UTAH PESTS News

Utah Plant Pest Diagnostic Laboratory and USU Extension Vol. X, Summer 2016

What's Inside

utahpests.usu.edu

5 Tips for Controlling Mosquitoes in Water Features

Shallow water features with standing water can be breeding grounds for mosquitoes. The larvae breathe through siphoning tubes at the surface of the water (shown below), so anything that breaks the surface (moving water, oil) can prevent larvae from surviving.

The downside to backyard beautiful water features is that some types can be a breeding ground for mosquitoes. Females lay eggs in or next to standing water, and the hatched larvae feed on organic debris, including algae. The larvae are air breathers with a breathing tube like a snorkel (click here for a video of this in action). They periodically must break the water surface to breathe. The larvae spend 5 to 14 days in the water and then pupate into the familiar biting adults.

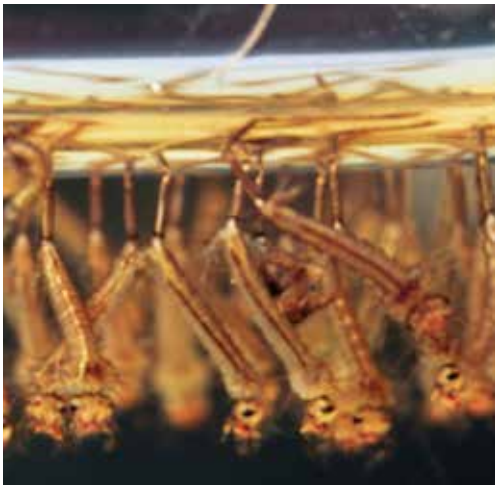
The Utah Mosquito Abatement program enacts safe larval control measures, but sometimes must spray for adults when there is a high possibility of disease transmission (such as West Nile virus). Help prevent the need for these sprays, and avoid the nuisance of mosquitos, by managing water features effectively. (And be sure to remove or treat other stagnant water sources.)

CLEAR THE ENVIRONMENT

Larvae need organic debris, including algae, not only for feeding, but for protection. Remove excess vegetation and install a pond skimmer, or regularly use a skimmer net to remove debris.

MAKE THE WATER DEEP

Mosquito larvae survive best in shallow water. Even one ounce of standing water can support a population of larvae. Water features that are deeper than 2 feet with vertical walls are less likely to be breeding grounds.



ADD FISH AND PROMOTE PREDATORS

Where feasible, add fish to your water feature. A handful of minnows can consume their weight in mosquito eggs in under a week. Promote beneficial bacteria, nematodes, and insects such as dragonflies and backswimmers that feed on mosquito eggs and larvae, by stopping use of broad-spectrum insecticides and synthetic fertilizers.

continued on next page

UTAH PESTS Staff

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

Cami Cannon
Vegetable IPM Associate
cami.cannon@usu.edu
435-797-2435

Ryan Davis
Arthropod Diagnostician
School IPM Associate
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

UTAH PESTS News
is published quarterly.

To subscribe, click here.

utahpests.usu.edu

EXTENSION
UtahStateUniversity

Mosquitoes in Water Features, continued from previous page

DISRUPT LARVAL ACTIVITY

Bubblers, fountains, water-wigglers, and waterfalls increase water circulation and prevent mosquito larvae from coming to the surface to breathe.

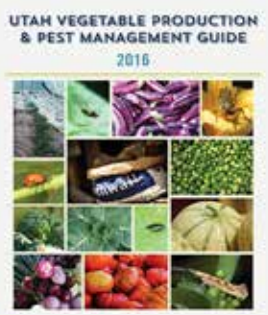
If the water is not needed for plant growth or for birds or mammals to drink/bathe in, apply a small amount of a vegetable-based oil to coat the surface of the water and reduce surface water tension. The oil will prevent larvae from penetrating the surface for breathing, and will also prevent newly hatched larvae from getting food below the water.

USE BIOLOGICAL CONTROL

Some water features that can't take fish, have lots of plants, or have standing water, may require further intervention with larvicides. The naturally occurring bacterium, *Bacillus thuringiensis israelensis* (Bti), specifically targets larvae of mosquito and related insects (fungus gnat, black fly). It is sold as various brands, including Mosquito Dunks, Mosquito Bits, and Microbe-Lift. The larvae ingest the Bti, and are killed within a few days. Bti affects only fly larvae, so it won't harm predatory insects living in the pond or water feature, or birds or mammals that ingest the water.

