



## Spring Into Alfalfa Weevil Monitoring

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#### NEW UTAH PESTS FACT SHEETS

The following can be found on our website:

Backyard Orchardist Series:

- Apple
- Apricot
- Cherry
- Peach/Nectarine
- Pear
- Plum

Critical Frost Temperatures for Fruit Trees

[www.utahpests.usu.edu](http://www.utahpests.usu.edu)

Spring is a time when Utah alfalfa growers become increasingly concerned whether the alfalfa weevil will devastate their first cutting and negatively impact subsequent cuttings throughout the growing season. The alfalfa weevil is an early season pest and the recent loss of Furadan, an insecticide commonly used as a prophylactic spray, means sampling and monitoring weevil populations is crucial to effectively time pest control measures.



Adult alfalfa weevils (A) have a characteristic snout and elbowed antennae. Eggs (B) are small, yellow, oval and deposited in clusters, and larvae (C) have a darkened head capsule and distinct white line down the center of their back. The pupal stage (D) lasts 10-14 days.

The alfalfa weevil is a snout beetle with one generation per year in Utah. In early spring, adult weevils begin depositing eggs in 3 to 4 inch-tall alfalfa stems. Eggs can hatch within 4 days, but continuous cool weather can delay larval emergence by several days or weeks. Small larvae (1/20" long) emerge from the eggs, exit the alfalfa stem, and climb to new alfalfa growth to feed. Young larvae are cream-colored and become bright green as they mature and grow in size (reaching 3/8" long). Although adult weevils and all larval stages feed on foliage, mature larvae are the most damaging and voraciously feed near the first alfalfa harvest. Fully grown larvae move down the plant to pupate on or near the soil surface and new adults emerge in early summer. Although these adults are active in the field they generally do not cause economic damage. By mid-summer the adults migrate to sheltered sites to overwinter until the following spring.

Recommendations for stem sampling (shake-bucket method).

Avg. larvae/ stem	Alfalfa height	Strategy
Less than 2	---	Sample 1 week later
2 or more	10-14 inches	Control recommended
2.5 or more	15-18 inches	Control recommended
3	18+ inches	Control recommended

The best success for weevil management is to monitor larvae regularly before the first cutting and when stems are at least 10 inches tall, using the stem or sweep sampling method. For either method, sample within a "U" or "Z" pattern in the field so stem and sweep samples are representative of the entire field, and avoid sampling near field edges (keep 20 paces away).

Stem sampling, or the "shake-bucket method," more accurately detects small

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## Alfalfa Weevil Monitoring, continued from previous page

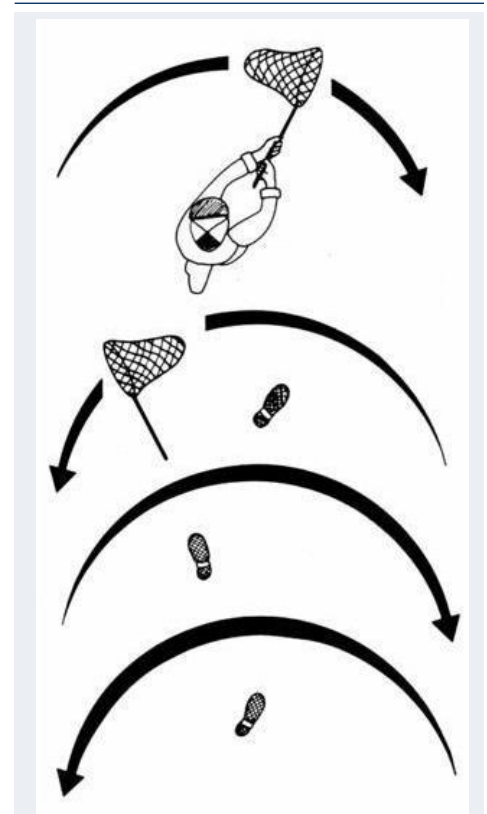
larvae than sweep sampling. To sample, clip 30 to 50 individual alfalfa stems at the soil surface and carefully place stems top-side-down into a 5-gallon bucket. Shake groups of five alfalfa stems at a time vigorously against the inside of the bucket to dislodge small larvae hidden in tight leaf whorls. Count the total number of weevil larvae collected and calculate the average number of larvae per stem (e.g., 32 larvae collected ÷ 50 stems = 0.64 larvae per stem). Refer to the recommendations in the table on the previous page.

