



UTAH PESTS News

Utah Plant Pest Diagnostic Laboratory and USU Extension

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News Highlights

WELCOME TO NEW VEGETABLE IPM ASSOCIATE

Bonnie Bunn recently joined the Utah Pests team to conduct outreach in vegeta-



ble integrated pest management. Bonnie is completing her M.S. in Biology at USU under Diane Alston. She has already made a great impact this summer by running the vegetable IPM advisories, monitoring and trapping for vegetable pests, and expanding our vegetable diagnostics image database. Bonnie will also develop fact sheets, expand our online content, and conduct presentations.

utahpests.usu.edu

First Report of Elm Seed Bug in Utah



In July 2014, the UPPDL received multiple submissions of a small, brown and black insect. We identified it, with confirmation from USDA APHIS, as elm seed bug (*Arocatus melanocephalus*), marking its first official appearance in the state. A native of Europe, the elm seed bug was first identified in the U.S. in Idaho in 2012 and then in Oregon in 2013. While the Utah sample submissions came from Salt Lake County, I also collected and identified this insect in Cache County around the same time. It is possible that the elm seed bug is already widely distributed along the Wasatch Front.

As a member of the family Lygaeidae, or the seed bugs, this insect feeds primarily on elm seeds, but can be found on other trees. In northern Italy, this insect has become a major nuisance pest, entering homes and buildings by the thousands, similar to the boxelder bug in Utah. Unlike boxelder bug, elm seed bugs can emit a pungent smell from scent glands, similar to bitter almonds.

The specifics of the elm seed bug life cycle in the U.S. are only generally understood. In northern Italy (Turin ~ 45°N and Modena ~ 44°N; Salt Lake City ~ 40°N), the insects overwinter as adults and begin to move from overwintering sites to host trees in March. Eggs are laid starting in early May

on elm fruits (samara) and young nymphs emerge in mid-to-late May. The nymphs progress through 5 growth stages before becoming a winged adult. There can be many overlapping life stages present during the summer, but in Italy, the insects have one generation per year. Invasions of buildings have occurred anytime between late May and late September and were seen to coincide with peak summer temperatures.

Control of elm seed bug with insecticides may be difficult due to their mobile behavior. Italian entomologists report that city governments attempted control with etofenprox, pyrethrum, and rotenone, but only etofenprox showed efficacy. In Italy, insecticides are most effectively applied to host trees when immature stages are present, beginning in early May.

Unfortunately, adult emergence dates, egg laying, and egg hatch are not known in Utah. Proper spray timing for elm seed bug in Utah should be accurately timed to coincide with the presence of the nymph stages for greatest results. Adults may start appearing in March and their nymphs, in April and May.

Pest-proofing homes and buildings is the best tactic to deal with nuisance pests like the new elm seed bug, just as it is for the

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Elm Seed Bug, continued from page 1

boxelder bug. The general exclusion techniques found in the [USU Boxelder Bug fact sheet](#) will help provide relief from this new pest. Where swarms are found, such as on warm exterior walls, the bugs can be vacuumed up into soapy water to quickly reduce large populations. More information on the elm seed bug and its control can be found in the [fact sheet from the Idaho State Department of Agriculture](#).

- Ryan Davis, Arthropod Diagnostician
and School IPM Associate

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Maistrello, L., L. Lombroso, E. Pedroni, A. Reggiani, and S. Vanin. 2006. *Summer raids of Arocatus melanocephalus* (Heteroptera, Lygaeidae) in urban buildings in Northern Italy: Is climate change to blame? *Journal of Thermal Biology*, 31(8): 594-598.

Idaho State Department of Agriculture. 2013. *Elm seed bug, Arocatus melanocephalus: an exotic invasive pest new to the U.S.* Fact sheet: 4pp.

School IPM Workshops Will Help Schools Adapt to New Law

In 2013, the Utah Department of Health amended the pest management section of [HR392-200-7\(12\)](#). The amendment now requires public, private and charter schools, K-12, and attached pre-schools, to practice integrated pest management (IPM).

Utah is the 40th state in the U.S. to enact stiffer laws, rules, or beyond-label requirements for pesticide use in and around schools ([NPMA, 2014](#)). The effort is primarily intended to minimize child exposure to pesticides, but the benefits extend to school employees and environmental health.

This fall, the USU School IPM Program is holding 17 workshops in 9 locations to teach about the new rule change, IPM basics, and how to run a successful IPM program. The workshops will train public, private, and charter school personnel, and the Utah Department of Health inspectors who will be enforcing the new law.

