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# UTAH PESTS QUARTERLY

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Utah Plant Pest  
Diagnostic Laboratory

USU Extension

## IN THIS ISSUE

|   |       |
|---|-------|
| Brown Marmorated Stink Bug<br>Status in Utah<br>-----                 | p. 01 |
| Verticillium Wilt in Vegetables<br>-----                              | p. 4  |
| Some Insect Pest Populations<br>on the Rise in 2017<br>-----          | p. 05 |
| Montana 6-Plume Moth<br>-----   | p. 07 |
| Innovative Applications for<br>Long-Lasting Insecticide Nets<br>----- | p. 08 |
| IPM in the News<br>-----  | p. 10 |
| Picture of the Quarter<br>-----                                       | p. 12 |

## NEW FACT SHEETS

Aphid Pests on Vegetables  
 Leafrollers in Fruit Orchards  
 Spotted Wing Drosophila  
 (update)  
 Minute Pirate Bug

## Brown Marmorated Stink Bug Status in Utah



Brown marmorated stink bug adult on corn leaf.

Brown marmorated stink bug (BMSB; *Halyomorpha halys*) is an invasive insect from Asia that is a nuisance pest of homes and landscape ornamentals, and an economic pest of various fruits, vegetables, nuts, and other valuable crops in Utah. It was first detected in the U.S. in Pennsylvania in the late 1990s and has since spread to at least 44 U.S. states ([www.stopbmsb.org](http://www.stopbmsb.org)).

BMSB was first detected in Utah (Salt Lake City) in 2012 by the general public and by 2015 was causing nuisance problems in parts of northern Utah. BMSB is currently found in Utah, Salt Lake, Davis, Weber, Box Elder, and Cache Counties. BMSB is strongly associated with urban developments and railroads (Wallner et al. 2014), so it is possible that it will become established in other portions of the state. This field season, the Utah BMSB team scouted for BMSB in ornamental hosts, and fruit and vegetable crops throughout northern Utah. For the first time, agricultural damage due to BMSB feeding was confirmed, and many individuals in Utah reported damage to the USU BMSB team.

### Ornamental Hosts

Cody Holthouse, a USU graduate student, is studying BMSB phenology and plant host use in urban-agricultural landscapes, and is also conducting biological control surveys. He has found BMSB on more than 40 ornamental hosts, with high numbers on catalpa, chokecherry, Siberian pea shrub, common lilac, and apple. Other North American studies have revealed that BMSB uses at least 200 hosts from annuals to trees, and are most commonly found on non-native woody plants. Further, BMSB uses different host plants throughout the growing season, and all life stages are more commonly observed on angiosperms (flowering plants) than gymnosperms (e.g., conifers) (Bergmann et al. 2016). Therefore, selective planting of non-hosts, such as gymnosperms, may help reduce the agricultural and nuisance pest status of BMSB (Bergmann et al. 2016).

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**Fruit Crops**

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In 2016, BMSB was detected in pheromone traps in commercial peach orchards for the first time (Davis and Weber Counties), and growers found BMSB at their urban fruit stands (Utah County). In 2017, BMSB adults and nymphs were found in traps placed along the edges of several orchards along the Wasatch front, and some growers found BMSB adults in their freshly picked fruit bins. BMSB adults were detected in traps as early as May, peaked in activity in August, and adults are still being captured in October. We have confirmed damage on peach and apple, and have received unconfirmed public reports of damage to raspberry. Crop damage was detected in late August. Other North American studies have found that fruit can exhibit injury by late May, but most damage occurs around mid-June and increases as the season progresses (Bergh et al. 2016). BMSB feeds on and can injure a variety of fruit crops, including apple, pear, peach, apricot, cherry, nectarine, and caneberries.



BMSB adult on damaged peach fruits in Utah.



BMSB feeding can cause pits and depressions on the fruit surface (Utah apple).



BMSB damage on peach in Utah.

For more fruit information, see [BMSB in Orchard Crops](#) or [BMSB in Small Fruit](#) from [stopbmsb.org](http://stopbmsb.org).

**Vegetable Crops**

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This summer, BMSB was detected in pheromone traps in commercial and community vegetable crops for the first time. Traps were placed on edges of tomato and squash plantings. The highest BMSB counts occurred in Salt Lake County community gardens, with smaller numbers in traps in Davis County sites, and one nymph in a Weber County commercial site. In late June, an adult BMSB was found inside a popcorn whorl in Salt Lake County. By early August, high numbers of BMSB adults and nymphs were detected in the same popcorn planting along with feeding damage to the leaves and husks. In mid-August, feeding damage was confirmed on squash leaves and nearby borage leaves (Salt Lake County), and an egg mass was detected on sweet corn in a commercial vegetable field (Davis County). Researchers have found that, in the mid-Atlantic U.S., BMSB pest pressure to vegetables is highest in July and August.