Sweep net sampling consists of swinging a 15" diameter canvas net from side-to-side in a 180° arc. Take a series of 10 sweeps at several locations in the field. Count the number of larvae after every 10 sweeps, calculate the average number of larvae per sweep, and follow the recommended strategies in the table below. Be sure to use the correct recommendations for the selected sampling method.

Recommendations for sweep sampling.

Avg. Larvae/sweep	Strategy
Less than 10	Sweep 1 week later
10-19	Sweep 3-5 days later
20+	Control recommended

Currently, chemical control and early cutting are the two main strategies for alfalfa weevil control. When larvae are not at destructive levels or destructive levels are just reached during the final 2 weeks before expected cutting (refer to Table 1 and 2), strongly consider an early cutting as an alternative to chemical spray. It is important to monitor re-growth and stubble infestations post-harvest particularly when using early-cutting for management. Newly emerged adults and weevil larvae may be concentrated in windrows and have the potential to reduce re-growth. It is recommended that a post-harvest treatment be done when adults are found feeding on 50% of crowns and normal green-up is prevented for 3-6 days or when larvae from 30 stems exceeds 20, 30, and 45 larvae on alfalfa stems 2, 4, and 6 inches



In sweep sampling, swinging the net from one side of the body to the other is considered a full sweep. The net should be kept below the tops of the alfalfa plants until the end of the sweep.

tall, respectively, 5-7 days after harvest. When adults and larvae are below these levels and normal green-up is present no treatment should be necessary.

-Ricardo Ramirez, Entomologist

### References:

- Evans, E.W. 1989. The alfalfa weevil in Utah. Utah State University Extension. Fact Sheet No. 58.
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- Statewide IPM Program, 1981, *Integrated Pest Management for Alfalfa Hay*. Oakland: UC ANR Publication 3312.

## Powdery Mildew in Your Backyard – Part II

### POWDERY MILDEW ON CUCURBITS

There are two powdery mildews that can occur on melons, squash, cucumber, pumpkins, and watermelon. Without a microscope, both look alike. *Podosphaera xanthii* (syn. *Sphaerotheca fuliginea*) is a mildew that has developed several races that infect some cucurbit varieties but not others. Seed companies may mention whether a variety is resistant to powdery mildew and to which race. For example: bean variety 'A' is resistant to race 1 but not race 2. If race 1 is found on a neighboring bean variety 'B', bean variety 'A' would not get powdery mildew. However, if race 2 of this mildew is present, then bean variety 'A' would be infected. *Podosphaera* powdery mildew occurs during warmer months.

The second powdery mildew is *Erysiphe cichoracearum*. It does not have races and infects all cucurbits except watermelon (which is susceptible instead to *Podosphaera xanthii*). *E. cichoracearum* also infects many weeds and some ornamentals that could provide inoculum for cucurbits. *E. cichoracearum* is more frequently observed during spring and early summer when temperatures are cooler.

Severe powdery mildew infection can result in yield loss. Both powdery mildews cause damage to the plants by reducing photosynthesis. Once the leaves are covered with white mycelium, they absorb less sunlight and are not able to produce enough sugars to sustain plant and fruit growth. In addition, heavily infected leaves become necrotic (turn brown and die) and fall off, which can result in sunburn of fruit.

The best management is the use of resistant varieties. Sulfur products work very well when they are applied just as the first spots of mycelium (threads of fungal growth) appear on the leaves. The treatment has to be repeated throughout the growing season as new spots appear. Sulfur should not be applied at temperatures above 90°F, as the leaves will burn. It is best to apply sulfur either in the evening after temperatures cool down or very early in the morning. Potassium bicarbonate is also very effective but needs to be applied often and does not have residual activity. Removing infected plant material with mycelium and spores results in fewer spores present to cause new infections.