Below is a list of workshop locations around the state. County agents interested in participating in their local workshop should contact: ryan.davis@usu.edu.

- Ryan Davis, Arthropod Diagnostician
and School IPM Associate

Workshop Location	School Employees	Dept. of Health Inspectors
Salt Lake City	Oct. 20	Oct. 21
Vernal	Oct. 28	Oct. 29
Richfield	Nov. 3	Nov. 4
Moab	Nov. 13	Nov. 14
Spanish Fork	Nov. 19	Nov. 20
St. George	Dec. 3	Dec. 4
Ogden	Dec. 9	Dec. 10
Brigham City	Jan. 13	
Provo	Jan. 15	

Bacterial Spot Shows up on Peppers in Utah

Bacterial spot of pepper and tomato, caused by *Xanthomonas vesicatoria* and *X. euvesicatoria*, is a disease that is commonly found in warm, moist regions that grow these crops, so it is not commonly found in Utah. The heavy rains in August 2014 in northern Utah, however, were prime conditions for an outbreak of bacterial spot, in particular on pepper.

The primary spread of bacterial spot is via seeds infected with the bacteria, while secondary spread can occur from one infected plant to another, or from infected debris left in a field. Transplants grown from infected seed may not show symptoms if they are grown in cool, dry conditions. The bacteria will remain latent until the plants are exposed to high temperatures and moisture through rain or overhead irrigation. Initial symptoms are small brown spots on leaves. Under warm and humid conditions, they can coalesce and form large blighted areas. On greenhouse-grown transplants, leaves turn yellow and drop prematurely. Black spots will also develop on fruit, which makes the fruit unmarketable. Once symptoms develop, splashing irrigation water or wind and rain can quickly spread the bacteria through the greenhouse or across a field.

Management of bacterial spot of pepper is difficult. The only chemical option is copper, which helps to stop spread of the disease from plant to plant. In many parts of the country, *X. vesicatoria* has become resistant to copper and treatments are ineffective. In Utah, we have not yet found resistant isolates of the bacteria.

There are cultural practices that can help to minimize this disease. Avoiding overhead irrigation can slow the spread of



Volcani Center Archive, Agricultural Research Organization, bugwood.org

In Utah, the symptoms of bacterial spot that we observed on peppers included small brown lesions on leaves and small, tan to black spots on fruits.

the bacteria. In addition, cull piles should be removed from adjoining pepper or tomato fields. Crop rotation after an outbreak is important because the bacteria can survive in infected plant debris. Peppers should not be rotated with tomatoes that are also susceptible to the pathogen. One year of rotation should be long enough.

The best management option is the use of disease-free seed and transplants. There is one pepper variety from Seminis Vegetable Seeds (PS 09942815 (with XIOR™)) that has resistance to all ten races of the bacteria that are known to occur. Other pepper varieties are resistant to races 1, 2 and 3 ([click here for more information](#)). We currently do not know which race(s) we have in Utah.

-Claudia Nischwitz, Plant Pathologist

6 Years of Raspberry Horntail Research, berry condensed

Recent research has defined horntail biology, developed a degree-day model, identified wasp parasitoids for biocontrol, evaluated insecticides, and assessed raspberry cultivars for susceptibility.

The raspberry horntail, *Hartigia cressonii*, is a prevalent cane-borer in raspberries of northern Utah. The horntail is a stem sawfly that exclusively attacks first-year primocanes. It was first found in Utah in the 1980s, and is known from the Pacific Northwest, California, and Colorado. Infested canes have lower berry yield, vigor, and winter survival. Through a comprehensive research program covering 6 years, we have defined horntail biology and life history in Utah, developed a degree-day model to predict adult activity, assessed biological control by parasitoid wasps, evaluated insecticide efficacy, and evaluated summer- and fall-fruited raspberry cultivars for susceptibility. This article provides an overview of the findings.

Horntail Biology There is only one generation each year; horntails are active from late spring through summer. Adults chew their way out of overwintering chambers within canes beginning in late May. Female sawflies seek attractive raspberry primocanes on which to insert eggs under the soft epidermis or bark. After hatching, the young horntail larva tunnels upwards in the cambium as the new cane grows. At the cane tip, the larva feeds heavily in the center pith causing the tissue to soften and wilt, leading to the characteristic shepherd's crook. Typically only one larva develops per cane; however, two larvae can develop in bifurcated canes. Wilted canes are evident from late June through early September. Larvae consume the succulent tissue in the cane tip, make a U-turn and tunnel downward through the cane pith. The mature larva overwinters within a silk-lined chamber, 1.5 to 2 feet above the base of the cane.