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BMSB adult and damage to a corn leaf.

### VEGETABLE CROPS AT RISK:

- Most vegetables that bear reproductive structures (e.g. fruit and seeds)
- Sweet corn and edible soybean/edamame (extremely high densities of bugs at kernel or seed development)
- Okra and bell pepper (preferred for majority of the season and BMSB reproduction)
- Green bean, tomato, and eggplant (preferred for BMSB reproduction)
- Sweet corn, green bean, bell pepper, and tomato (very susceptible to feeding injury and typically experience higher injury rates from BMSB than eggplant or okra)
- Asparagus and Swiss chard (may be regularly attacked by BMSB)

### VEGETABLE CROPS AT MINOR RISK:

- Cucurbits such as squash and cucumber and brassica vegetables such as broccoli and collards

### VEGETABLE CROPS NOT AT RISK:

- Leafy vegetables (excluding Swiss chard), root and tuber vegetables (e.g. potatoes), and onions

For more vegetable information, see [BMSB in Vegetables](#) from [stopbmsb.org](#).

Traps baited with commercial lures have been shown to be effective at detecting BMSB. The Utah BMSB team has been conducting trapping trials to develop monitoring tools and economic thresholds to guide management decision-making. Our findings will be shared with growers during 2018 winter conferences and in future newsletter articles. To learn more about BMSB, including identification, host use, damage symptoms, and monitoring/management, please consult the [USU BMSB Fact Sheet](#), the [Invasive Fruit Pest Guide for Utah](#), the [stopbmsb.org](#) website, and/or the references listed herein.



BMSB nymph feeding on squash leaf.

——— Lori Spears, USU CAPS Coordinator  
——— Cami Cannon, Vegetable IPM Associate

This work was funded by various sources over the years, including the USDA's Specialty Crop Research Initiative (USDA-NIFA SCRI grant no. 2016-51181-25409), USDA's National Institute of Food and Agriculture (grant no. 2015-68004-23179), USDA's Farm Bill Goal 1 Surveys (FY13-17), Utah Agricultural Experiment Station, Utah Specialty Crop Block Grant, and the WSARE and Utah IPM program.

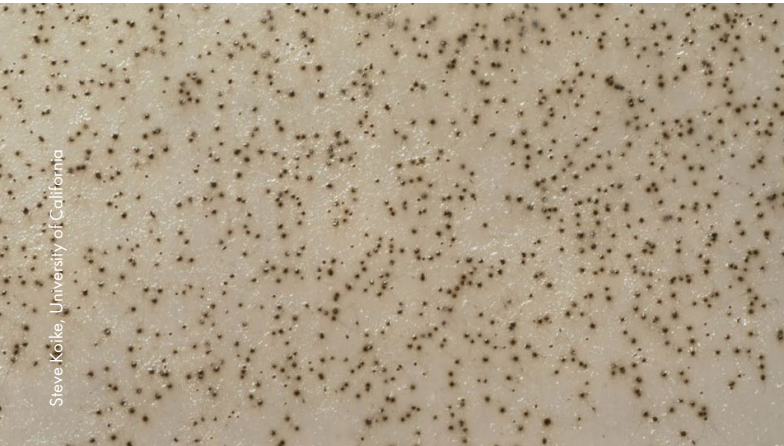
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## Verticillium Wilt in Vegetables

In Utah, Verticillium wilt in vegetables is caused by the fungus, *Verticillium dahliae*. It is a soilborne pathogen that produces two types of fruiting structures. Occasionally, the fungus produces spores on infected above-ground plant tissue. Its most important fruiting structures are microsclerotia.



Steve Koike, University of California

Microsclerotia fruiting structures of *Verticillium dahliae*.

Microsclerotia are hard balls of fungal tissue that usually have a black pigment. Microsclerotia can survive in the soil for up to 20 years. Most vegetables can be infected with Verticillium and the higher the concentration of microsclerotia in the soil, the more likely a plant gets infected.

Verticillium does not cause a root rot. It colonizes the plant host's vascular bundles, through which water and nutrients are transported, and does not affect the roots directly. The pathogen keeps growing in the vascular bundles, thus clogging them and preventing the uptake of water and nutrients. Eventually, the plant starts to wilt and leaves may



Cornell University

Chlorotic and wilting symptoms of Verticillium wilt.

turn chlorotic. Only the parts of the plant containing the infested vascular bundles will wilt. Sometimes only that half the plant is wilting and the other half looks healthy.