### POWDERY MILDEW ON ORNAMENTALS

Powdery mildew on ornamentals affects mostly the aesthetic value of the plants. Ornamentals such as lilac, maple, rose, columbine, dahlia, delphinium, and phlox are frequently infected with powdery mildew in late summer and early fall. There are many different powdery mildew species that infect



Severe infections of powdery mildew can result in a plant of poor vigor and cause losses in fruit yield, as shown on watermelon (top). It is best to monitor plants and look for young powdery mildew lesions forming on leaves to determine when to treat, such as on these cucumber leaves (bottom).

ornamentals. Each of them will infect one or more plant species. For example, *Sphaerotheca pannosa* infecting roses can also infect photinia and *Erysiphe cichoracearum* infects many ornamentals in the composite family including zinnia, phlox, chrysanthemums and dahlias. Treatment options are the same as with powdery mildew of cucurbits.

-Claudia Nischwitz, Plant Pathologist

#### For additional information:

- Cucurbit powdery mildew, [Cornell University](#)
- Cucurbit powdery mildew, [UC Davis](#)
- Ornamental powdery mildews, [Utah State University](#)
- Ornamental powdery mildews, [UC Davis](#)



## Can Plants Get “Immunized” Against Diseases?

Exploiting plants' natural ability to ward off pests is an alternative option to disease control that can reduce pesticide use. For decades, biologists have known that plants can develop “immunity” to certain pathogens after being “vaccinated” with microorganisms or specialized proteins. This type of resistance is technically referred to as systemic acquired resistance, and it is only recently that development of products for this type of plant protection has increased.

### HOW IT WORKS

Systemic acquired resistance (SAR) is a defense response that can occur by inoculating a plant with a SAR elicitor, which could be a weaker or non-virulent strain of a specific pathogen, or a synthetic chemical compound. The resistance is regulated by salicylic acid, which drives a set of complex pathways that “jump into action” to prevent infection. Salicylic acid induces the accumulation of proteins, called pathogenesis-related proteins (PR proteins) throughout the plant, that in turn protect it from disease. The PR proteins create morphological and biochemical changes in SAR-protected plants, including a faster lignification response, an increase in glucose and fructose, and an accumulation of antimicrobial and fatty acid derivatives.

### BIOLOGICAL SAR ELICITORS

There are several organisms that have been examined as eliciting resistance in agricultural crops, often leading to defense against multiple organisms. For example, it was shown that radishes inoculated with a biocontrol strain of *Pseudomonas fluorescens* were protected from a fungal root rot and bacterial and fungal leaf spots, and cucumber inoculated with *Colletotrichum lagenarium* were protected against a dozen diseases caused by fungal, bacterial, and viral pathogens.

Use of SAR biological elicitors on landscape plants has not received much attention and would most likely be restricted to specimen trees or the nursery and greenhouse industry. Dutch Trig (*Verticillium albo-atrum*) is one of the few available, labeled for the protection of elms against Dutch elm disease.

### CHEMICAL SAR ELICITORS

SAR can also be triggered by exposing the plant to salicylic acid. Applying salicylic acid to foliage, however, causes severe phytotoxicity, and several other chemicals have been developed that are just as effective and safer to use. The most commonly tested chemical is benzo (1,2,3) thiazazole-7-carbothioic acid S-methyl ester (BTH). BTH (Actigard) is registered on a variety of agricultural crops. Other examples include harpin (Messenger), which is a protein derived from *Erwinia amylovora*, and a variety of phosphonate products that

are registered on agricultural crops, turf, and ornamentals.

Actigard was originally marketed as a means to control powdery mildew of wheat and barley and has since been tested on dozens of other crops.

There are over 30 examples of disease management with Actigard, including powdery mildew, septoria leaf spot, and leaf rust of wheat, downy mildew of maize, bacterial spot of tomato and pepper, apple scab on apple and pear, fire blight on apple, and citrus scab and leaf spot of citrus.

Phosphonates (Aliette, Agri-fos, Vital, Fosphite, etc.) are primarily used for prevention of *Phytophthora* diseases. Recent reports, however, show that these products have some efficacy against downy mildew, apple scab, phomopsis canker on grapes, rust on bean, fusarium wilt, dollar spot on turf, and powdery mildew.