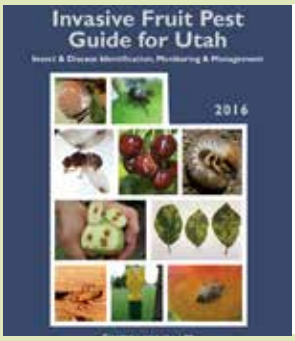
Marion Murray, IPM Project Leader

New Utah Pests Publications



The Utah Vegetable Production and Pest Management Guide has been greatly expanded in the new 2016 edition (click title for link to pdf). The guide includes production (soil prep, planting, weed control, harvest, storage) and pest information (conventional and organic treatment options) for:

brassicas • corn • onion
cucurbits (cucumber, pumpkin, squash, melons)
solanaceous crops (tomato, potato, pepper, eggplant)



The Invasive Fruit Pest Guide for Utah is a new publication that will help fruit growers to be prepared for possible pest outbreaks (click title for link to pdf). Many of the pests included in the book have been found in Utah, but have not yet caused economic damage, and include:

brown rot • plum pox virus • spotted wing drosophila
brown marmorated stink bug • velvet longhorned beetle
Japanese beetle

Leaf Mold on Tomato Common in Spring 2016

Leaf mold of tomato is caused by the fungus *Fulvia fulvum*. Several plant samples have been sent to both the Utah Plant Pest Diagnostic Lab and the plant pathology lab this year that were identified with this disease. This year's outbreak is likely due to Utah's rainy May and early June, and the subsequent high humidity.

Fulvia needs humidity of 85% or higher to infect leaf tissue. The preferred temperature for infection and growth is about 77°F, but the fungus can grow at temperatures from 40°F to 94°F. Therefore, the disease can be especially problematic in high tunnel or greenhouse situations. Fulvia produces spores that can survive for up to one year in crop residue. There have been reports that Fulvia can be seedborne.

Early symptoms consist of yellow spots on the upper side of leaves with brown lesions on the underside. Over time, as high humidity persists, spores will be produced on the lesions on the underside. Severely infected leaves will eventually die.

There are several options for management and a combination of them would provide the best control. Fungicides should be applied weekly and thorough coverage of the foliage is important. Fungicides with fair to good efficacy registered in Utah are Inspire Super, Revus Top, copper-based products, and Gavel 75D.

Cultural controls are very important in managing this disease. Reducing the humidity to under 85%, with increased air movement between plants, reduces leaf infections. At the end of the growing season, plant debris should be removed to reduce inoculum for the following season. Surfaces in greenhouses or high tunnels such as trellises, stakes, and benches should be sterilized with a 10% bleach solution. When growing transplants, the use of disease-free seed is important. Many companies will provide information on the diseases that have been tested on their seed.

Although there are some resistant tomato varieties, they are only resistant to certain races of Fulvia. Fulvia is a fungus that frequently mutates and produces new races against which the current resistant varieties would be of no use. A list of resistant varieties is available in this Cornell University publication.

Claudia Nischwitz, Plant Pathology Specialist

Early symptoms of leaf mold include yellow spots on the upper side of leaves with brown lesions on the underside (***top***). Over time, as high humidity persists, spores will be produced on the lesions on the underside (***middle***). Later symptoms include circular necrotic lesions with a yellow halo (***bottom***).

14 Ways to Manage Weeds Without Chemicals

Canada thistle weed seeds ready to disperse.

In addition to being a nuisance, weeds may harbor pest insects and diseases. Using non-chemical practices to manage weeds can supplement an overall integrated pest management approach by attacking three birds (weeds, pests, and diseases) with one stone.

1. Identify the weed "hot spots" on your farm.

2. Know your weeds. For example:
- Annual or biennial weeds must be destroyed before they flower (and release seeds).
- Some perennial weeds like quackgrass can grow (and spread) from individual plant segments that have been cut via hoeing or disking.

3. Prevent spread.
- Clean weed seeds from farm machinery between fields.
- Discuss weed seed contamination with your supplier of forage seed, straw, hay, compost, or manure.
- When possible, use farm-generated soil amendments to reduce foreign weed seed introductions.

4. Reduce weed pressure. Manage your weed seed bank, and keep weeds from going to seed.
- Reduce weed influx by mowing or harrowing alleys and field edges.
- Thoroughly compost animal manures to kill off weed seeds or avoid using manure altogether.
- Mow adjacent areas and field edges to prevent weed seeds from blowing into your fields.
- Clean your seed (especially cover crop seed) with common cleaning practices such as screening or fanning.