Predicting Horntail Activity A degree-day (DD) model was developed to predict timing of adult egg-laying. In early spring, raspberry canes containing horntail larvae were collected from farms in five northern Utah counties across three years. They were placed in a constant 77°F chamber within mesh fabric cages, and checked 2 to 3 times per week for adult emergence. Using a lower developmental threshold of 50°F, and accumulating degree



Horntail larvae hollow out the pith of the tops of raspberry canes.

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Raspberry Horntail Research, continued from previous page

days from January 1 of each year, the adult emergence period was found to span 500 to 1800 DD. This timing corresponds to approximately late May to mid-August, but varies with location and year. The DD model provides a critical tool to improve the timing of horntail management.

Natural Enemies We detected an abundance of biological control by parasitoid wasps; however, parasitism of the horntail larva takes place in the cane tip, after some injury has already occurred. We found three species of native parasitoid wasps attacking horntail larvae. One of the most common is an ichneumonid wasp with a long ovipositor. It is a solitary ectoparasite; an individual parasitoid egg is laid upon the horntail larva within the cane tip, and the parasitoid larva consumes the horntail. Another common parasitoid we found is a gregarious pteromalid wasp whose larvae attack horntail larvae in groups of three to twenty. The least abundant parasitoid in our survey was a tiny eurytomid wasp that is known to parasitize gall midges and gall wasps. In our study, the majority of horntail parasitism occurred from late June to mid-August with peak rates of parasitism from 40-100% in late July and early August.



Several small larvae of an ectoparasitic pteromalid wasp feeding on a single horntail larva inside a raspberry cane.

Cultivar Resistance Since 2009, 21 cultivars of floricane-fruiting (summer-bearing) raspberries and 16 cultivars of primocane-fruiting (fall-bearing) raspberries have been evaluated at the USU Horticultural Research Farm in Kaysville. Horntail infestation was substantially lower in primocane- than floricane-fruiting plants. The main reasons are likely two-fold: primocane-fruiting canes were removed at ground level in the fall or spring, thus removing the overwintering horntail larvae; and horntails avoid thin canes which are more common in primocane-fruiting cultivars.

Horntail population pressure was higher in the 2009-2011 cultivar trial than in the 2013-2014 trial, likely because of successive years of removal of infested canes at the site as

Floricane-fruiting (summer-bearing) cultivar susceptibility to raspberry horntail (RHT): mean number of larvae per row-foot of plants, Kaysville, UT.

Cultivar	# RHT	Cultivar	# RHT
2009-2011 Trial			
Royalty	0.25 a	Reveille	2.85 abc
Moutere	0.80 a	Chemainus	2.95 abc
Cascade Dawn	1.25 ab	Canby	3.25 bc
Cowichan	1.55 abc	Georgia	3.65 c
Coho	1.60 abc	Cascade Bounty	3.75 cd
Cascade Delight	1.75 abc	Titan	4.10 cd
Lauren	1.85 abc	Willamette	5.10 cd
Tulameen	2.20 abc	Saanich	5.95 d

2013-2014 Trial			
Octavia	0.01 a	Prelude	0.26 ab
Cascade Gold	0.05 a	Cascade Bounty	0.68 ab
1142-1	0.12 a	Nova	1.07 b
Chemainus	0.18 a		

Primocane-fruiting (fall-bearing) cultivar susceptibility to RHT: mean number of larvae per row-foot of plants, Kaysville, UT.

Cultivar	# RHT	Cultivar	# RHT
2009-2011 Trial			
Polana	0.40	Joan J	0.7
Caroline	0.60	Ruby	0.7
Polka	0.60	Himbo Top	0.8
Summit	0.60	Heritage	0.9
Jaclyn	0.60	Anne	1.0

2013-2014 Trial			
Autumn Treasure	0.03	Polana	0.23
Josephine	0.06	Autumn Bliss	0.30
Brice	0.08	Joan J	0.34
Vintage	0.14	Dinkum	0.50
Autumn Britten	0.18		

part of the sampling process. Of the summer-bearing cultivars, 'Royalty', 'Moutere', 'Octavia', and 'Cascade Gold' were the least attractive to horntail while 'Cascade Bounty', 'Nova', 'Titan', 'Willamette' and 'Saanich' had the highest infestations.