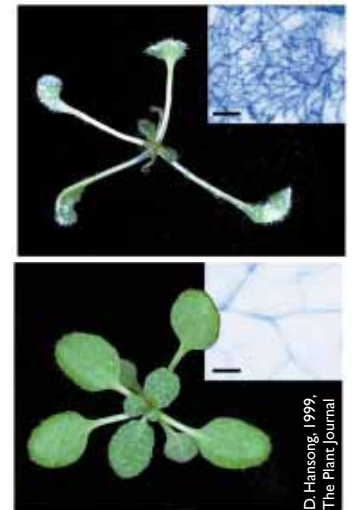
### CONCLUSION

The use of SAR elicitors in agricultural crops and landscapes has the potential to become a sustainable approach for plant protection. Biological or chemical elicitors can effectively reduce diseases caused by a broad spectrum of pathogens. SAR can reduce the use of pesticides, does not involve gene transfer, and can sometimes last the lifetime of the plant. The agricultural and landscape industries would benefit from the registration of a wider variety of effective SAR elicitors.

-Marion Murray, IPM Project Leader



Examples of products that can protect certain plants from disease through the process of systemic acquired resistance.



Evidence of systemic acquired resistance in an Arabidopsis plant treated with harpin (bottom) after inoculation with *Phytophthora parasitica*.

## Tree Killers: Bark Beetles and Their Control

Bark beetles are one of the most destructive insect groups in the world. While most of the damage occurs on forest land, trees in the urban landscape are also at risk of attack by bark beetles. Bark beetles (subfamily Scolytinae) are a group of small, mostly black to brown beetles that are very difficult to identify. The largest member of this group is the red turpentine beetle, which reaches a maximum length of 8 mm. Despite their small size, bark beetles can work together to overcome host trees (mass attack), killing them outright, or killing portions of the tree.

The bark beetle life cycle begins when adults emerge from trees infested the previous summer or fall. "Pioneer" beetles search for new trees by cuing in on host chemicals. They can detect and select stressed trees which are less able to defend themselves. They land on the tree and bore a hole through the bark into the phloem of the tree. If the pioneer beetles survive the host tree's resin or toxic chemicals, they create a nuptial chamber where mating occurs. Mated females then tunnel their way through the phloem, creating parental galleries along which they lay their eggs. Parental galleries vary greatly in shape and size depending on the beetle species, and are often used to aid identification. As the adult beetles eat and digest phloem tissue, they release pheromones that attract other bark beetles of the same species.

Eggs hatch, and each individual larva chews its own gallery leading away from the parental gallery. The larval galleries start out very narrow, and increase in size as the larvae grow,



Mountain pine beetle (*Dendroctonus ponderosae*) parental and larval galleries.



Trees attacked by bark beetles may have beetles on the bark (A), fading/yellowing crown (B), pitch tubes (C and D), and sawdust like material (frass) in the bark crevices or on the ground around the trunk. Any of these signs on backyard trees would warrant an examination by a certified arborist.

getting larger as they extend out from the parental gallery. Once the beetles have gone through their immature stages, they create a circular pupal chamber at the end of the larval gallery. There they pupate into adult beetles. Eventually, the adults emerge from the tree to start the life cycle again. Depending on the beetle species and climate, beetles can have from one generation every two years to one to five generations per year.

In Utah, spruces, pines, elms, and fruit and nut trees are the primary trees affected by bark beetles. The table on the following page lists the most common Utah bark beetles and their hosts.

Usually, by the time people realize they have bark beetles, it is too late to save the tree. All control tactics for bark beetles are proactive, and begin by keeping trees stress free. Trees should be properly planted in the appropriate site, given optimal water and fertilizer, and kept free from injury. For example, blue spruce should not be planted with drought

tolerant plants (xeriscapes) because they will not receive enough water, becoming stressed and more susceptible to attack. Planting rows of the same species of tree provides easy access to host material for bark beetles as they move from one tree to the next. Planting a diverse landscape limits

continued on next page

Bark Beetles, continued from previous page

pest movement. Where necessary, use chelated iron, and avoid injury to root systems during construction or other projects.

Bark beetle damage may not be visible until crown dieback occurs, so careful observation of susceptible trees is important. Dying trees in the vicinity might contain beetles that will emerge and move to susceptible trees. Trees attacked in late summer or fall may still have green foliage the following spring and early summer.

Infested trees should be removed and chipped or debarked immediately to prevent emerging adults from killing more trees. Do not cut down infested trees and keep the firewood near susceptible trees. A preventive insecticide spray can provide protection to trees that have not been attacked but are near beetle-killed trees.