Verticillium wilt can be detected in the field, especially when multiple vegetable types are affected. Few pathogens affect a broad range of vegetables in the same location. For example, *Fusarium oxysporum* can cause the same symptoms in vegetables but is very host specific and will only infect one vegetable species in the field, such as tomatoes.

When cutting the stem of a symptomatic plant, discoloration of the vascular tissue is visible. The infected tissue will be brown instead of white. For a confirmation, a sample can be submitted to the UPPDL lab for isolation of the pathogen. In Utah, the disease is frequently seen in vegetables that have been planted in fields that previously had alfalfa in them.



PoDIL

Infected plant (left) with discolored vascular tissue and healthy plant (right).

There are a few vegetables not affected by Verticillium, including onion, garlic, lettuce, carrots, asparagus, beans and peas. There are some resistant tomato varieties. Resistance is usually indicated by a "V" in the description of the variety or on the seed packet. A list of [resistant tomato varieties](#) and [Verticillium-tolerant potato varieties](#) can be found on the University of Minnesota Extension website.

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Microsclerotia imbedded in infected tissue.

Management of Verticillium is difficult due to the broad host range and longevity of the microsclerotia. Crop rotation out of susceptible crops for three to four years can reduce the amount of microsclerotia in the soil. Removing debris from infected plants from the field can help to reduce the amount of inoculum added to the soil. Verticillium forms microsclerotia in the plant tissue that are released into the soil as the tissue decomposes. Never compost infected plant material. The microsclerotia will survive composting. Plant debris should be put in the trash or taken to the garbage dump. Fungicides or fumigation are not effective.

— Claudia Nischwitz, Extension Plant Pathologist

### ENTOMOLOGY NEWS AND INFORMATION

## Some Insect Pest Populations on the Rise in 2017

Steep drops in insect populations—especially pollinators—have been documented worldwide (see references), attributed to a variety of factors, including loss of habitat, urbanization, and increasing temperatures (which limits reproduction). However, an almost equal number of studies have shown that some of these factors—urbanization and increasing temperatures—have caused pest insect and mite populations to significantly increase. In some parts of Utah, we've seen greater issues with codling moth in apple and pear, pavement ants, urban grasshoppers, aphids, and varroa mites on bees.

With codling moth in particular, urbanization may increase populations when apple, pear, crabapple, and hawthorn trees are planted yet not managed. This allows the insect to build up, and infest neighboring trees and orchards. Temperatures also have an effect on codling moths.

In the continental U.S., the two warmest years on record were in 2012 and 2016, and in Utah, they were 2012 and 2015. According to NOAA's National Centers for Environmental Information, Salt Lake City logged the hottest summer on record in 2017 (from over 120 years of data), and 2017 as a whole is on track to be the hottest year.

Temperature is the most important environmental factor influencing pest behavior, distribution, development, survival and reproduction. Climate scientists and entomologists have estimated that with a 3.6°F rise in temperature, insects might experience one to five additional life cycles per season. Some of the reasons for this include the following:

- Milder winters allow for earlier insect growth and a reduction in overwintering deaths.
- Increasing summer and fall temperatures allow for higher rates of growth and reproduction. Weather during fall is a particularly important factor in determining overwintering success. Fall temperatures for the last 4 to 5 years in northern Utah have been warmer and drier than average, allowing insects extra time to reproduce and prepare for a successful winter diapause.
- Also in the last several years, spring conditions have been unsettled, allowing insects to emerge over a wider time span, which extends the reproductive period and increases their dispersal capabilities.