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Kill Bill(bug): Activity in Turf and a New Insecticide Option

Billbugs (*Sphenophorus* spp.) are a primary pest of turfgrass in the Intermountain West. Young billbug larvae feed within turf stems and mature larvae feed on roots, causing a tan to brown discoloration resembling drought-stressed turf, and sometimes plant death. Although the adults do feed on turf blades, the majority of damage results from larval feeding.

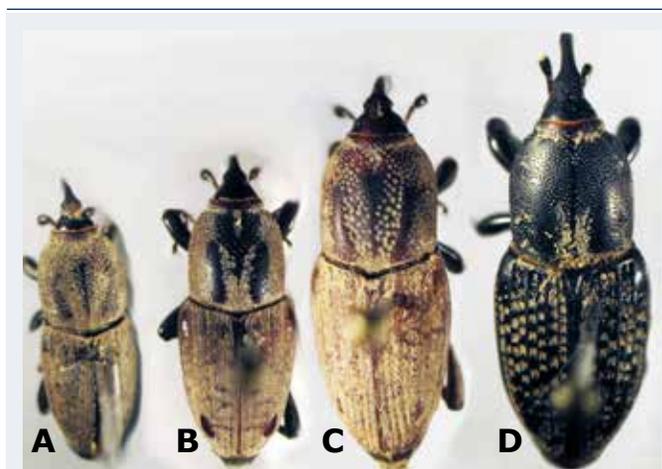
Most of what we know about billbugs comes from research from the eastern U.S., and we have found many differences in our region. In the Intermountain West, there is a complex of three species that occur simultaneously, including the bluegrass, hunting, and Rocky Mountain billbugs. In some isolated spots, the Phoenix billbug represents a fourth species. In other regions of the U.S., only one and sometimes two of these species will be present as major pests.

The eastern U.S. degree day (DD) model predicting billbug activity does not appear to be a good fit for the Intermountain West. For example, first occurrence of billbugs in Logan, UT in 2014 was on April 12 (60 DD after March 1), more than one month earlier than the eastern model predicted, which was on May 25-31 (280-352 DD). (Degree days can be obtained at the [Utah TRAPs online tool](#)).

Recognizing these differences from the eastern and western regions is key to improving management strategies. One way to be effective is to monitor. Installing and monitoring pitfall or linear pitfall traps aids in determining when the billbug adults are active in the turf.

In 2014, we monitored billbug activity on two golf courses near Boise, ID and one each in Logan and Draper, UT, and found that bluegrass billbug was the dominant species, making up more than 50% of the total trap catches. The next most abundant was the hunting billbug at around 35% of total trap catches, and Rocky Mountain billbug was the least abundant. Peak capture of adult billbugs occurred from late May to early June. Based on observations in 2013 and 2014, peak activity for the region has been around 400-600 DD. Billbug egg-laying coincided with peak adult activity and larval stages were most abundant a few weeks after adult peak activity.

Appropriately timed insecticide applications early in the season have been successful at suppressing newly emerged and young larval stages. The options include the neonicotinoid and diamide classes of insecticides that have systemic activity. Turf managers will be familiar with the neonicotinoids (Arena, Merit, and Meridian) and Acelepryn, a diamide having a mode of action that leads to muscle paralysis and death of the insect. Registration of Ference, a new diamide insecticide from



Four species of billbugs have been found in the Intermountain West: **Bluegrass billbug (A)** is the smallest and most abundant; **Phoenix billbug (B)** is identified by the dark M on the thorax; **hunting billbug (C)** is identified by the Y and parentheses markings; **Rocky Mountain billbug (D)** is the largest species with deer hoof prints on the wings.



Linear pitfall traps are used to monitor billbug activity in turf.

Syngenta, was made available in August 2014 and has shown good results in suppressing billbug larvae.

These materials were tested in northern Utah and Idaho to determine optimal timing of these products in the region.

- Neonicotinoids, namely Meridian, should be applied between May 1 and mid-June.
- Acelepryn, which has very low water solubility, should be applied 2 to 3 weeks earlier, starting in mid-April.
- Although Ference has a similar chemistry to Acelepryn, it has a higher water solubility so that it should be applied at a similar timing to neonicotinoids. Ference also has a shorter half-life and persistence in the soil than Acelepryn.