5. Diversify crop rotations. As C.E. Leighty put it in the 1938 Yearbook of Agriculture, "Rotation of crops…is the most effective means yet devised for keeping land free of weeds." Rotating crops and altering planting dates will disrupt weed life cycles and prevent weeds from adapting.
- Protect poor-competitor plants (e.g. slow growing carrots or alliums) by planting them after crops that reduce weed populations (e.g. lettuce that is harvested before weeds go to seed, or a competitive cover crop that smothers weeds).
- Diversify your production by rotating areas between crop groups with differing characteristics.
- Follow weedy crops like squash (vines make it difficult to cultivate), with a crop like potatoes (easy to cultivate) or lettuce.

6. Group crops with similar management.
Grouping crops by vegetable family, row spacing, cultivation, tillage, mulches, etc., can help save time and money. For example:
- Tomatoes, peppers, and eggplants may be mulched with black plastic and when grouped together, all the plastic can be placed at once.
- Plants with the same spacing can be mechanically cultivated as an entire row.
- Common groups for weed management are:
  - Brassicas: cabbage, broccoli, cauliflower
  - Cucurbits: summer/winter squash, cucumber
  - Greens: spinach, lettuce, chard, kale
  - Legumes: peas, beans
  - Roots: carrots, beets, turnips
  - Solanaceous crops: tomatoes, peppers, eggplants

7. Use the correct cultivation equipment.
- Adjust machinery settings each year to ensure proper function before you begin cultivation.
- Plan bed and row spacing that will optimize the efficiency of your tools.

8. Till and cultivate at the right time.
- When planning seeding and transplant dates, create a weed control calendar at the same time. This calendar will serve as a reminder and help you hit the windows of opportunity for cultivation.
- Till weeds in the first few weeks of crop growth, during the "critical weed-free period," especially when they are just emerging and before you can see their leaves. This

continued on next page

14 ways to manage weeds, continued from previous page

is also known as the "white thread stage" because the weeds look like white strings in the soil.
- For a list of weed-free periods for vegetable crops, see pg. 15 of this NC State publication on organic weed management.

9. Manage crops to outcompete weeds.
- Choose the right cultivar for your area and specific needs.
- Use transplants when possible.
- Use high quality crop seeds with vigorous growth.
- Seed at the right time with uniform and proper placement.
- Ensure crop health with proper nutrient and soil management.

10. Use mulches and cover crops.
- Apply mulches to give crops a competitive advantage.
- Use cover crops during a transitional period or fallow-year rotation.

11. Irrigate effectively.
- Bury drip irrigation to provide moisture to the crop and minimize water available to weeds that are close to the soil surface.

12. Feed the crop, not the weeds, by properly timing and applying fertilizer.
- Side-dress or band more expensive fertilizers at low rates when planting.
- Primarily rely on green manures and/or compost to release nutrients in the middle of the season.
- Avoid pre-plant broadcasting of soluble nutrients that may be more readily used by fast-growing weeds than slow-growing crops.
- Make fertilizer applications near the crop rows where it is more likely to be captured by the crop.

13. Consider stale seed beds or stale rows.
- Just before planting, till seedbeds, and allow weeds to germinate with irrigation (or rainfall). Kill young weeds with shallow cultivation, flame weeding, or other non-selective method.
- Success with the stale seedbed technique depends on the time of planting and the spectrum of weeds present.
- Use flame weeding to protect slow-to-germinate crops like carrots and alliums. The advantage of flaming over tilling is that flaming does not disturb the soil which can bring up new weed seeds for germination.

Weeds can be alternate hosts to vegetable insects and diseases, such as flea beetle on this leafy spurge.

- For more information on flame cultivation see this publication from NC State University on organic weed management.

14. Solarize/sterilize the soil.
This method is more effective against perennial weed control and may not be practical in some cases because part of the land is taken out of production during the summer. However, some solarizing plastics can be left in place while cash crops are planted through the plastic after solarization is complete.
- During the summer months, place black or clear plastic mulch (0.03-0.08 inches thick) over tilled, moist soil to kill germinating weeds. Ensure that the plastic fits tightly over the soil and that the soil reaches the recommended temperatures of 140°F at a depth of 2 inches and 102°F at a depth of 18 inches. Leave plastic in place for 6 weeks or longer.
- For more information on soil solarization, see this publication from UCDavis.

Each of these methods may not be very effective alone, but can be quite powerful when combined. Be sure to compare the success of different combinations, to know what works on your farm. Integrating the cultural tactics listed above to reduce the number or size of weeds by 5 to 10 percent can provide significant and often low-cost control of weeds.