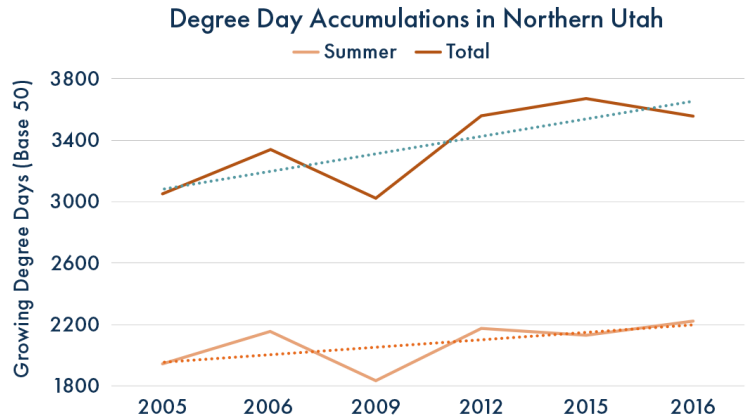
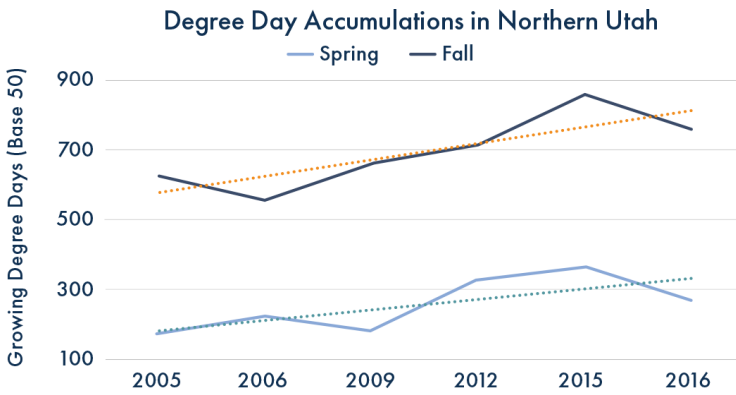
As a result of these factors, it is more important than ever to implement IPM practices to manage pests, as we want to minimize pesticide use as much as possible. See the Utah Pests' IPM website for [management tactics for individual pests](#).

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**Degree Days Influence Insect Activity**

Degree days are a measurement of heat, and are indicative of the warmth of the year. Higher numbers mean hotter seasons (and thus, greater potential for increased insect activity). The graph below shows the degree days that accumulated during spring (Jan 1 – May 1) and fall (Sept 1 – Dec 1) since 2005, with a general increasing trend. Note in particular, the warmer fall seasons.

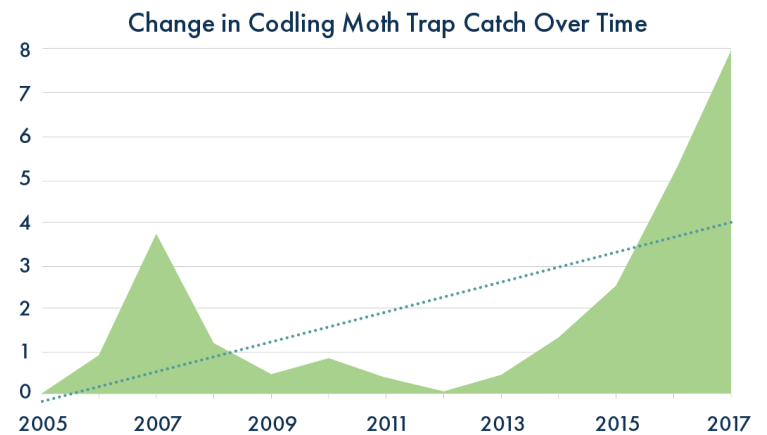
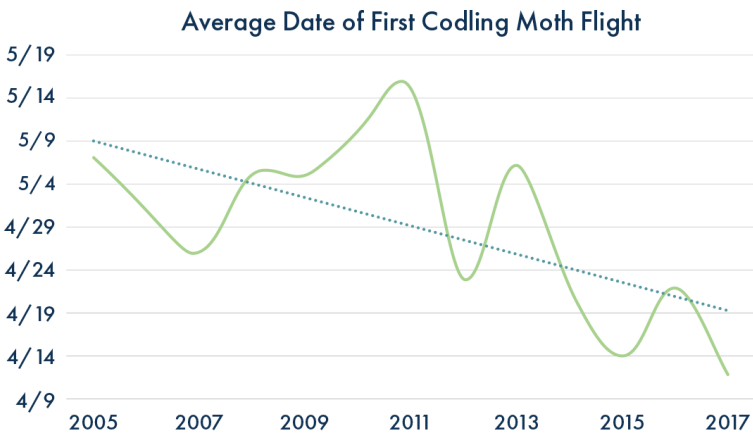
Most degree days for a given year are accumulated during summer, when insects are rapidly reproducing. The graph below shows the accumulated degree days that occurred during summer (May 1 – Aug 1) and for each year since 2005, with a general increasing trend.



**Codling Moth as an Example of Population Increase**

Codling moth is the “worm in the apple”, and the incidence of this pest has increased in certain areas of Utah. The graph below represents the average first flight date (“biofix”) for four areas in Utah County, since 2005. Note that in general, codling moths are emerging earlier, and having longer reproductive seasons.

The graph below represents the average weekly trap catch each year, among the same four sites in Utah County, since 2005. A general trend shows that the weekly trap catch numbers have been slowly increasing, with a spike in 2017.