Keep in mind that the recommended timing provided above is a guide and that weather and location can shift the dates. Colder winters and springs will mean later billbug activity while warmer winters and springs may result in earlier activity. Monitoring and becoming familiar with tools like degree day models helps to predict and anticipate pest populations.

-Ricardo Ramirez, Entomologist

Fruit and Vegetable Pest Monitoring in Summer 2014

Every summer, the Utah IPM Program monitors for pests in fruits and vegetables in northern Utah and uses that information for research and to produce pest activity reports. In 2014, we hung over 80 pheromone traps for 12 fruit pests in 9 sites, and conducted vegetable pest monitoring in 8 community and commercial vegetable sites.

CODLING MOTH

Codling moth is the primary pest of apples in Utah, so it is important to provide timely information to growers. Despite the warmer early spring temperatures, biofix (first flight) was about average across all sites, occurring from late April to early May in northern Utah. We saw a fairly typical pattern of moth flight, with two full generations and a partial third generation in most areas.

The last very hot season in this region was in 2007. Several years of cooler springs and summers since then have not helped in reducing codling moth populations. In fact, in Utah County orchards that are not using mating disruption, our trap catch numbers have increased over the last 3 years (see graph). In 2012, the average number of moths per night for these monitored sites was 1.5, in 2013 it was 1.7, and in 2014, it was 4.0. This change may be due to a change in predator populations, milder winters, or individual farm practices.

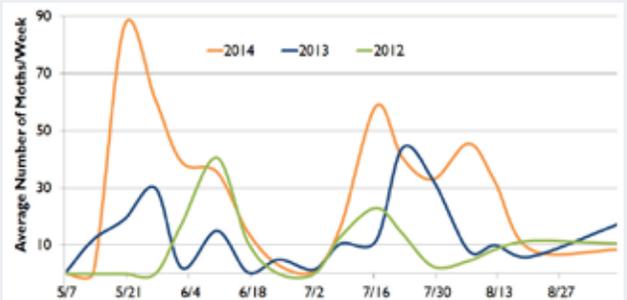
APPLE MAGGOT

During the 2013 season, we heard several reports of apple maggots infesting apples and plums. We were able to confirm maggots in plums, and although we found suspicious symptoms in apples, we were not able to find any apples with maggots inside them. During 2014, we hung 12 traps in 3 sites in the Cottonwood Heights area near Salt Lake City. All of these sites grew apples, and we inspected apples throughout the growing season for possible infestation. Although trap catches were very high (see graph) and we found maggots in plums, we again did not find any maggots in apples.

LEAFROLLERS

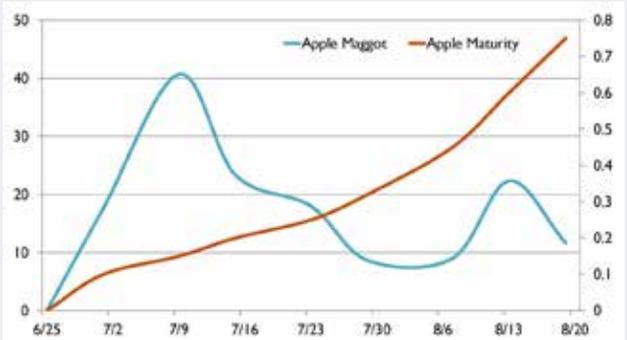
The IPM Program normally monitors for several leafroller species, but through a USDA Specialty Crop Block Grant, USU researchers have been looking at a greater number of species in more sites. We will report on that project in detail in a future issue of *Utah Pests News*, but for the most part, we have observed that the obliquebanded leafroller is the most commonly trapped species in Utah fruit orchards. In the past, this pest had always been trapped in high numbers, but the larvae that cause the damage were almost non-existent, controlled by Guthion, a commonly used insecticide for

Average weekly trap catch of codling moth in conventional orchards in Utah County.



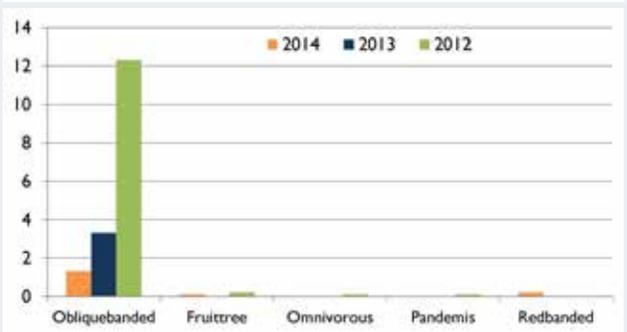
For the last 3 years in Utah County, codling moths have had just 2 full generations. Over this time period, the moth population has been increasing slightly in non-mating disrupted sites.