Cami Cannon, Vegetable IPM Associate

Other Resources:

Creating a Weed Plan for Your Organic Farm (Penn State)
Weed Management for Organic Crops (UCDavis)
Weed Management in Organic Cropping Systems (Penn State)

Lygus, a Disrupter of Alfalfa Seed Production

Late instar nymph and adult lygus bugs are the most damaging, using their stylet to pierce seeds in developing pods, resulting in seed that is not viable.

Although Utah does not have the vast acreage of alfalfa seed production it once had, the areas that still produce seed must deal with lygus bugs. Lygus are true bugs having piercing-sucking mouthparts with nymph and adult stages that feed on a variety of plants. They are damaging as an agricultural pest because they pierce plant terminals and stems, resulting in stunting and abnormal plant growth. Toxins in their saliva affect flower buds, and direct feeding on the buds and developing seeds can result in premature bud shedding, shriveled seeds, and reduced seed viability. They affect many seed crops besides alfalfa, including ornamental perennials such as penstemon and lupine. Alfalfa seed producers in the West have reported that lygus is a persistent and serious pest.

Lygus' broad host range makes it difficult to manage because weeds like Russian thistle, kochia, and weedy mustards can be good hosts. Alfalfa appears to be a preferred host, particularly when in the reproductive stage. Lygus are highly mobile and have been seen migrating from newly harvested alfalfa fields to nearby cotton fields. Therefore, important management strategies for alfalfa seed production include targeting lygus at initial feeding sites, weed management of field edges, and management in alfalfa hay.

Monitoring prior to bloom and seed maturation with a sweep net has been recommended for making management decisions. An economic threshold of 4 or more lygus per sweep prior to pollinator release and bloom has been recommended as a general guideline for considering insecticide treatment. During bloom to seed set, the threshold increases to 8-10 lygus per sweep, and then to 10-15 when alfalfa seed is set and maturing.

Insecticides are one of the primary means of management in alfalfa seed production. Pre-bloom applications have included broad-spectrum insecticides, namely organophosphates and pyrethroids. Continued use of these products over many years have reduced their efficacy and increased issues with lygus resistance, demonstrating the need for chemical rotation. The options become more critical as the alfalfa bloom period starts because of insecticide toxicity to pollinators and other beneficial insects.

Recent trials conducted in Idaho evaluated several insecticides (Assail, Capture, Beleaf, Rimon, Transform, Warrior, and Grandevo) for lygus management during alfalfa bloom. Most of the treatments had their greatest effect on nymphs. Compared to Capture (bifenthrin), other insecticides had considerably less effect on predators and on the alfalfa leafcutting bee. It is noteworthy that Rimon (novaluron), which appeared safe on adult alfalfa leafcutting bees, was found to be toxic to the leafcutting bee larvae. Although the biopesticide, Grandevo (chromobacterium), appeared to be soft on leafcutting bees, it did not provide adequate suppression of lygus nymphs or adults at the recommended 2 or 3 lb rates. Finally, the trials showed that two applications of Transform (sulfoxaflor) was found to provide equal or better lygus suppression and seed yield compared to two applications of Beleaf (flonicamind) or Warrior (lambda-cyhalothrin).

Transform was approved in 2013 for use in several crops. However, in 2015, it was revoked because of the growing concerns about potential hazards to bees. Given the continually high lygus pressure and effectiveness of Transform against lygus, western states have attempted to gain EPA approval for emergency use in alfalfa seed production. All requests were denied because EPA issues approvals only when it can be shown that the lygus pressure has increased, the available products are not effective, and economic losses on alfalfa seed yield increase dramatically as a result of lygus pressure. As management options become more limited, it is important that growers, extension faculty, and researchers work together to continually gather data on lygus to improve management solutions.

Ricardo Ramirez, Extension Entomologist

Resources

USU Extension Lygus Bug Fact Sheet
University of Idaho Lygus Efficacy Trial
High Plains IPM: Lygus Bugs

Protect and Promote Native Bees in Utah

Utah is a mecca for native bees. About 1,000 named species live in the state, and their diversity is tremendous. Native bees pollinate a cornucopia of native, food, and ornamental plants in our environment. Bees help keep our 'Gardens of Eden' blooming. However, urbanization can take a toll on reducing their habitat and preferred food sources. Gardeners and landscapers can mitigate these negative impacts by taking simple steps to help our native bees thrive.

Native bees require two primary resources: food and nesting sites. Unlike honey, bumble, and some sweat bees, most native bees live a solitary lifestyle. They may aggregate in popular nesting sites, but each female provisions her own nest. She will typically lay her eggs singly in cell-like structures made of mud or leaves, and provision her offspring with a ball of nectar and pollen. The larva consumes this provision during development within its cell. Many native bees have only one generation per year, and their activity period coincides with bloom of their preferred plants. It is easy to see how destruction of certain flowering plants in a given area due to development or other human-caused activities can greatly harm local native bee populations, especially for highly specialized species of bees that visit only one or several types of flowering plants.

