UTAH PESTS News

Utah Plant Pest Diagnostic Laboratory and USU Extension Vol.VII, Summer 2013

What's Inside

News Highlights

NEW FACT SHEETS

Necrotic Ring Spot and Summer Patch of Turf

TURF WOES

The diagnostic lab has received many turf samples this season. Most were diagnosed as "abiotic" (not caused by insect or disease). Several management tools are recommended to keep turf healthy, including aeration, de-thaching, and proper watering (too much water can be just as detrimental as not enough). Dr. Kelly Kopp and others have developed a "sprinkler performance" fact sheet for each county of the state. See the list here (among others; scroll down).

www.utahpests.usu.edu

Gastronomical Insects

Grilling season is here, so fill up your propane tanks and polish up your skewers for a shish kebob feast of crickets, cicadas and palm weevils. Don't eat bugs? It might be time to give them a try. Not only has the U.N.'s Food and Agriculture Organization made the case for why insects should be on your dinner plate, but many U.S. restaurants have started serving up tasty insect delicacies to rave reviews. That's a new twist to integrated pest management!

In the report released in May 2013, Edible Insects: Future Prospects for Food and Feed Security, the FAO argues that in the future, insects could be essential to feeding the world's population. Insects are nutritious, can generate jobs, and their production is safer for the environment than other protein sources such as beef. For example, to produce 1 pound of meat, insects require 2 pounds of feed while cattle require 8 pounds. Insects beat out beef when it comes to essential nutrients like iron, too: 100 grams of locusts contain 8 to 20 milligrams of iron while the same weight of beef contains 6 milligrams. This FAO website offers more nutritional content information for insects.

The FAO wants all locales, including developed nations, to stop turning up their noses at eating insects. In the U.S., we already unknowingly consume about 1 pound of insect parts per person per year, in foods such as chocolate, peanut butter, and fruit juice. An FAO spokesperson comments that "although it will require considerable convincing to reverse [feelings of disgust], it is not an impossible feat."

According to the FAO, more than two billion people–30 percent of humanity–already supplement their diet with insects. The most widely consumed insects worldwide are the larvae of palm weevils. Indigenous cultures in Africa, South America, Southeast

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UTAH PESTS Staff

Diane Alston
Entomologist
diane.alston@usu.edu
435-797-2516

Ryan Davis
Arthropod Diagnostician
ryan.davis@usu.edu
435-797-2435

Marion Murray
IPM Project Leader
Editor, Utah Pests News
marion.murray@usu.edu
435-797-0776

Claudia Nischwitz
Plant Pathologist
claudia.nischwitz@usu.edu
435-797-7569

Ricardo Ramirez
Entomologist
ricardo.ramirez@usu.edu
435-797-8088

Lori Spears
USU CAPS Coordinator
lori.spears@usu.edu
801-668-4056

Utah Plant Pest Diagnostic Lab
BNR Room 203
Utah State University
5305 Old Main Hill
Logan, UT 84322

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COOPERATIVE EXTENSION

Gastronomical Insects, continued from page 1

Asia, and New Guinea have all developed techniques for mass-producing these larvae, which involves cutting down select species of palms and returning 6 to 10 weeks later to harvest the larvae from the fallen trees. While weevils are sometimes eaten raw, in most cases, they are dried, boiled, fried, or roasted.

In central Mexico, red and white maguey larvae (of the butterfly, *Aegiale hesperiaris* and the moth, *Comadia redtenbacheri*) that feed on the leaves of agave are considered a delicacy. When fully mature, the highly nutritious caterpillars are eaten deep fried or braised, seasoned with a spicy sauce, and served in a tortilla. The red maguey worms are also found in bottles of mezcal liquor (made from agave). (See page 4 for an edibles list.)

While insects are not routinely eaten in most western societies, the common European cockchafer bug (*Melolontha melolontha*), was used in a gourmet soup in France, Germany, and other European countries from the early 18th century to the mid-20th century. The soup was prepared from ground larvae, vegetables, herbs, and bouillon. It was said to compare to lobster stew. Despite the dish's status as a delicacy, controversy in western nations over eating insects has continued through the years.

To help change perceptions, restaurants and organizations are delving into ingenious ways to use insects as food. For example, The Nordic Food Lab and University of Copenhagen received almost $630,000 to expand their research into insect gastronomy, by identifying ways to make insects delicious to the Western palate. The group recently participated in a gala feast ("Pestival"), where they served moth larvae mousseline, cricket broth with grasshopper garum, butter-roasted desert locust with wild garlic and ant emulsion, and an oatmealworm stout.

Ready to take the plunge? Get brave with the recipes below, or check out this

list of 13 restaurants in the U.S. that serve up insect delicacies.