Preventive insecticides should be applied before beetles emerge in spring or early summer. Typically, spring applications should occur once temperatures are consistently over 50°F. At this temperature, many bark beetles continue development under the bark or emerge to find new host trees. Properly timed and applied insecticides will kill bark beetles as they chew through the insecticide-soaked bark, preventing successful attack. Once beetles are under the bark, no insecticide treatment will save the tree. To date, no systemic insecticides have been proven effective at preventing bark beetles from killing trees.

For pines and spruces, formulations of carbaryl (Sevin SL), bifenthrin (Dagnet, Masterline Plus C, Astro), and permethrin (Onyx) are effective at preventing bark beetle attack. Carbaryl offers 2 year protection, while the pyrethroid insecticides last 1 year. Avoid using lawn and garden products with these active ingredients, as they may not be as effective as the products listed above. For fruit, nut, and other ornamental hardwood trees, active ingredients such as spinosad, endosulfan, chlorpyrifos, carbaryl, and permethrin can effectively prevent successful attack. Always make sure that the site of application is listed on the insecticide you select. In most cases, commercial applicators with high pressure sprayers are needed to propel insecticides high up on the main stem and branches.

Beetles collected from infested trees may be sent to the Utah Plant Pest Diagnostic Lab (UPPDL) for identification. When submitting a bark beetle sample always include host tree information, and a picture of the galleries if possible (remove

Utah's common bark beetles.

Bark Beetle Name	Utah Hosts
Spruce Ips	blue & Engelmann spruce
Engelmann Spruce Ips	Engelmann & Norway spruce
Pine Engraver	ponderosa, lodgepole, and occasionally other pines
Pinyon Ips	pinyon and singleleaf pinyon
Six-Spined Ips	ponderosa pine
Pine "Ips"	pinyon, lodgepole, limber, ponderosa and other pines
Banded Elm Bark Beetle	elms
European Elm Bark Beetle	elms
Fir Engraver	firs
Shot-hole Borer	apples, pears, cherries, and hawthorns
Mountain Pine Beetle	lodgepole, ponderosa, limber, and other pines
Douglas-Fir Beetle	Douglas-fir
Roundheaded Pine Beetle	ponderosa pine
Spruce Beetle	Engelmann and blue spruce
European Shot-hole Borer	Norway & sugar maple, water & paper birch, hazels, walnuts, apples, pears, cherries, oak, willow, and grapes
Walnut Twig Beetle	walnuts
Arizona Cypress Beetle	Arizona cypress, junipers, cedar
Western Balsam Engraver	sub-alpine fir, white fir, and Engelmann spruce (not common)

bark with a hatchet). Proper identification of bark beetles can lead to precise prevention tactics for other at-risk trees.

-Ryan Davis, Arthropod Diagnostician



## CAPS Update: Light Brown Apple Moth

This year a survey for eight insect species will be conducted in 50 Utah orchards as part of the Cooperative Agricultural Pest Survey program. One species that will be targeted is the light brown apple moth (LBAM), *Epiphyas postvittana*. This species, native to Australia, has become established in many parts of California since its detection in 2006. California has been working hard to eradicate the pest; meanwhile, a male LBAM was found in Oregon in 2010.

Light brown apple moths are 0.4 inches-long, about half the size of a dime. They tend to be yellowish-brown with dark brown markings on their forewings. The greenish caterpillars are the most damaging stage, consuming leaves, flowers, and fruits. They feed and hide inside rolled leaves, making it difficult to effectively control them with insecticide sprays. There is some evidence that LBAM may be developing resistance to some commonly used insecticides.

Many of the 120 plant genera that are known LBAM hosts are grown in Utah, including apples, peaches, pears, and raspberries. Historically, Utah has been surveyed for LBAM many times, but continued monitoring is crucial, especially now that there is potential for accidental introduction from California. Early detection of this pest is important to prevent severe economic impacts within our state.

-Cory Stanley, USU CAPS 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 Cory Stanley (USU) and Clint Burfitt (UDAF).*



Department of Primary Industries and Water, Tasmania Archive, Bugwood.org



Department of Primary Industries and Water, Tasmania Archive, Bugwood.org

Light brown apple moth (adult, top) has not been detected yet in Utah. The larvae (bottom) can damage apple fruit by feeding when fruit are small. They also feed on a variety of other hosts including peaches and raspberries. A rigorous trapping program will be conducted in Utah in 2011.