Dr. Jim Cane with the USDA-ARS Pollinating Insect Research Lab in Logan, UT, wrote two very useful fact sheets for USU Extension on attracting and enhancing native bee populations, and they are described below.

Projects to encourage and observe native bees are well-suited for youth and gardening clubs, as well as to the individual gardener. So take a look at these two informative resources, and go out and protect and promote native bees in Utah!

Diane Alston, Entomologist

Gardening for Native Bees in Utah and Beyond

This fact sheet (click on title for link to document) focuses on the selection of suitable flowering plants for the garden and landscape. It includes a comprehensive plant list and calendar of plant bloom and native bee activity times. By selecting plants from the list, you can enhance native bee populations in your local environment.

Left: The European carder bee is attracted to lamb's ear.
Top: Male *Melissodes* bees get pollen from, and "spend the night," in sunflowers.
Bottom: Pollinator gardens should contain a mix of season-long blossoms.

continued on next page

Protect and Promote Native Bees, continued from previous page

Gardening and Landscaping Practices for Nesting Native Bees

This fact sheet (click on title for link to document) provides an overview of gardening and landscape practices that enhance native bee nesting populations. For example, attractive substrates for some ground-nesting bees include stream pebbles and cobbles rather than bare ground. Weed barrier fabrics and thick mulches are impenetrable to bees, thereby discouraging their nesting activity. Sprinkler irrigation can also inhibit bee nesting. Adjust irrigation times to the evening and night when bees are within their ground nests, or switch to water-conserving drip irrigation. Promote twig- and stem-nesting bees by leaving dead hollow twigs, such as those of forsythia, raspberry, or bamboo. Wooden blocks drilled with holes will attract cavity-nesting bees.

Top: Nest with cocoons of the bee *Hoplitis sambuci* excavated in the pith of a dead sumac twig.

Middle left: River pebbles provide an ideal nesting substrate for *Halictus rubicundus* bees, and is an attractive landscape mulch.

Middle right: Drilled wooden nest block with paper straw liners filled with mud nests of the blue orchard bee.

Bottom left: Brilliant green *Agapostemon* bee emerging from a ground nest in a suburban lawn.

All images on this page courtesy Jim Cane, USDA ARS Bee Biology and Systemics Lab, Logan, UT

New Honey Bee Pest Detected in Utah

An invasive pest that has caused economic damage to commercial beekeepers in the U.S. has been discovered in Utah. In April 2016, a single small hive beetle was found in Washington County. The small hive beetle (SHB) (*Aethina tumida*) is native to sub-Saharan Africa, where it is a minor pest in African honey bee (*Apis mellifera scutellata*) colonies. In Africa, SHB damages only weak bee colonies and stored comb; however, outside its native range, it can be a major pest of European honey bees (*Apis mellifera mellifera*). Africanized honey bees are more aggressive than non-African honey bees, and will harass adult beetles inside the hive, keeping the beetles in check.

SHB adults and larvae feed on honey, pollen, wax, and bee brood. The larvae are associated with a yeast (*Kodamaea ohmeri*), which contaminates the honey, causing it to ferment and froth. Honey damaged by SHB becomes discolored (blackened) and develops a smell likened to decaying or rotten oranges. Bees and frames may also appear wet or greasy. Heavily infested colonies may eventually abandon the nest.

SHB was first detected in the U.S. in Florida in 1998 in a commercial apiary, but is thought to have arrived as early as 1996. It has since been found in more than 30 states, and infestations are especially common in the southeast. It is unknown how this pest found its way into the U.S. (and into Utah). Adult beetles are strong fliers and capable of traveling nearly 10 miles on their own. Adults and immature life stages can also be transported by human assistance (e.g., infested bee colonies).

Adults vary in color from tan to reddish brown to a darker brown or black. They have clubbed antennae and are 1/4-inch long and oblong in shape. Adult beetles avoid sunlight and will scatter for cover into corners or fly away when the hive is opened. Eggs are pearly-white in color and clusters can be found in small cracks and crevices of the hive. In weak colonies, eggs may be found directly on brood comb. Larvae are cream-colored with a brown/tan head, and have small spines along their back and three pairs of well-developed legs near their head. They are often found clustered together in the corners of a hive.