Caramel Popcorn Cicadas

Mix ½ lb cicadas with ½ cup brown sugar and 2 tbsp Sriracha. Bake at 350°F for 20 minutes.

From "Girl Meets Bug"

Cabbage, Peas, N Crickets

This recipe stars crickets as the main protein, calcium and iron source. Stir fry the following for 5-10 minutes:

- handful of crickets
- 1 cup chopped snap peas
- 1 cup chopped red cabbage
- 1 tbsp olive oil
- 1 crushed clove of garlic
- pinch of salt

From Iowa State

Chocolate Covered Grasshoppers

- baker's chocolate
- candied crickets

Melt baker's chocolate in double boiler. Fill molds halfway with chocolate, add grasshoppers, fill rest of the way. A tasty surprise in every bite!

From "Insects are Food"

Mealworm French Fries

4 large potatoes
2 dozen mealworms – boiled but not roasted
1 cup chopped scallions
½ tsp smoked salt

Cut and slice potatoes into strips. Deep fry potatoes, mealworms and scallions together for 3 minutes in oil, and season to taste.

- Marion Murray, IPM Project Leader

Trap Cropping to Manage Grasshoppers

By Clint Burfitt, State Entomologist for the Utah Department of Agriculture and Food. Clint is co-coordinator of the Utah Cooperative Agriculture Pest Management Survey program, and manages the statewide grasshopper and Mormon cricket surveys.

Grasshopper infestations are difficult to predict, and over the years, have caused widespread damage to Utah's crop and rangeland habitats. Infestations are cyclic, occurring every 3 to 7 years. They can last up to 5 years depending upon environmental conditions such as food availability, weather, and presence of pathogens. When a community, neighborhood, or large area is experiencing the onset of a grasshopper infestation, it is best if landowners can communicate and coordinate treatments. Just treating a small part of an infested area will not be effective.

Treatment efforts should occur before grasshoppers become adults and begin mating (by early August in northern Utah and mid June in southern Utah). Before conducting any sprays or control efforts, applicators should contact nearby beekeepers and organic-certified producers to avoid negatively impacting their businesses. Ranchette developments and absentee landowners can complicate treatment efforts and often create situations where coordinated actions are not possible. In these situations, homeowners and agricultural producers can be subject to the nuisance and crop damage associated with large numbers of grasshoppers.

One treatment option that has been conducted successfully in Utah is trap cropping. One Hurricane farmer, who grows watermelon, planted rows of grains (wheat, triticale, and rye) early in the spring to serve as wind breaks for the watermelon crop. The grass borders, so long as they stay green, create a barrier between areas where grasshoppers hatch and where they prefer to feed. They are particularly effective in areas where there is a lack of attractive or green grasshopper forage in the surrounding areas.

As range or weed plants die down, grasshoppers migrate to feed on the grain strips. After the grasshoppers build in numbers in the border grasses, they are sprayed or baited to reduce the population. Treating trap crops reduces the amount of pesticides used on food crops and gardens, helps to protect beneficial and pollinator insects, and saves money.

Green borders as trap crops can also work in home gardens. Plants should be started early in the spring or late fall to protect crops or gardens from grasshoppers.

- Clint Burfitt, Utah State Entomologist

The Cooperative Agricultural Pest Survey is a federal program, administered jointly by USDA-APHIS-PPQ and each state, whose purpose is early detection of invasive species that could threaten U.S. agriculture. In Utah, the program is co-coordinated by Lori Spears (USU) and Clint Burfitt (UDAF).

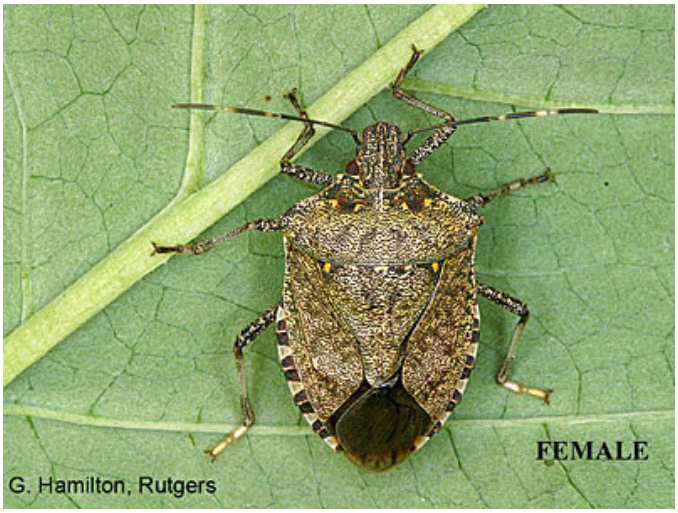
Early and Ongoing Monitoring of Invasive Pests

In Utah, agricultural commodities are largely grown along the major N-S interstate highway, which makes this state vulnerable to introduced exotic pests and increases the likelihood of their spread once introduced. It is therefore critical that Utah crops be safeguarded and regularly monitored for invasive pests. In 2013, the Utah Cooperative Agricultural Pest Survey (CAPS) program will survey agricultural and horticultural crops for various exotic pests, including insects and plant pathogens, and will set and monitor more than 400 traps statewide.