Average weekly trap catch of apple maggot, as compared to apple maturity



In Utah, apple maggot flight peaks before apples mature. Research has shown that maggots feeding in non-mature apples are killed by the pressure of the expanding apple, which may explain why we have not yet found them there.

Comparison of average weekly trap catch of 5 leafroller species in Utah County



Obliquebanded leafroller has always been the dominant leafroller species, and numbers have declined since 2012.

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Pest Monitoring Report, continued from previous page

codling moth and other pests. When Guthion was cancelled, leafrollers were not controlled by the alternate products and in 2011 and 2012, the larvae started causing problems, primarily for tart cherry growers. Now that growers are aware of the problem and have targeted the leafroller larvae, the adult moth and larval population of this species have declined significantly (see graph on previous page). In 2014, we did not see any economic injury from leafrollers.

OTHER FRUIT PESTS

Thankfully, growers dodged the fire blight bullet this spring due to the drier conditions and moderate temperatures during bloom. Those conditions also seemed to dampen the effects of coryneum blight. Woolly apple aphid, which was becoming an issue in 2011-13, seems to be more under control, mostly due to growers' diligence. Other pests were present in typical numbers, including aphids, spider mites, powdery mildew, and peachtree borer. Boxelder bugs on ripening peaches have become an increasing nuisance over the last 5 years, with very high numbers this year. And finally, we had no reports of brown rot on peaches, unlike in 2013.

VEGETABLES

In 2014, we monitored for vegetable pests more intensely than in past years, thanks to the addition of Bonnie Bunn, the new Vegetable IPM Associate. The monitoring sites were located in Box Elder, Cache, Salt Lake, and Utah counties, and consisted of backyard and community gardens, including 3 locations within the Wasatch Community Gardens program.

Flea beetles and squash bugs and the injury they cause were found in high numbers throughout the season in almost every site we monitored. Three species of flea beetles were identified: the pale striped flea beetle, tobacco flea beetle, and the western flea beetle. These insects cause "shot hole" damage from feeding adults, and are particularly harmful to young plants and seedlings. Squash bug feeding can cause plants to suddenly wilt, mimicking a disease problem. We predict that squash bug and flea beetle populations will continue to be high in 2015. They overwinter as adults, so it will be important to watch for them next spring.

We also saw a widespread problem of stunted tomato plants with yellow, curled leaves. Many of these affected plants also had the classic symptoms of curly top disease: purple venation on the leaves and premature fruit ripening. However,



Top: The tobacco flea beetle was found in very high numbers on potato plants in northern Utah. It is reddish, yellow brown, with a brown patch across the width of the wing covers.

Bottom: Many tomato plants in the vegetable monitoring sites showed symptoms of curly top virus, including the classic symptom of curled, yellow leaves with purple veins.

despite testing more than 20 symptomatic plants, none were positive for curly top disease. The cause of the symptoms remains a mystery that we will investigate further next season.

-Marion Murray, IPM Project Leader and
Bonnie Bunn, Vegetable IPM Associate

Update on Spotted Wing Drosophila and Brown Marmorated Stink Bug

Spotted wing drosophila (SWD) is an invasive insect pest of most fruits grown in Utah. SWD differs from related vinegar flies in that the female has a large, serrated ovipositor that enables them to lay eggs in healthy, developing fruit. Other *Drosophila* species can deposit eggs only in overripe or damaged fruit. SWD is native to Asia and was first detected in the continental U.S in California in 2008. Since then, SWD has spread to more than 40 states and is causing severe economic damage in several of these states. In Utah, SWD was first confirmed in Davis County during late summer of 2010. SWD has been collected in traps in low numbers every year since, but no damage has been reported.

The Cooperative Agricultural Pest Survey (CAPS) program placed nearly 200 SWD traps in Rich, Cache, Box Elder, Weber, Davis, and Utah counties in 2014. There were five "firsts": an early season capture and four new county reports. In early June, a single male was caught near a Davis County orchard in a wild habitat that included river hawthorn, serviceberry, wild plum, and other fruits. This was the earliest seasonal capture of SWD in Utah; in previous years, flies were never caught before mid-August. They were not caught again in Davis County until early September. In addition, the CAPS team collected SWD from traps in Rich, Cache, Box Elder, and Utah Counties, the first report for all four locations. So far this year, 31 flies have been caught in Rich County (starting in late September), 12 flies have been caught in Cache County (starting in mid-August), 1 fly has been caught in Box Elder County (in mid-September), 24 flies have been caught in Davis County, and 2 flies have been caught in Utah County (starting in mid-September).