To prevent SHB from invading honey bee colonies, keep a healthy and strong colony, as weak colonies are more susceptible to disease and attack. During the summer, inspect hives at least once every 10-14 days for pests and diseases. Bee hives should be kept in a sunny area, away from trees and if possible, on a concrete pad or another soilless surface. SHBs prefer cool, shady spots and sandy soils for pupation.

Top: Small hive beetles are easily visible in a hive among bees.

Bottom: Small hive beetle larvae can introduce a fermenting yeast, damaging honey.

This summer, the Utah Department of Agriculture and Food (UDAF) is leading a survey for honey bee pests, including SHB. As part of this survey, they have placed several SHB traps near the area that the initial detection was found and will also be inspecting nearby apiaries. If you find this insect or suspect you have an infestation, please contact Kris Watson (kwatson@utah.gov) or to request an inspection of your hive, email UDAF-Insects@utah.gov. For more information about Utah's Apiary program, click here for their beekeeping page.

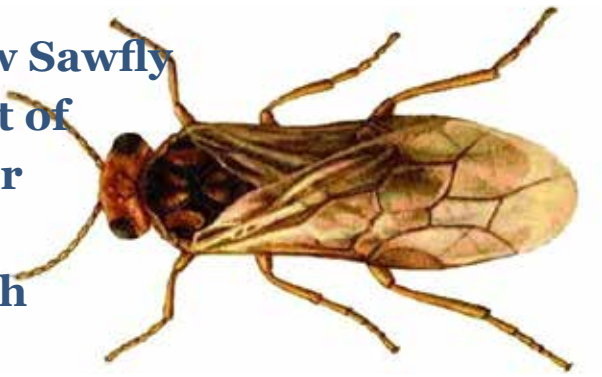
Lori Spears, USU CAPS Coordinator

References

Ellis, J.D. and A. Ellis. 2010. Small hive beetle. EENY-474. University of Florida.

Hood, W.M. 2000. Small hive beetle. Clemson Cooperative Extension.

New Sawfly Pest of Pear in Utah



Hoplocampa brevis was identified from infested pears in Utah County in spring 2016.

When hearing the name "pear sawfly," one may think of the somewhat common gelatinous, leaf-feeding larva on pear and cherry (also known as pear slug). A different sawfly that was newly identified in Utah is also called "pear sawfly" in other parts of the world. To differentiate, it will be referred to as European pear sawfly (*Hoplocampa brevis*) in this article.

In spring 2015, an Orem, Utah grower reported having pear fruitlets with exit holes similar to codling moth. Many fruits were inspected, but no larvae could be found, and no new damage occurred. In spring 2016, the grower again found damage, and sent infested fruitlets to the UPPDL. The diagnostic lab suspected pear sawfly, and it was confirmed with molecular DNA testing.

In North America, EPS was first detected in Maryland and Pennsylvania in the 1960s, in Ontario, Canada in 1964, and in Virginia in 2005. Across the Atlantic, EPS was detected in England in 1934 and is known to inhabit northern and central Europe, Asia Minor, parts of Russia, and Iran.

EPS is a small, fly-like wasp that measures about 3/16 in length. Adult males are said to be uncommon, and parthenogenic reproduction is suspected. The tiny, clear eggs are found in an egg-laying scar below the blossom sepals. Larvae are creamy white with a light brown to dark black head capsule. When mature, they are 1/3-inch long. To see more images of this pest, click on this page.

EPS is a spring pest, but the exact life cycle in Utah is not known. In Italy, it overwinters as a mature larva in the soil, and pupates in the spring. Adults emerge before, during, or after pear bloom. Females lay eggs for 10 to 25 days, inserting them singly inside the base of flowers in a blister-like cavity just below the level of the sepals. Hatched larvae enter the fruit and feed on the flesh and seeds. Some larvae will feed on more than one pear, resulting in a "secondary attack." Larvae feed for up to three weeks before dropping to the ground to overwinter. There is one generation per year.

EPS feed exclusively within pear fruitlets. The damage includes fruit tunneling and frass, and accompanying black decay around the exit holes. Damaged fruits will fall to the ground. Injury may fluctuate from year to year and depends

Fruit infested by a larva of the European pear sawfly may become deformed in shape and do not size up at the same rate as healthy fruit. Sticky brown frass can be seen on the calyx end of the fruit.

Larvae may exit the fruit and move to adjacent fruit, causing a secondary attack. When mature, larvae drop to the ground and diapause in the soil until the following spring, when they pupate to an adult.

continued on next page

New Pear Pest in Utah, continued from previous page

upon the previous year's population, the timing of adult flight and bloom, the level of fruit set, and overwintering conditions. The Orem, Utah grower reported minor losses, but in highly infested areas of Europe, EPS can cause up to 70% loss, primarily on orchard borders.