Two of the insects that will be targeted this year are the spotted wing drosophila (*Drosophila suzukii*) and the brown marmorated stink bug (*Halyomorpha halys*).

The spotted wing drosophila (SWD) is a pest of soft fruit such as raspberry, cherry, strawberry and peach, and was first was first detected in Davis County, Utah in 2010. Male SWD can be identified as having one spot per wing. Female SWD have saw-like ovipositors which enable them to lay eggs in ripe and ripening fruit. The larvae feed inside the fruit, causing the fruit to become soft and unmarketable.

The brown marmorated stink bug (BMSB) feeds on a wide variety of host plants, including apples, peaches, corn, and tomatoes. The BMSB also poses a problem for residences when it searches for protected, overwintering sites indoors. BMSB is shield-shaped with light bands on the antennae and distinct white triangles on the rear of the front pair of wings. In the fall of 2012, BMSB was found for the first time in Utah in Salt Lake County.



Brown marmorated stink bug is identified by the black and white pattern around the abdomen and antennae, and rounded shoulders. It is also the only stink bug that would "invade" homes for the winter.

If you believe that you've seen one of these pests or if you have suggestions for trapping sites, please contact Lori Spears, USU CAPS Coordinator (lori.spears@usu.edu).

- Lori Spears, USU CAPS Coordinator

Insect Gastronomy, continued from page 2

Global pest insect species used widely for human consumption

Locusta migratoria, migratory locust, Intercontinental
Locustana pardalina, South African migratory locust, Africa
Schistocerca gregaria, desert locust, Intercontinental
Zonocerus variegatus, variegated grasshopper, Africa
Sphenarium purpurascens, chapulines, Mexico
Rhynchophorus phoenicis, African palm weevil, Africa
Rhynchophorus ferrugineus, Indian red date palm weevil, Asia
Rhynchophorus palmarum, American palm weevil, America
Augosoma centaurus, scarab beetle, Africa
Apriona germari, mulberry longhorn stem beetle, Asia
Oryctes rhinoceros, coconut rhinoceros beetle, Intercontinental
Agrius convolvuli, sweet potato hawkmoth Zimbabwe
Anaphe panda, wild silkmoth, Africa
Gynanisa maja, emperor moth, Africa

Nematodes We Want in the Yard and Garden

Gardeners cringe at the mention of nematodes and plant diseases, but it turns out not all pathogens are bad. There are a number of insect-attacking pathogens (entomopathogens) that are natural enemies of yard and garden pests, and aid in pest suppression. Entomopathogenic nematodes are resident in soil and do not harm plants but are often found at low levels. Many beneficial nematode species, however, have been formulated so that they can be applied as a biopesticide.

Entomopathogenic nematodes are clear, nearly microscopic roundworms that enter their host insect through body openings, such as the mouth. These nematodes are associated with a bacterium they release that kills the insect within a couple of days and allows the nematodes to develop and reproduce. They are soil dwelling and perform best against insect pests, in particular larval stages, associated with a moist soil environment. Applications of entomopathogenic nematodes have also been shown to suppress plant-parasitic pest nematodes. Foliar applications of nematodes have been less successful and are not generally recommended, but may be used in greenhouses and against leafminers and thrips on ornamentals. Research on adjuvents, using surfactant-polymer formulations, and less disruptive spray nozzles is ongoing to improve foliar applications.

There are several beneficial nematode suppliers online (a list is provided in the cited references below), and nematodes can also be found at some garden centers. When purchasing nematodes, species will be associated with the genera *Heterorhabditis* or *Steinernema* and are labeled with a trade name like Nemasys, Millenium, and NemaShield and/or their species name. Species vary in their behavior, specificity to attack particular insects, and tolerance to various environmental conditions. These characteristics, often provided by the supplier, should be used to select the appropriate species for the insect being targeted. When nematodes are shipped from a supplier the container should have ice packs to keep them cool in transport. At a garden center, they should be kept refrigerated, otherwise the nematodes may not be alive. It is best to apply the nematodes immediately after they arrive, otherwise, refrigerate, and avoid freezing them. One way to determine whether your nematodes are alive is to place a small amount of the nematode product in a clear plastic baggie and add a few drops of water. Although nematodes are tiny, after a few minutes you should see nematodes squirming around either with a hand lens or the naked eye.

Beneficial nematodes are living organisms, so care is needed to ensure their effectiveness. Here are a few basic considerations.

