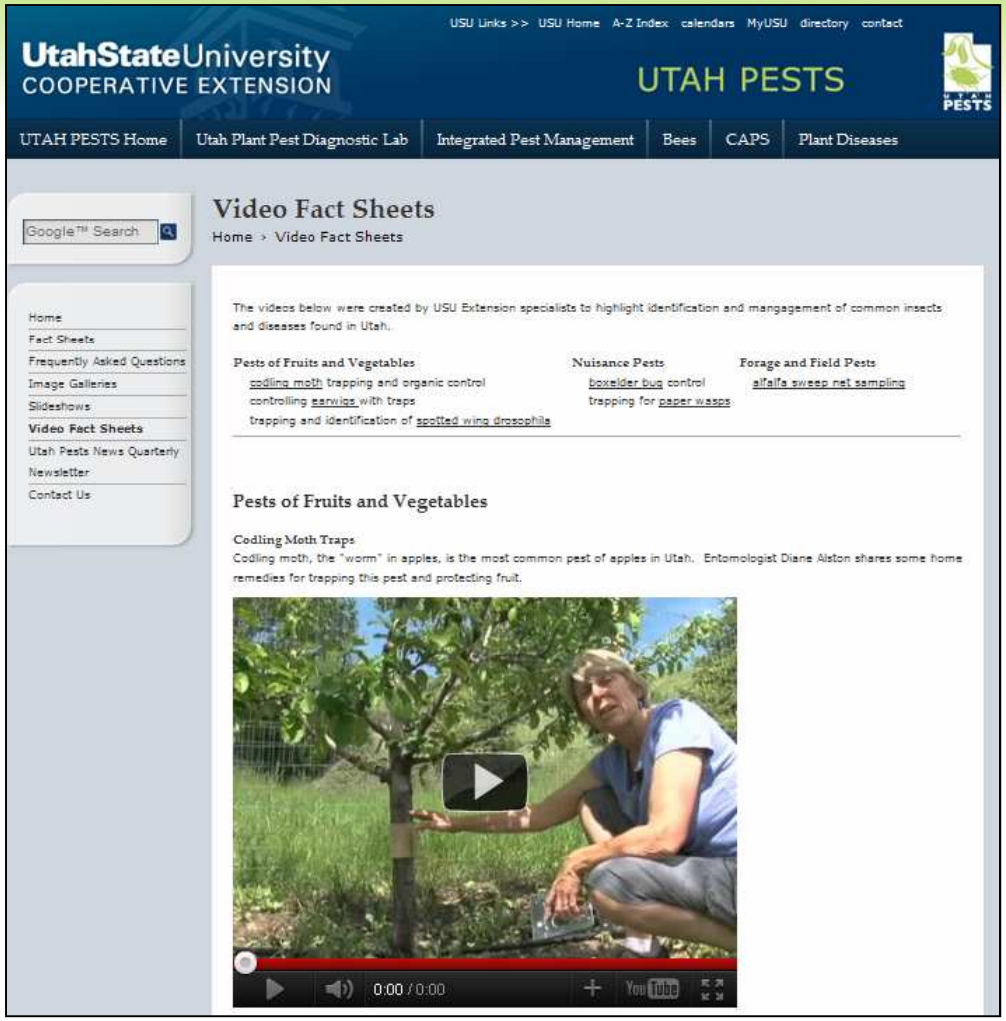
LIFE HISTORY

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

- Elongate brown body with a red-brown head; ½ to ¾ inch long.