Conventional approaches to managing EPS in other countries have involved the application of a pesticide at petal fall. In the U.S., there are no products specifically labeled for EPS, but typical dormant or petal-fall treatments for other pests have been shown to be effective in Ontario. The Orem, UT grower reported that he applied dormant oil plus diazinon this spring, and his losses were reduced by about 90%.

For organic control, the use of entomopathogenic nematodes were evaluated in Italy in 2007. The researchers found that when *Steinernema feltiae* was applied as a foliar spray when larvae started exiting fruit, results were comparable to rotenone and pyrethrum. More applicable to Utah is the use of nematodes in the soil. A second part of their study found that applying a mix of *Heterorhabditis bacteriophora* and *S. carpocapsae* to the soil just before larval drop (late May to early June) resulted in zero adult sawfly emergence the following year, as compared to 20 adults in the untreated control.

Utah Pests staff will continue to evaluate EPS in Utah and will establish an acceptable management program for areas affected by this pest. A more detailed look at EPS and management practices will soon be published in a Utah Pests fact sheet.

Ryan Davis, UPPDL Arthropod Diagnostician

References

Afonin, A.N., S.L. Greene, N.I. Dzyubenko, A.N. Frolov. 2008. Interactive Agricultural Ecological Atlas of Russia and Neighboring Countries. Economic Plants and their Diseases, Pests and Weeds [Online].

Antropoli, A., Faccioli, G., and Pasqualini, E. 1994. Relationship between adult captures of *Hoplocampa brevis* Klug (Hymenoptera, Tenthredinidae) and larval infestation. IOBC/wprs Bulletin, 17(4): 1-4.

Curto, G, Boselli, M., Vergnani, S., and Reggiani, A. 2007. Effectiveness of entomopathogenic nematodes in the control of sawfly (*Hoplocampa brevis*) in pear orchards. IOBC/wprs Bulletin Vol 30 (1), pp. 13-17.

Davoudi, Z. 1987. Pear sawfly in Iran. Entomologie et phytopatologie appliquees, 54: 1-2.

Dustan, G. G. 1965. Occurrence in Ontario of the Pear Fruit Sawfly, *Hoplocampa brevis* (Klug). The Canadian Entomologist, 98: 267.

Thomas, I. 1936. On the occurrence in England of the pear fruit sawfly, *Hoplocampa brevis* Klug. Annals of Applied Biology, 23: 633-639.

Virginia Tech. Pear Fruit Page. Last accessed 6-23-16.

Exit holes of European pear sawfly are easily visible, and the edges are typically blackened.

Larvae tunnel through the flesh and feed on the seeds of one or multiple fruits over a period of up to 30 days. Infested fruit drop just before the typical "June drop" period.

In the National News

NON-CROP PESTICIDE EXPOSURE OF BEES

Purdue University entomologists report in *Nature Communications* that honey bees in a Corn Belt location collect the majority of their pollen from non-crop plants, even in areas dominated by corn and soybeans, and that pollen is contaminated with both agricultural and urban pesticides. The study included honey bee hives from a seed-treated corn field, an untreated corn field, and a natural meadow. Pollen was collected weekly for 16 weeks, and found to represent up to 30 plant families and residues from up to 31 pesticides, with fungicides and herbicides dominating. The highest concentrations of pesticides were pyrethroids, followed by neonicotinoids. The authors comment that their findings illustrate how honey bees are chronically exposed to pesticides throughout the season. Little is known about how these pesticide classes interact with one another to affect bees.

"PACE TO PLANT" TECHNIQUE TO REDUCE PLANT STRESS

Urban trees face many stressors, particularly heat from sidewalks, streets, parking lots, and buildings, that can lead to increased pest activity. University of Florida entomologists determined the minimum amount of these impervious surfaces around a tree that can induce stress. The study, published in *Arboriculture and Urban Forestry*, found that trees surrounded by < 33% impervious surface cover (at 25 m) will most likely be in good or excellent condition. Trees surrounded by 33% - 66% are likely to be in fair condition, and trees surrounded by 67% or more tend to be in poor condition. The study proposes the "Pace to Plant" technique to estimate the percent of surrounding impervious surface, which entails walking transects totaling 100 steps in various locations from the planting site. Using their threshold levels of impervious surface, the authors conclude that landscape architects and professionals can plant trees in a way that reduces pest damage and economic loss.