From a couple of nematodes entering an insect, hundreds to a few thousand will eventually exit in search of a new insect host. Shown above is a waxworm infected with *Heterorhabditis* species nematodes.

- Irrigate before and immediately after a nematode application to help with their establishment in the soil.
- Apply nematodes in the evening or on a cloudy day to avoid UV exposure that can kill them.
- Remove fine screens and filters when using a sprayer and keep the spray pressure below 300 psi. Nematodes can also simply be applied with a watering can, just shake or stir the solution to keep the nematodes from settling at the bottom.

Other factors to consider are the compatibility of nematodes with other plant and pest management tactics. Nematodes are compatible with other pesticides but avoid applications with organophosphates, carbamates, nematicides and *Do Not* mix with fertilizer solutions. Some research has shown also that strategies used to reduce plant parasitic nematodes, such as mustard green manures, may decrease the effectiveness of entomopathogenic nematodes for insect management.

Once nematodes have been applied it can be difficult to determine if they are doing their job. One way to test that the nematodes are alive and capable of infecting is to collect soil in the area of the application, place a small amount of soil in a cup, and add a couple of *Galleria* waxworms (available where fish bait or live food for small animals is sold) on top of the soil. About 2-3 days later, nematode infected waxworms are dead and tan to brown in color for *Steinernema* species or reddish to orange for *Heterorhabditis* species.

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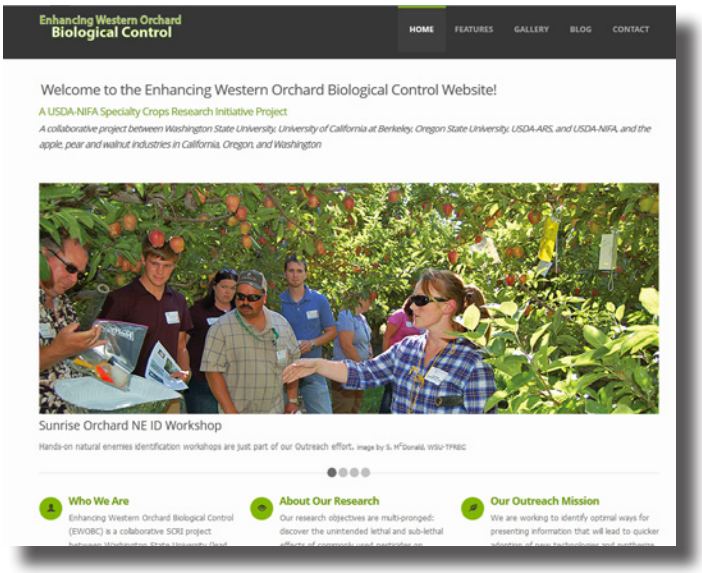
New Website Identifies Biocontrol Bottom Line

The bottom line in business refers to a company's profits. The bottom line in biological control refers to the benefits from use of biocontrol methods on the farm or garden. A team of tree fruit researchers has determined the bottom line for implementing biological control in orchard systems in the western U.S. The team was funded by a USDA Specialty Crop Research Initiative grant and composed of entomologists from Washington State University (lead institution), USDA-ARS, Oregon State University, and the University of California at Berkeley. The team goal was to improve the stability of integrated pest management in apple, pear and walnut orchards by enhancing biological control.

The team developed a comprehensive online resource, enhancedbiocontrol.org, for implementing biological control in orchards. Much of the information is also applicable to other plant systems. The website includes an image gallery of beneficial insects, mites, and spiders; videos on how to implement biocontrol, including perspectives from growers and consultants; materials from a biocontrol short course, reports, and surveys; an easy-to-understand table on pesticide effects on natural enemies; a blog; and other useful information.

For example, to guide selection of pesticides that are safer to beneficial arthropods, a quick look at the pesticide effects table informs you that Delegate, a spinosyn insecticide generally thought to be reduced-risk because it is based on



a bacterial toxin, is actually quite toxic to most beneficial insects and mites. In contrast, Altacor, a diamide, is safer for some predatory mites, true bugs and parasitoids, but is harsh on lady beetles and lacewings. The fungicide Kocide is generally safe to natural enemies, except not to the western orchard predatory mite. The website provides the type of information that is critical to learning how to increase the use of biocontrol in orchards and other cropping systems.

- Diane Alston, Entomologist

Nematodes, continued from previous page

Table of nematode species suitable to certain pests (adapted from Cornell).