— Marion Murray, IPM Project Leader

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## Montana 6-Plume Moth



Jim Johnson, iNaturalist.org



Sterling Sheehy, iNaturalist.org

Adult 6-plume moth (*Alucita montana*).

Every fall, we receive calls about tiny moths invading peoples' homes, especially at higher elevations or in structures located in forested, rural settings. I too, have noticed these moths and wondered what they were and what, if any, potential threat they posed to people, structures, or stored-food products.

We have since discovered that these tiny moths belong to the many-plumed moth family, Alucitidae. In North America north of Mexico, there are only three described species, only one of which occurs in Utah – the Montana 6-plume moth (*Alucita montana*). This moth is distributed from southeast Canada, and throughout the western provinces and states, from central Alberta to western Texas.

The Montana 6-plume moth is small. The forewing is about 5.5 - 6.5 mm in length and the wingspan from 11 - 16 mm. The moth is predominantly gray-brown, with transverse bands of dark brown and white across the wings. When the moths are active, the plumes are fanned out and readily visible upon close inspection, however close observation is needed to see the details of this delicate moth. At rest, the plumes may be in a closed position making the moths appear more like plume moths (family Pterophoridae) than many-plume moths.

These moths fall into the nuisance pest category, as do so many insects that overwinter as adults. In fall, adults seek shelter in walls, firewood, near windows, sometimes causing alarm. While these moths are unique-looking and relatively easy to identify, it is always best to confirm your suspicions with the UPPDL to rule out pest moths like the Indianmeal moth or clothes moths.

What do these moths feed on? The Montana 6-plume larva has primarily been found on snowberry (*Symphoricarpos* spp.). In Utah, snowberry occurs from the foothills to high-elevation areas on open, dry slopes to moist meadows and forests. The exact life cycle of the Montana 6-plume moths is not known, but it is believed that this moth has one generation per year, with the overwintering moths emerging in spring as temperatures warm. Because of the wide range in elevation and habitats at which the moths occur, they can be found throughout the year. Larvae are active in spring and summer, and pupate on the snowberry plant, or in litter below.

The Montana 6-plume moth is a nuisance pest when it enters structures. Exclusion methods are recommended to help keep these moths from entering structures, but their small size will make complete exclusion difficult. Vacuuming or physical removal are the best methods to remove invading moths.

— Ryan Davis, Arthropod Diagnostician

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## Innovative Applications for Long-Lasting Insecticide Nets

Insecticide-treated nets have been popular for insect vector control in areas where humans are at risk for contracting malaria and other vector-borne diseases. The nets are treated with an insecticide that repels and kills mosquitoes and other insects that land on the nets. These nets are dipped or washed in insecticide solution; the insecticide longevity is generally relatively short-lived. Recent development of polyethylene screen fabric with insecticide incorporated into the fibers has extended the longevity of release of some insecticides up to multiple years. These fabrics can be washed when they become dirty, and fresh insecticide from the fibers moves to the surface to replace the active residue.

One such patented product, Vestergaard Frandsen, has 0.4% deltamethrin incorporated into the fabric, and is stable in outdoor conditions with high ultraviolet light exposure. The long-lasting nature of the product has expanded its use into livestock fencing to reduce disease-carrying and biting flies (ZeroFly®), and more recently for crop protection (PermaNet®). In Europe, PermaNet has been evaluated as fencing around crop fields to reduce populations of small flying insect pests such as root maggots, thrips, aphids, and flea beetles. The netting has shown promise for control of pests in greenhouse crops as well.

Recent research in the U.S. has evaluated the potential of long-lasting insecticide nets (LLINs) to kill the invasive insect pest, brown marmorated stink bug (BMSB) (Kuhar et al. 2017). When stink bug nymphs (immature stage) and adults were placed in containers with ZeroFly netting after just 10 seconds of exposure, more than 90% and 40% of nymphs and adults died, respectively. Ten-minute exposure of adults to the nets resulted in 84% mortality. Ongoing BMSB research is evaluating the potential of LLIN in combination with aggregation pheromone lures to function as an attract-and-kill device.