## IR-4 Pesticide Registration Successes

IR-4 is a national program to assist with the registration of crop protection products on minor or specialty crops. Product registrations that were completed in the last quarter of 2010 with relevance to Utah crops include:

- Acramite (bifenazate) – miticide on strawberry and other low-growing berries
- Oberon (spiromesifen) – insecticide/miticide on dry pea and mint
- Kanemite (acequinocyl) – miticide on fruiting vegetables, okra, edible podded beans, and hops
- Moncut (flutolanil) – fungicide on brassica leafy greens and turnip greens
- Dual Magnum (S-metolachlor) – herbicide on carrot, bulb onion, green onion, brassica leafy greens, turnip greens, melon, and caneberrries

## Monitoring for Insect Pests

Spring is here, and it's time to start monitoring for insect pests. Early and consistent monitoring, will aid in maintaining an integrated pest management program. It is a lot easier to keep pest populations at low levels using non-chemical methods if they are detected early. It is best to survey for insect activity at least weekly from spring to mid-summer, and at least every other week later in the season.

Look for insects in all of their life stages (eggs, larvae, pupae, adults) wherever they might occur, such as the undersides of leaves, under bark, inside fruits, and in soil. A helpful article on scouting for egg masses was written in the [Utah Pests Landscape IPM advisory](#).



When monitoring for insects, be aware of insect damage that can help to detect insects that are nocturnal or very small. Don't just look for damage to leaves and fruits, but look for holes in wood and bark that might be evidence of boring insects.

There are certain tools that are important for successful pest detection. A 10-30x hand lens can be very helpful for examining eggs, larvae, pupae, and small adults. Hand lenses can be purchased online and are inexpensive. There are several places to purchase a hand lens including amazon.com and bioquip.com. The hand lens should be used to examine plants for difficult-to-see symptoms, tiny insects such as thrips and mites, and to help identify the insects that you find.

Several insects, such as moths and flies, can be monitored using sticky cards or pheromone traps. Pheromone traps attract target insects using lures and a sticky liner. More information on using pheromone traps can be found in the [Utah Pests Tree Fruit IPM advisory article](#). Two companies that carry traps are greatlakesipm.com and contech-inc.com.

Double-sided tape can be wrapped around tree limbs to monitor for scale crawlers. Many well-hidden insects can



Insect traps are used for monitoring, not pest control. Pheromone traps use insect-specific lures and sticky liners that attract and trap a target insect. Do not use white-colored traps because they attract honeybees.

more easily be monitored using a beating tray, which can be purchased online, or homemade. Instructions for making one may be found on the Utah Pests sampling forms for [pear psylla](#) and [campyloomma bug](#).

Finding insects is only the first step in monitoring, and accurate identification is important. Whitney Cranshaw's [Garden Insects of North America](#), is an excellent resource guide for identification. Insects that are difficult to diagnose should be collected for later identification. Tweezers, a small paintbrush, vials of alcohol, and small plastic containers are used for collecting and saving samples. Use the tweezers or paintbrush to retrieve the insects, placing hard-bodied insects in vials and soft-bodied insects, along with their food source, in plastic containers.

Photograph the insect, the damage it caused, and the surrounding area. Send the photos along with the insect to the Utah Plant Pests Diagnostic Lab (UPPDL). For a small fee (\$7), the UPPDL will not only identify the insect, but provide information about the damage, habits, life cycle, and control options. In addition to insects, they can also identify spiders, other arthropods, and plant diseases. For instructions on preparing and submitting samples, go to the [UPPDL website](#). More useful information can be found on the [Utah Pests IPM website](#), where I recommend that you sign up for the pest advisories that will help keep you informed about pests and their activity in our area.