Pest	Key Crop	Nematode species to consider
Armyworms	Vegetables	*Steinernema carposapsae, S. feltiae, S. riobrave*
Billbugs	Turf	*Heterorhabditis bacteriophora, S. carpocapsae*
Black cutworm	Turf, vegetables	*S. carpocapsae*
Fungus gnats	Mushrooms, greenhouse	*S. feltiae, H. bacteriophora*
Scarab grubs	Turf, ornamentals	*H. bacteriophora, S. carpocapsae*
Strawberry root weevil	Berries	*H. marelata*

There are several factors to consider from the supplier to the application and management compatibility when using entomopathogenic nematodes so that they successfully aid in pest suppression. Taking these precautions, however, can help add beneficial nematodes to a yard and garden pest management program.

- Ricardo Ramirez, Entomologist

For More Information:

University of Massachusetts fact sheet: Biological Control: Using Beneficial Nematodes.

Cornell University fact sheet: Biological Control - Nematodes.

Arthropod Traps for the Home, Garden, and Agriculture

This is the first in a two-part series on common methods to trap and exclude insects and their relatives. This article will focus on ways to attract and trap arthropods for both monitoring and management purposes. The next issue will cover common exclusion devices to keep arthropods out of buildings and away from plants.

To successfully use traps, there are two basic requirements: the arthropods must move, and the trap must hold them after capture. An advantage in using traps is that they can be set in place and left to catch arthropods 24/7 for a period of time. Traps can be attractive or passive. Attractive traps rely on visual and/or chemical cues; passive traps intercept arthropods as they move about.

Visual Traps

A blacklight trap attracts a variety of night-flying insects that are visually attracted to short wavelengths, including moths.

Light, color, contrast, and shape are common visual attractants used in insect traps. Light traps are used to detect and monitor populations of moths, mosquitoes, and other insects, including the invasive brown marmorated stink bug. Because many insects are attracted to short wavelengths, or ultraviolet light, traps that include a blacklight lamp are useful in attracting a spectrum of insects, especially noctuid moths (e.g., corn earworm, cutworm, armyworm). For mosquitoes, the addition of dry ice and a fan or suction increases the trap's effectiveness. A downside of blacklight traps is a lack of selectivity; if used for monitoring specific insects, the bi-catch (non-target insects) can flood the trap and make it difficult and time-consuming to identify the insects of interest. Blacklight traps can also attract beneficial and aquatic insects important as biocontrol agents and food for wildlife, respectively. The "bug zapper"-style of trap is an example of a light trap used for insect population reduction. After many years of availability, the effectiveness of bug zappers in reducing mosquito and other pest insect populations is still hotly debated.

White, yellow, and blue-colored traps can be visually attractive to insects. Why? Light, bright colors reflect more ultraviolet light, which is attractive to insects. Instead of seeing green color reflected from the leaves of plants as humans do, insects see hues of yellow and blue. The color of reflected light that humans see as yellow (wavelength 500-600 nm) is a major component of light reflected from plant surfaces, especially from new growth. Sticky cards colored yellow, blue, and white can be used to attract and kill flying insects, such as thrips, whiteflies, aphids, and fruit flies. Colored sticky cards can be used to monitor and reduce populations of insects in greenhouses, indoor plantscapes, and some horticultural crops. But all things seem to have their downsides; these colors are also attractive to pollinators. For example, to avoid trapping honey bees in orchard insect pheromone traps, the use of orange versus white colored delta traps decreases pollinator kill. Insects do not see the color orange.

Contrast and shape can also be visually attractive to insects. For example, the brown marmorated stink bug and many tree-attacking beetles are attracted to a black column-shaped trap. The tall, dark shape of the trap simulates the contrast of a tree trunk against daylight. Typically odor lures are added to draw the insects into the trap container once they climb onto or fly into the trap base. The Manitoba trap utilizes a large, dark sphere suspended under a transparent cone for collection of biting flies. The Manitoba trap, and its many variations, mimic moving livestock to the flies.

Bait Traps

Bait traps rely on an insect's sense of smell for attraction. Food, attractive host plant odors (called kairomones), and mimics of insect pheromones (chemicals used for

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Arthropod Traps, continued from previous page

communication within a species) are the most common baits used in traps. To trap pesky European paper wasps to keep them off ripening fruit, a homemade pop-bottle trap containing fruit juice, yeast, and ripe fruit attracts them inside to their death (click here for a how-to video).

A pop bottle trap containing fruit juice and yeast attracts the European paper wasp.

Many fruit-feeding flies are attracted to vinegar-related scents. A homemade trap of a cup filled with apple cider vinegar lures vinegar (drosophila) flies away from egg-laying activity on ripe fruit in the home. The cherry fruit fly is attracted to yeast, sugars, and ammonia; a commercial attract-and-kill product, GF-120, contains these food baits and an ultra-low dose of spinosad insecticide.

The sex pheromone of many moth species has been identified and used in traps to selectively monitor agriculturally important pest species. For example, codling moth (causes "wormy" apples) males are highly attracted to the female's sex pheromone called codlemone. But alas, only the males are caught in traps, and so it is an effective monitoring tool, but not effective for control.