Brown marmorated stink bug (BMSB) is another invasive insect pest that the CAPS team has been monitoring for the past several years. BMSB is a very serious agricultural pest and has an expansive host range, including fruits, vegetables, and woody plants. It is also a nuisance pest because it uses homes and other buildings as overwintering sites. It is native to Asia and was first found in the U.S. in Pennsylvania during the late 1990s. As of April 2014, BMSB has been detected in more than 40 states and is posing agricultural and/or nuisance problems in about half of them (www.stopbmsb.org).

BMSB was first found in Utah in 2012 in residential areas of Salt Lake City and again in 2013, in residential areas of Salt Lake City and Provo. These findings were always late in the



Sheila Fitzpatrick, Agriculture & Agrifood Canada, Pacific Agri-Food Research Centre



David R. Lance, USDA, APHIS, PPQ, bugwood.org

Top: Male (left) and female (right) spotted wing drosophila. Inset shows the ovipositor (egg-laying structure of the female).

Bottom: Adult brown marmorated stink bug.

season and in very low numbers. The trend continues for 2014, as we have collected just one specimen, from a trap in Salt Lake City near the Liberty Park area in early September. We will continue to monitor for SWD and BMSB until at least mid-October, and during spring 2015 we will be holding a series of workshops on SWD and BMSB throughout the state. Watch for updates on this fall's trap captures and information about these workshops on the Utah CAPS website (utahpests.usu.edu/caps). (Note that individual pages have been set up for each pest.) Please report suspect SWD, BMSB, and crop injury to Lori Spears (lori.spears@usu.edu).

Visit these links for more information on SWD and BMSB:

- [USU Extension SWD Fact sheet – General information](#)
- [USU Extension Fact sheet – Monitoring for SWD](#)
- [USU Extension Video – Trapping and identifying SWD](#)
- [USU Extension BMSB Fact sheet](#)

-Lori Spears, USU CAPS Co-Coordinator

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 and Clint Burfitt (Utah Department of Agriculture and Food).

In the National News

FUNGUS MANIPULATES ANTS FOR SURVIVAL

Penn State scientists used GIS mapping and 3-D imagery to track the activity of fungal-infected carpenter ants in Brazil. The parasitic fungus *Ophiocordyceps camponoti-rufipedis*, better known as the “zombie ant fungus,” infects and feeds on host ants, and before the fungus kills them, it “forces” ants to die in a location that ensures its spread. First, the study showed for the first time, that the fungus is not able to reproduce or spread when introduced inside an ant colony, partly due to “social immunity” (keeping the colony clean) and partly due to the environmental conditions. They also found that, although the fungus can reproduce outside, they did not find infected ants away from the colony. Through several years of field observations, they concluded that infected ants will return to the “doorstep” of the ant colony and begin feeding on nearby leaves. There, it dies while attached to the leaves so that the fungal spores can drop onto ants entering and leaving the colony, bypassing ant’s “social immunity” and ensuring the longevity of the fungus.

STOPPING THE MED FLY

The Mediterranean fruit fly infests more than 300 types of cultivated and wild fruits, vegetables, and nuts worldwide. One of the most environmentally-friendly management techniques is to release sterile males into the environment, interrupting the mating between wild males

and females. The downside is that these males don’t tend to mate as well in the wild because the irradiation method used for sterilization weakens them. Published in *Proceedings of the Royal Society B*, researchers in Europe have developed a genetically engineered male fly that is able to mate with females, but produces only male offspring. They tested the fly’s effect in a simulated, caged environment, and found that the modified flies were capable of rapidly reducing the fly population. The next stage of the research will be to gain approval for open-field studies.

BEETLE SHELLS INSPIRE A BRIGHTER WHITE

In recent years, many engineers have been looking to structures found in nature to inspire their designs. For example, the *Cyphochilus* beetle has ultra-white scales that are able to scatter light more efficiently than any other biological tissue known. Even current man-made technology is not able to produce a coating as white as these beetles can in such a thin layer. A new investigation published in *Scientific Reports*, looked at the optical properties of these scales. The study showed that the beetles have a compressed network of chitin filaments that is directionally-dependent, allowing high intensities of reflected light for all colors at the same time, which produces the intense white. In other words, the scales have a structure that is highly complex, giving rise to something that is

greater than the sum of its parts. These findings will likely be relevant for many applications, enabling a whiter white of paper, plastics, and reflective paints, while using a smaller amount of material.