Video Fact Sheets



4-7 min how-to videos

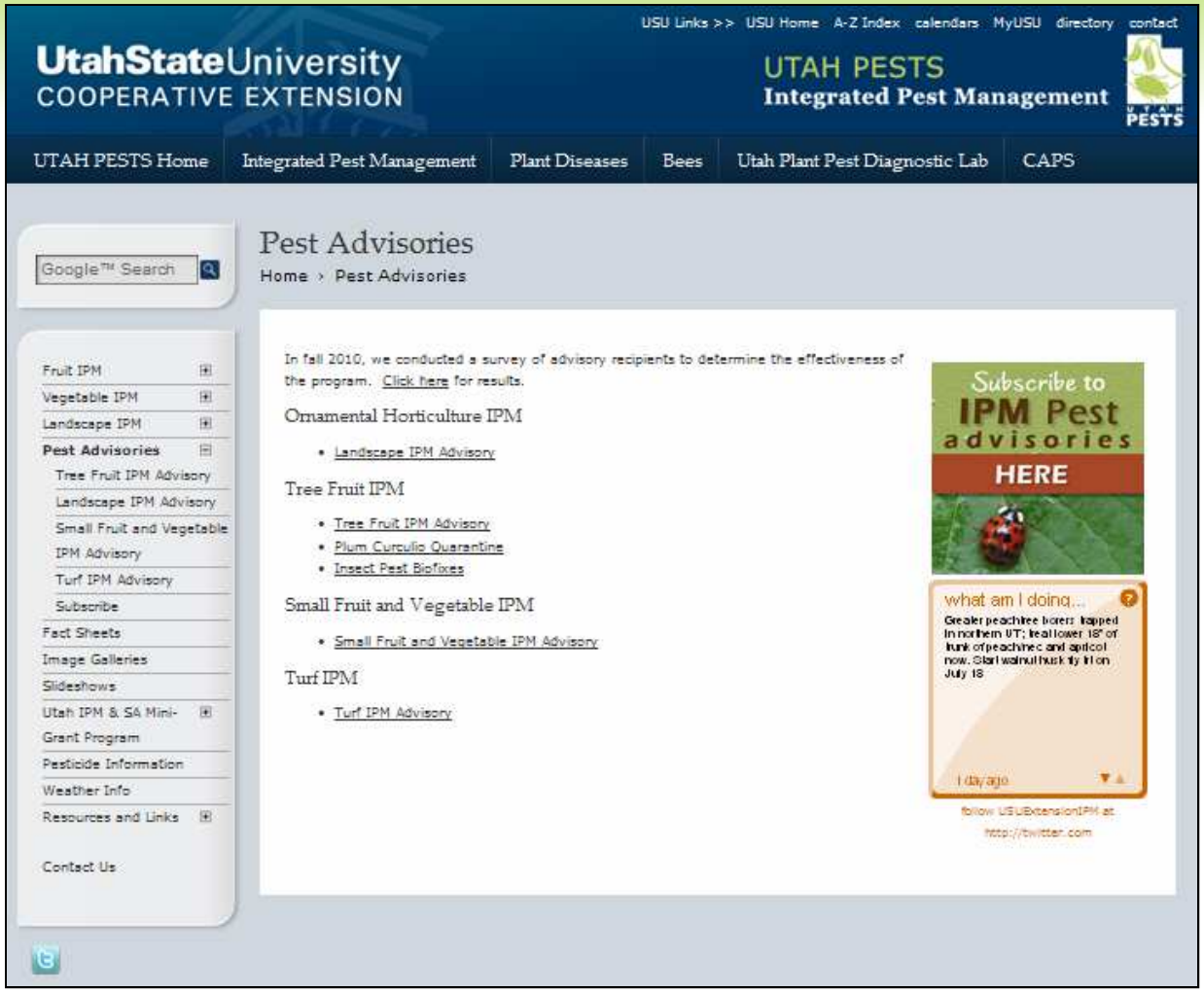
homemade insect traps

low toxicity pest management options

insect identification

insect monitoring

Pest Advisories
(integrated pest management)



utahpests.usu.edu/ipm

Free subscription

Timely info on pest activity
- -insects
- -mites
- -diseases
- -nutrient deficiencies
- -environmental stress

Lots of images!

IPM recommendations

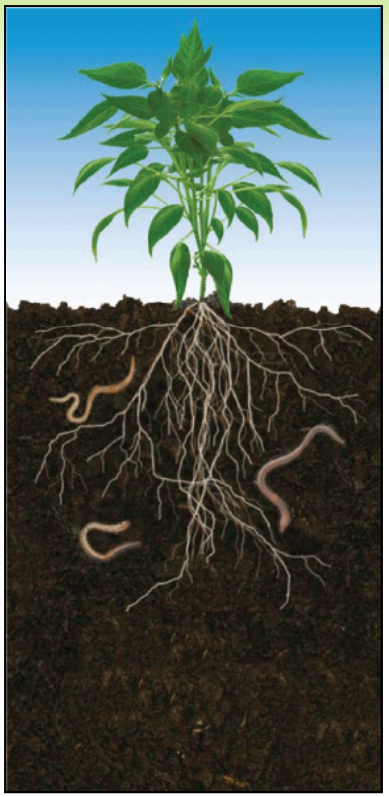
Effective pesticides

Pest Diagnostics

Utah Plant Pest Diagnostic Lab
utahpests.usu.edu/uppdl

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

Look for this Slideshow and Others at utahpests.usu.edu

Over 100 slideshows posted

This one posted under "Insects-Beneficial"