Beetles, like moths, can be trapped using pheromones. A recent invasive insect to Utah, the Japanese beetle, is effectively trapped with a combination of rose floral scent and the beetle's pheromone. Bark beetles have been monitored and repelled from valuable conifer trees, such as at cabin sites and in campgrounds, with the use of aggregation pheromones, attractive host plant chemicals, and repellent pheromones. The interactions among bark beetles, their host trees, and behavior-modifying chemicals is complex and not yet well understood; thus, there can be a fine line between attraction and repellency, and use of these chemicals for bark beetle control is tricky.

Passive Traps

The color yellow attracts flies, and a shallow yellow pan with soapy water can be used as a fly trap on windowsills.

In the home, sticky boards placed along baseboards and behind doors and furniture, can be highly effective in reducing populations of active spiders, such as the hobo. Sticky traps can also be placed in locations with high insect activity to trap insects on the adhesive for sampling or control.

Window and water-pan traps can monitor or control flying insects around the home. A window trap is made from a piece of glass attached to a trough filled with soapy water. When placed in an insect fly-way, insects that hit the glass slide down into the trough. Water pan traps are made from a basin painted yellow or blue and filled with soapy water.

There are a variety of passive traps used in natural and agricultural settings. A Malaise trap is an open-fronted tent made from mesh fabric, that traps insects in their fly-ways. Tall pipe-style suction traps are used to sample insects flying

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Utah's common assassin bug, the masked hunter, can occasionally find its way inside homes where it may bite someone. (Outdoor and indoor lights attract the bugs to buildings.) Masked hunters are known to bite areas around the lips and are sometimes referred to as kissing bugs; however, they are not the true kissing bugs in the Triatominae subfamily, and they do not feed on human blood. Bites can cause localized swelling and pain similar to a bee sting, but rarely need medical attention beyond basic first-aid. Bites normally occur from mishandling this insect, but its nocturnal habit also predisposes people to bites while sleeping. Keep in mind that handling any assassin bug could result in a bite.

Many people are familiar with assassin bugs. They are known as being a beneficial insect predator. While assassin bugs are mostly good, there are a few members of this family that can bite humans. Utah's most common biting assassin bug is the masked hunter, *Reduvius personatus*.

Every year the UPPDL receives a few calls or samples of masked hunters. Usually, people are concerned because they received a bite from this insect and they are afraid they will contract Chagas disease. Chagas disease, also called American trypanosomiasis, is a parasite (*Trypanosoma cruzi*) that is spread through the feces of a group of blood-feeding assassin bugs, also known as "kissing bugs." It is not spread through the masked hunter, which is not a true kissing bug.

In the U.S., there are 12 species of kissing bugs, and they occur primarily in southern states. Only 7 cases of Chagas originating in the U.S. have been reported, and they occurred in Texas, southern California, Tennessee and Louisiana. Two species, the western conenose bug (*Triatoma protracta*) and *T. navajoensis*, are found in Utah; however, no cases of Chagas have been reported from the state, and according to the Utah Dept. of Health, Chagas is not considered a "reportable disease" in Utah.

Margarethe Brummermann, bugguide.net

The western conenose bug is a species of "kissing bug" found in Utah. Although it can bite, it is not known to spread Chagas disease in the state. It looks similar to the masked hunter.

Masked hunters are predators of many insects, and have been reported in the nests of bats and swallows, feeding on bat and swallow bugs. They have also been found preying upon bed bugs indoors, however they are not a potential biocontrol.

Eggs of masked hunters are laid singly or in clusters and hatch within 8-30 days. The young nymphs pass through 5 immature stages before becoming a winged adult. Developmental times depend on the availability of food and temperature, but one generation per year is normal.

Whitney Cranshaw, Colorado State University, Bugwood.org

The term masked hunter comes from the habit of the nymphs to camouflage themselves in dust and dirt from the surrounding environment.

Masked hunter populations rarely reach large numbers within a home and typically only a few are found per year. If large numbers exist, it is likely that another insect population (food source) is attracting and sustaining them.

Because masked hunters are usually solitary, chemical treatment is not recommended. Instead, the insect should be safely captured and frozen, submerged in alcohol, or crushed with a shoe or rolled newspaper. Do not handle the insect as that can result in a bite. Masked hunters feed on other

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insects, so controlling other insect populations within the home is a first step. A mixture of sanitation and exclusion techniques will help keep all insect presence low:

- Vacuum cracks and crevices and other dark, dry areas where masked hunters hide during the day.
- Sweep the garage, even under shelves and other insect-preferred areas.
- Make sure all door sweeps leading outdoors or into the garage are in contact with the ground throughout their length, preventing access to the home.
- Seal cracks and crevices where masked hunters could hide during the day.
- Change external lighting to sodium vapor bulbs to dissuade insect attraction.
- Use sticky monitoring traps indoors to pick up wandering masked hunters and to monitor for other insects.