ELECTROCUTING EMERALD ASH BORERS

The emerald ash borer, introduced into the U.S. in 2002, is said by some to have become the most destructive forest pest ever seen in North America. Monitoring for new introductions is important, and beetle catches on sticky traps may lag behind an active infestation. A large team of researchers tested high-voltage female decoys to bait and trap males. They tested 4 decoys. One group was a plastic decoy made from a nickel nano-coating mold of a dead female that retained the surface texture of the beetle. The second group was this same decoy, but painted metallic green, the third group was created from a 3-D printer that did not retain the beetle’s surface texture or color, and the fourth group was dead females. The decoys were then electrically wired and pinned onto forest trees. They found that the males only landed on, and thus were electrocuted by, the dead females and the realistic green painted plastic decoys. These results showed that the fine-scale texture of the visible surface is more important than color or shape for males to find resting females. The results will appear in the *Proceedings of the National Academy of Sciences*.

Useful Publications and Websites

- idtools.org links to databases of photos and current information on 194 species that have the potential to become serious invasive pests.
- The 2nd edition of [Fungicides in Crop Protection](#) includes information on new fungicide classes, the increased

incidence of fungicide resistance, legislative requirements to reduce fungicide applications, and current trends in fungicide use.

- [Induced Resistance For Plant Defense](#) is an updated 2nd edition book that covers this important topic of a

potentially environmentally-benign pest control option in plants.

- [Basic and Applied Aspects of Biopesticides](#) is one of the few books available that provides holistic information on all aspects of biopesticides.



Featured Picture of the Quarter

Squash bugs are a perennial pest problem across Utah. The feather-legged fly (*Trichopoda pennipes*), a member of the parasitic fly family, Tachinidae, is one of just a few natural enemies that plays a small role in reducing squash bug (and stink bug) populations. The adult female lays several small whitish eggs on the outside of the host body. When the eggs hatch, the larvae burrow inside the host to feed on its contents. During this time, the host still lives, but does not reproduce. The larvae pupate inside the host and emerge as adult flies, at which time the host insect dies.

-Image by Bonnie Bunn, Vegetable IPM Associate

ENTOMOLOGY NEWS, continued

Raspberry Horntail Research, continued from page 5

Cultivars with the greatest winter hardiness, cane vigor, and yields tended to have fewer horntails. For fall-bearing cultivars, horntail infestation did not exceed one larva per row-foot of plants, and there were no differences among cultivars.

IPM for raspberry horntail utilizes a comprehensive approach to reduce horntail populations, use resistant cultivars, and optimize timing of insecticide applications to protect natural enemies. By gaining a better understanding of horntail biology and its life cycle, we have tailored an IPM program for Utah raspberry production systems, shown at right.

Fact sheets on raspberry horntail and suitability of raspberry cultivars for Utah are available on the USU Extension website at utahpests.usu.edu and fruit.usu.edu.

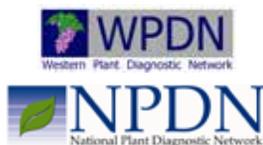
-Diane Alston, Entomologist

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The USU-Recommended IPM Program for Raspberries

- Select more resistant raspberry cultivars
 - ✦ Fall-bearing are less susceptible than summer-bearing cultivars
- Prune out infested canes before adults begin to emerge in May
 - ✦ Remove fall-bearing canes at ground level
 - ✦ Remove floricanes-fruiting canes with horntail tunnels in the pith
- If warranted, apply effective insecticides beginning at 500 DD to kill adults before eggs are laid; repeat based on protection interval of insecticide through 1800 DD
 - ✦ Carbamate: carbaryl (Sevin)
 - ✦ Pyrethroid: bifenthrin (Brigade, Capture), esfenvalerate (Asana), fenpropathrin (Danitol), zeta-cypermethrin (Mustang Max)
 - ✦ Organophosphate: malathion, diazinon
- Prune out infested cane tips all summer to lower horntail populations and prevent further cane injury
- Conserve natural parasitoid wasps by avoiding unnecessary insecticide applications

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