Recently, the Vestergaard netting became available in a bright yellow color. This past summer, my lab evaluated its potential for reduction of tephritid fruit flies in cherry orchards. Although we were unable to assess fly mortality directly as the flies typically fly off before they die, we were able to evaluate the attractiveness of fruit flies to the LLIN. The netting was not received and tested until late summer, after tephritid fly populations had declined; however, we were able to assess its attractiveness to multiple tephritid species. The LLIN was hung in 24" × 28" sheets from southwest facing limbs of tart cherry trees. An



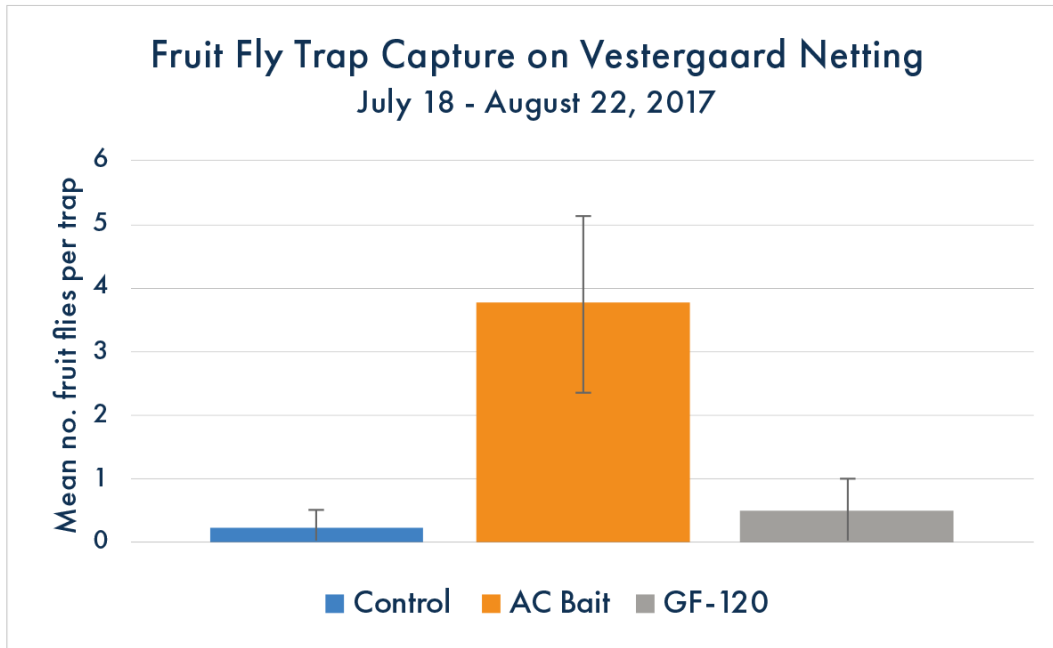
Sheets of Vestergaard net baited with ammonium carbonate were hung to attract-and-kill fruit flies in a cherry orchard.

Alpha Scents yellow sticky trap was hung from each sheet alone, with two ammonium carbonate (AC) bait boxes, or with the bait spray GF-120 (Dow AgroSciences) applied to the net. Treatments were replicated four times. Although fruit fly populations were low during the trial period, more flies were attracted to the nets with AC bait. The majority of flies were western cherry fruit fly (WCFF); some apple maggot (AM) flies and one walnut husk fly (WHF) were attracted.

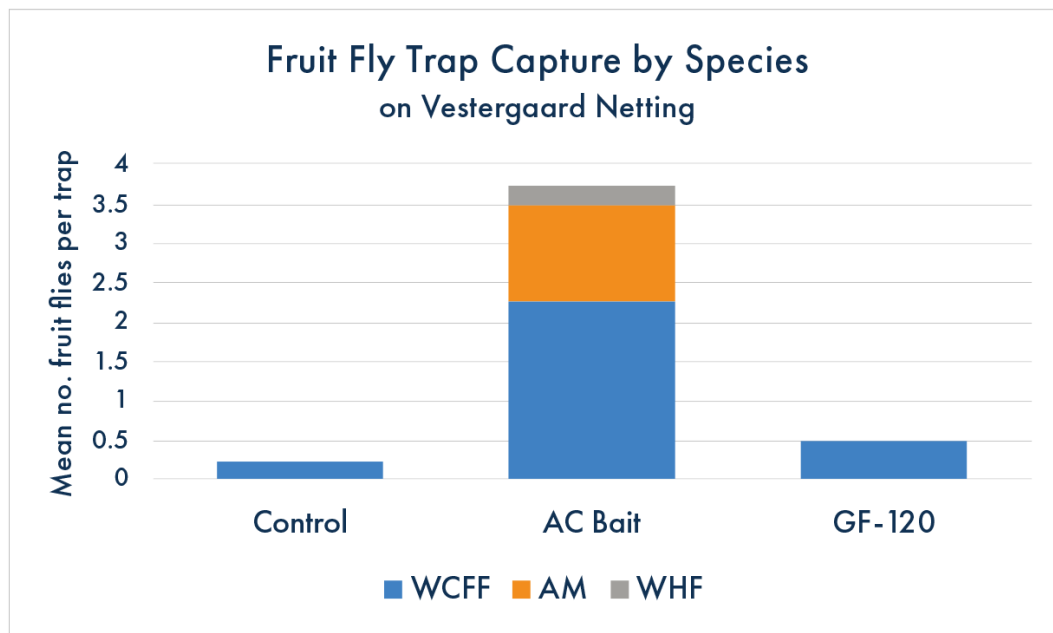
The potential of LLIN products to contribute to integrated pest management programs for crop insect pests shows promise. Net availability in multiple colors provides the opportunity to explore insect attraction and suppression for numerous crops and pests.