Target masked hunters in garages, crawl spaces, and in the home with an appropriately labeled pyrethroid insecticide only if populations are large.

- Ryan Davis, Arthropod Diagnostician

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Arthropod Traps, continued from page 8

A linear pitfall trap is used by USU entomologists and turf managers for monitoring billbugs in turf.

over fields. Pitfall traps placed in the ground can be effective for sampling and controlling ground-dwelling arthropods. The pitfall trap consists of a collecting bottle buried in the ground with a funnel placed at the soil surface. A fluid, such as glycerin or ethanol, can be added to kill the insects that fall into the trap. A rain-roof can be added to keep pitfall traps from flooding.

There are many styles of traps; one can be designed to capture most types of arthropods in many situations. Much information can be found online. Many types of traps are sold as insect and spider control devices. Refer to university and other educational websites for recommendations on effective traps; don't just believe all that you read on a sales website. For those interested in making an insect collection, there are a number of excellent websites that provide tips on insect trapping. Just search online by "how to make an insect collection." Traps can be a low-cost, low-toxicity method to monitor and reduce populations of insects, spiders, and other arthropods around the home, garden, and in agricultural settings.

- Diane Alston, Entomologist,

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Summer Fire Blight Management

Most fire blight infections occur in spring from bacteria transmitted by bees to blossoms. But the bacteria can also be spread by water when it comes in contact with bacteria oozing from existing cankers and by using pruning tools. Bacterial infections from splashing water and pruning tools can occur year round. All the bacteria need is a tiny opening in the succulent leaf or twig tissue to enter the plant. Hail, strong winds, or even the act of pruning can wound the foliage, and bacteria splashed by water on leaves can enter through those wounds and cause new infections.

Some varieties, such as Fuji and Gala apples and Bartlett Pear, are more susceptible than others. On susceptible trees, the bacteria will move through the vascular tissue more quickly, from the infected shoot toward the main trunk. More and more of the branch will die as time progresses. Eventually, when the bacteria reach the trunk, the tree may die.

Correct pruning of infected shoots is an excellent way to reduce fire blight in an orchard. In the spring, removing infected shoots soon after the symptoms appear reduces dieback, as the bacteria will be stopped before they can move too far inside the branch. Since visible symptoms lag behind the advance of the bacteria, infected branches should be cut 12 inches beyond the visible dead shoot to remove all bacteria and stop the infection.

It is important to decontaminate the surface of pruning tools between cuts, using disinfecting wipes or dipping the blades in a 70% alcohol solution. In the USU plant pathology lab, we tested the effect of using disinfecting wipes on their ability to clean bacteria off tools and to prevent bacterial spread through pruning cuts. We sprayed the cleaning tools with a solution of fire blight bacteria, and found that the disinfecting wipes removed over 90% of the bacteria. To test spread of bacteria through contaminated pruning tools, we sprayed blades with a bacterial solution and cut into healthy branches. Almost 50% of the branches cut with contaminated blades became infected. None of the branches cut with clean blades did.

- Claudia Nischwitz, Plant Pathologist

For more information, check out our fire blight management fact sheet.

The USU Pathology Lab tested the spread of fire blight through contaminated pruners, and found that 50% of the branches cut with the pruners became infected with fire blight. Symptoms included bacterial oozing (***top***), and wilting (***bottom***).

In the National News

BED BUG NANOTECHNOLOGY

The Center for Advanced Technology in Sensor Materials at Stony Brook University, New York, has produced an innovative new nanotechnology product that traps bed bugs. The product is a microfiber that is several million times more dense than fabric, and could be used for sheets and mattress or furniture covers, or other products. The material's "entanglements" become interwoven with the structures of the bed bug, stopping them in their tracks until death. The microfiber is safe for humans and pets and unlike chemical treatments, the insects cannot develop a resistance to it. This patent-pending technology is being commercialized by Fibertrap, a private company that employs non-toxic pest control methods.

FLOWERS IMPROVE PREDATOR DIVERSITY

Entomologists at Washington State University recently published research work in the journal Biological Control, showing the power of flowers to suppress orchard pests. They found that plantings of sweet alyssum attracted a host of spiders and predatory bugs that in turn preyed on woolly apple aphids, a pest that usually requires chemical sprays. After one week, they found that aphid densities decreased considerably in the apple trees with alyssum versus the trees without the flowers. Previous studies showed that alyssum attracted the most syrphid flies, an important predator of aphids. But they found few syrphid fly larvae eating the aphids. To discover the other aphid predators, and whether alyssum was attracting them, researchers sprayed the flowers with a protein marker and captured predatory insects and spiders in nearby traps. Many of the captures, including wasp parasitoids, lacewings, minute pirate bugs, lady beetles, earwigs, and spiders were marked with the protein. This study shows that sweet alyssum can be an appealing best management practice for organic growers since it can aid in aphid suppression.