RADISH AS A COVER CROP

Cover crops are plants that are grown during a fallow period to protect soil from erosion, improve fertility, and suppress weeds. University of New Hampshire agronomists report in *Agronomy Journal* that out of eight cover crops tested, forage radish was the most effective in suppressing weeds and increasing soil quality and health. In addition, the cash crop that was planted after the cover crop produced the highest yield in the radish-grown soil. The other crops that were included in the two-year study were annual ryegrass, winter rye, alfalfa, crimson clover, white clover, hairy vetch, and soybean.

NEW BIOCONTROL FOR EMERALD ASH BORER

Emerald ash borer (EAB) has been devastating ash trees throughout eastern North America, and occurs as far west as Boulder, CO. In May 2015, USDA Animal and Plant Health Inspection Service (APHIS) approved the release of *Spathius galinae*, a parasitic wasp native to Russia, as a biocontrol agent. It is one of the most host-specific wasp parasitoids of EAB discovered to date. Research on *S. galinae* was conducted by University of Delaware and Agricultural Research Service entomologists on how to rear the wasps, their environmental requirements, and their ability to find their host. Like many other parasitoid wasps, it locates host larvae first by "sniffing" out infested ash trees, and then by using sensors in their legs to detect the vibrations of larvae feeding underneath the bark. Once a wasp feels the vibrations, it uses its ovipositor to drill through the bark and lays up to 15 eggs on the surface of an EAB larva. The wasp larvae then feed on, and kill, the EAB larvae. Now that the studies have been completed, the rearing process of *S. galinae* has begun at the USDA APHIS lab in Michigan, with releases soon to occur.

PEACHY DEFENSE SYSTEM FOR SEEDS

Pits (seeds) from peaches and other Prunus family plants contain amygdalin, a substance which can degrade into hydrogen cyanide in the stomach. This is nature's way of protecting plant seeds from being eaten by herbivores. Chemists in Zurich have developed a coating for seeds that functions in the same way as this natural model. The coated seed compared favorably with chemically-treated seed in killing larvae of mealworm, Indian meal moth, and the lesser grain borer, all insects that cause considerable damage to wheat stores worldwide. In addition, the coating on the seed did not impair germination, and is biodegradable. The chemists say that using this seed coating is as straightforward as spraying, with similar costs.

SUNFLOWER POLLEN PROTECTS BEES

Native bee species that are artificially fed sunflower pollen often develop poorly, slowly, or not at all. Yet in the wild, many bee species purposefully collect pollen from the sunflower family (including dandelions, daisies, and thistles). Entomologists from the Rocky Mountain Biological Laboratory (RMBL) in Colorado theorized that this specialization confers antiparasite benefits. They observed various cavity-nesting bee species over 4 years and found that those that specialized on sunflower pollen were not attacked by sapygids, common parasitic wasps of bees. Sapygid wasps penetrate the bee nests and lay eggs on the bee eggs. The larvae eat the bee egg, and then feed on the pollen provision. A follow-up study at the RMBL confirmed the pollen specialization when they discovered that the sapygid larvae could not survive on the sunflower pollen.

Featured Picture of the Quarter

Dr. Claudia Nischwitz is always on the look-out for plant viruses, in particular those that affect vegetables, and often finds them on nearby weed hosts. She has identified 13 vegetable viruses (some repeated on different hosts), seven of which are new to Utah.

She recently confirmed alfalfa mosaic virus (AMV) on clover. This disease is not a problem on alfalfa in Utah, but could affect tomatoes, peppers, and beans, and in 2015, caused 15% losses in a Utah potato field. This particular virus is spread by aphids, and her findings show the importance of managing nearby weed hosts of vegetable viruses.

-Image by Claudia Nischwitz, Extension Plant Pathologist

New Publications and Apps

- Koppert Biological Systems sells beneficial insects for greenhouse production. They recently released a mobile app that provides information on pesticide compatibility with biocontrol agents called Koppert Side Effects Guide.
- Pentair Hypro releases Spray It mobile app to identify the right spray nozzle for various chemicals.
- Purdue University is releasing a mobile-friendly "Indiana Soil and Water" series. The first publication focuses on cover crops, with much material also pertinent to Utah.
- University of California's Agriculture and Natural Resources has published the 3rd edition of *Pests of Landscape Trees and Shrubs*. It includes 545 color images, and many new pests
- For weed identification, University of California-Davis provides a comprehensive Weed ID Guide of over 150 weed species. It uses pictures to narrow down the identification.

UTAH PESTS people and programs are supported by:

EXTENSION UtahStateUniversity · WPDN Western Plant Diagnostic Network · NPDN National Plant Diagnostic Network · APHIS · NIFA · UDAF Utah Department of Agriculture and Food