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Ammonium carbonate (AC) bait attracted the most fruit flies to the insecticide netting.



Western cherry fruit fly (WCFF), apple maggot (AM) and walnut husk fly (WHF) were attracted to Vestergaard netting in a cherry orchard

— Diane Alston, Entomologist

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Kuhar, T. P., B. D. Short, G. Krawczyk, and T. C. Leskey. 2017. Deltamethrin-incorporated nets as an integrated pest management tool for the invasive *Halymorpha halys* (Hemiptera: Pentatomidae). *Journal of Economic Entomology* doi: 10.1093/jee/tow321.

## IPM In The News

### Beet Armyworms Eating Each Other

Can beet armyworm, a common vegetable pest, become cannibalistic? The answer is yes. According to biologists from the University of Wisconsin, beet armyworms exposed to high concentrations of methyl jasmonate, will abandon their plant meal and instead eat one of their own. Methyl jasmonate is a chemical that plants produce themselves when they are under attack. The researchers sprayed caged tomato plants with either a control solution or low, medium, or high concentrations of methyl jasmonate, then added eight caterpillar larvae to each cage. The study, published in *Nature*, found that the armyworms ate each other quickly in the medium- and high-concentration treatments, with very little damage to the plants. The next area of study will be to apply this research to field conditions.

### Predicting a Pathogen that Kills Gypsy Moth

Caterpillars of the invasive pest, gypsy moth, can decimate northeastern deciduous forests. Fortunately, a fungal insect pathogen appeared in New England in 1989 that only infects gypsy moths. The fungus colonizes the caterpillar body, killing it within four to six days. Once dead, spores erupt from the caterpillar cadaver and become windborne. Entomologists at Cornell University found that clouds of these spores can travel more than 40 miles. They took this finding and developed a weather- and DNA-based model for tracking the geographic range of the pathogen to predict how bad gypsy moth damage will be in a given year.

### Improved Codling Moth Trapping Technique

Pheromone trapping is an important tool in monitoring codling moth, the “worm in the apple”, and growers are needing a more efficient trapping method. Michigan State University entomologists have studied the movement of moths to traps for over a decade. In that time, they found that a single standard trap only attracts moths within 17 feet, and that rather than “vacuuming moths in,” moths are actually only finding traps randomly. This leads to variable trapping results and potential injury in un-trapped areas of the orchard. In a study published in the *Journal of Economic Entomology*, the MSU team tested a new trapping approach, where instead of a single trap, five traps are placed 13 feet apart in a straight line. This method produced average catch numbers that were much less variable than single traps. The configuration does not greatly increase labor, but it does increase the probability of representative catch due to the combined reach of all the traps’ pheromone plumes.

### Biodiversity in IPM Orchards Same as Organic Orchards

According to research by the industry group Plant & Food Research out of New Zealand, using IPM in apple orchards has the same effect on biodiversity than fully organic systems. The group surveyed plant species and collected 210,000 insects from 15 orchards. The results, published in *Agriculture, Ecosystems & Environment*, showed that orchards using IPM had similar biodiversity index scores than the organic orchards. There were also no differences in the abundance and diversity of the key natural enemies that help to keep apple pests in check.

### Pests Build in High Tunnels

High tunnels are popular as a season-extending production method. They protect plants from the cold, allowing earlier plantings and later harvests. Many growers have felt that the enclosed nature of high tunnels keep pests from getting into the structure, and causing damage to plants inside. Purdue University entomologists tested this theory over a 2-year period using four plant-pest combinations: tomatoes and hornworms, broccoli and cabbage looper, imported cabbageworm and diamondback moth, and cucumber and cucumber beetle. Their results, published in *Pest Management Science*, found increased presence of the pests in high tunnels as compared with adjacent open field plots. In particular, the tomatoes in the high tunnels were decimated by the explosion of hornworms, a pest that is rare in field conditions. The authors theorize that pests enter the tunnels through the sides when plastic is rolled up for ventilation. When those insects are ready to exit, they tend to fly straight up, hitting the top of the tunnel and become trapped. Further research at Purdue is looking at solving this problem through the use of floral plantings to promote beneficials and side screenings to exclude pest insects while allowing for ventilation.