OZONE POLLUTION SLOWS INSECT FORAGING

Ozone pollution is known to injure plants, but researchers at Pennsylvania State University and the University of Virginia have also shown that insects are also adversely affected. Using the striped cucumber beetle as an example, they found that the beetle was unable to identify cucurbit plants that were affected by ozone. Volatile organic compounds that are normally secreted by the plant and used by the insect for identification, are destroyed by the ozone. This result may help to explain declining insect communities in some parts of the world. The researchers commented that plants that rely on insect pollination can also be negatively impacted for the same reason.

WHY THE ASIAN LADY BEETLE IS A SUCCESSFUL INVADER

The Asian lady beetle was introduced to the northeastern U.S. by the USDA in the late 1970s to control scale and aphids. It is now spreading uncontrollably, threatening to outcompete native lady beetle species. To investigate its success, entomologists from the University of Giessen and the Max Planck Institute for Chemical Ecology in Germany looked for answers. They found that a microsporidia (fungus-like parasite) lives in the beetle's hemolymph. In addition, the Asian beetle has a strong immune system capable of producing antibiotic and antimicrobial substances. All ladybug species compete for food, sometimes eating each other. Native lady beetles that eat Asian lady beetles or who are exposed to secretions from the Asian beetle's hemolymph are killed by the microsporidia, providing a clue to the ecological success of this insect.

BEES KILLED BY PESTICIDE

Thousands of bumble bees were inadvertently killed by a misapplication of a pesticide called dinotefuran (Safari), to treat aphids. Linden trees in bloom were treated in two commercial locations outside Portland, OR. The pesticide label specifically states that the product should not be applied to blooming plants. As a result, the Oregon Department of Agriculture has placed a ban on the use of all pesticides on plants containing dinotefuran for at least 180 days while they investigate.

HOUSE MAKES STINK BUG PUBLIC PEST NO. 1

The brown marmorated stink bug has invaded 39 states, and the worst is feared for the coming season. On June 13, 2013, House lawmakers signed a spending bill directing four agencies within the USDA to expand research to reduce stink bug damage, and orders the Animal and Plant Health Inspection Service to implement biological control technology. The leader of the bill was Virginia Rep. Frank Wolf.

Useful Publications and Apps

- Working in Entomology, written by Amateur Entomologists' Society member Rachel McLeod, promotes entomology as a profession, and contains a collection of interviews of entomologists and their work.
- The Annual Flower Doctor and Perennial Flower Doctor are two specialized encyclopedia apps from Purdue University, offering gardeners ways to identify and manage plant pests.

Featured Picture of the Quarter

Parasitoid wasps are important beneficial insects. They help regulate the population of aphids, scales, stink bugs, borers, and many other insects. Some wasps parasitize spiders, like the tarantula hawk, shown at left. This adult wasp paralyzes her tarantula prey with a painful sting, drags it to her burrow, and lays an egg inside the spider. As the wasp larva grows, it feeds on the (still living) spider and completes its development inside, emerging as an adult the following summer. The wasp shown here, like most adult parasitoid wasps, requires nectar as a food source. Having a diverse landscape of flowers will attract a wide variety of beneficial insects, including all sizes and shapes of parasitoid wasps.

Image by Diane Alston, Entomologist

Calendar of Events

August 4 - 9, 98th Ecological Society of America Annual Meeting, Minneapolis, MN, www.esa.org/meetings/upcomingmeetings

August 10 - 14, 2013 American Phytopathological Society Annual Meeting, Austin, TX, www.apsnet.org

August 11 - 24, Planning and Implementing Sustainable IPM Systems, Corvallis, OR, oregonstate.edu/conferences/event/

August 14-17, The Second International Conference on Pollinator Biology, Health and Policy, State College, PA, www.cvent.com/events/international-conference-on-pollinator-biology-health-and-policy/event-summary

August 18 - 21, 57th Annual Conference of the Association of Structural Pest Control Regulatory Officials, Atlanta, GA, www.aspcro.org/?q=upcoming

September 4 - 6, International Conference on Entomology 2013. Orlando, FL, www.omicsgroup.com/conferences/entomology-2013

October 2 - 3, Extension Sustainability Summit, Park City, UT, wrdc.usu.edu/htm/programs/ess
The Extension Sustainability Summit was designed by Extension educators, for Extension educators, to assess what major environmental sustainability programs are currently being delivered through Cooperative Extension, and to envision our future direction.

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