### Quick Detection of Crown Gall

Crown gall is a bacterial disease of woody plants that causes large galls to grow on roots, crown, and branches. Because there is no cure for the disease, early and rapid detection is key to management. Traditional methods of detection can take several hours using specialized equipment. Oregon State University plant pathologists published in *Phytopathology*, that they have taken a major step toward developing a faster, on-site detection tool. They first developed highly sensitive DNA probes that can detect the pathogen from a tiny sample. They then incorporated these probes with commercially available kits that use a dipstick to reveal the presence of the pathogen within minutes. Nurseries typically go through extreme protocols to keep their sites clean, and a quick detection method will reduce losses. OSU has filed for a patent for the molecular tool.



### Ants Shown to Fertilize Plants

For the first time, researchers have documented that nutrients from ant waste are taken up by foliage and transported to other places in the plant. Some trees, including those in tropical coffee plantations, can house up to 60,000 ants. Danish entomologists from Aarhus University found that the tree ants' excrement contains amino acids and urea. They wondered about the benefits of this "natural" fertilizer. They developed a mini coffee plantation with several individual coffee "trees" placed in water. The central coffee tree held a colony of weaver ants and the plantation included "bridges" so that ants could cross the water between some—but not all—of the trees. On the central tree, ants were initially fed a special nitrogen-containing amino acid that the researchers could identify in the excrement on the neighboring trees. They found that the ant-visited trees had a higher content of nitrogen than the other trees. In addition, the ant-visited trees had larger crowns than the trees without ants. The researchers will next investigate if this ecological phenomenon is widespread.

## New Publications, Videos, Books, and Apps

- Rodale Institute has introduced a new [Regenerative Organic Certification](#), a cooperative effort among a coalition of farmers, ranchers, nonprofits, scientists, and brands to establish a new, high-bar standard for regenerative organic agriculture. This certification does not aim to supplant current organic standards but instead builds upon the standards set forth by USDA Organic and similar programs.
- A series of [Insect Pest Handbooks](#) is available through the Entomological Society of America's website. The audience for the handbooks is other entomologists and agricultural research scientists, agricultural teachers and their students, area and county agents, veterinarians, foresters, master gardeners, and homeowners.
- "[Abrasive Weeding: A New Tool for Weed Management in Organic Agriculture](#)" is a fact sheet and video produced by eOrganic. Abrasive weeding is a non-chemical weed management tool that uses compressed air and grit to abrade weeds. The outreach materials include expected weed control and economic feasibility.
- "[Brambles: Organic Production](#)" is an ATTRA publication that introduces organic practices for fertility, weed, disease, and insect management. It also provides new information on high tunnel production and season extension and addresses economics and marketing.
- Videos of the five finalist's of the Entomological Society of America's "[Your Entomology](#)" contest are available to view online.
- The U.S. Environmental Protection Agency just released an updated guide to implementing IPM in schools titled [Pest Control in the School Environment: Implementing Integrated Pest Management](#). It provides an overview of IPM and details the steps a school can follow to establish an IPM program.



## Featured Picture of the Quarter



This praying mantid appears to be eating the head of a brown marmorated stink bug (BMSB).

BMSB are both agricultural and nuisance pests in North America. Natural enemies may play an important role in reducing BMSB populations. Although the praying mantid is not the most significant predator of BMSB, it never hurts to have one more player on the team.

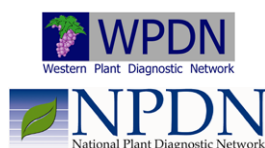
Some common biological enemies of BMSB include:

- parasitoids (*Anastatus*, *Trissolcus*, *Telenomis*, and *Ooencyrtus* families)
- spiders (*Theridiidae*, *Pholcidae*, *Agelenidae*, and *Salticidae* families)
- adult green lacewing
- predatory wasp (*Astata bicolor*)
- spined soldier bug
- minute pirate bug
- big eyed bugs
- coccinellids
- ants
- grasshoppers
- ground beetles
- earwigs
- soldier beetle larvae

For more information on natural enemies of BMSB, see [Stop BMSB: Who are the Native Natural Enemies of BMSB?](#)

—— Photo by Erin Petrizzo, Plant Pathology Research Assistant

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