-Cory Stanley, USU CAPS Coordinator



## Attract-and-Kill Stations for Management of Cherry Fruit Fly

Western cherry fruit fly, *Rhagoletis indifferens*, is the key insect pest of cherries in Utah and western North America. Processed tart cherries have a zero tolerance for fruit fly larvae, and so strict prevention of fruit infestation must be maintained. Use of a reduced-risk bacterial insecticide, spinosad, formulated with a feeding attractant, GF-120 Naturalyte, has proven effective in suppressing cherry fruit fly populations in Utah tart cherry orchards; however, the bait-insecticide is susceptible to ultraviolet light degradation and is not rainfast, and so must be reapplied every 5-7 days or immediately after a rain event. GF-120 is registered for organic production (OMRI approved).

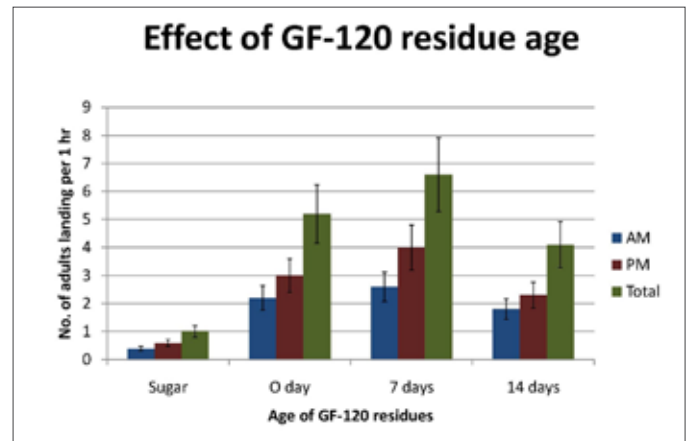
In collaboration with Dr. Jaime Pinero (now located at Lincoln University of Missouri, Jefferson City, MO), and based on previous research from Pinero and a team of entomologists at the University of Hawai'i, we proposed that killing stations could protect GF-120 droplets from sunlight and rain, and yellow color could enhance attraction of fruit flies to the bait droplets.

We constructed killing stations from 36 inch-diameter plastic plant pot saucers. Saucers were hung inverted from tree limbs or posts and GF-120 sprays were applied to the underside. Stations were painted green or yellow. We found that both male and female flies were attracted to killing stations treated with GF-120, but females preferred yellow to green-colored stations.

In experimental orchards with moderate to high cherry fruit fly populations, killing stations deployed at 18 and 30 per acre kept fruit infestation at or below 0.3%. Killing stations extended the efficacy of GF-120 droplets up to 14 days as compared to fresh residues. Interestingly, reproductively mature cherry fruit fly females (ovaries contained mature eggs) were more attracted to less concentrate GF-120 dilution (1 part GF-120 to 5 parts water) and GF-120 with the standard ammonium acetate concentration (1%) than to the more concentrated GF-120 (1:2.5 and 1:1.5) and GF-120 with 2% ammonium acetate. In contrast, immature females (without mature eggs) were equally attracted to all GF-120 and ammonium acetate concentrations tested.



Killing stations for cherry fruit fly may allow expansion of organic cherry production.



Effect of GF-120 residue age applied to killing stations for attraction of cherry fruit fly adults: 0, 7, and 14 day-old residues compared to fresh 20% sugar water. Data for morning (am), afternoon (pm), and total fruit flies per 1 hour observation period.



Killing station treated with GF-120 bait spray attract cherry fruit flies, which then feed on the bait, and are killed.

These results suggest that reproductively mature females looking for egg-laying sites in fruit can be repelled by ammonium acetate concentrations higher than about 1%. This finding bodes well for attempts to extend the longevity of GF-120 in the orchard through killing stations.

Once placed in an orchard, killing stations are relatively easy to maintain with targeted GF-120 sprays every 1-2 weeks. Sprays can be applied with a directed nozzle, such as from a hand-pump or electric sprayer mounted on an ATV. Yellow killing stations show promise as a technology to increase female fruit fly response to bait-insecticides, and could help expand organic cherry production.

-Diane Alston, Entomologist

## In the National News

### TWO PESTICIDES LINKED TO PARKINSON'S DISEASE

The National Institute of Health's Agricultural Health Study, which is examining pesticide use of 90,000 applicators, has found a relationship between the use of rotenone and paraquat and the incidence of Parkinson's disease. Applicators who used either pesticide were 250% more likely to develop Parkinson's than non-applicators. Rotenone targets mitochondria and paraquat can harm cellular structures. Rotenone has recently been voluntarily cancelled for all uses other than fisheries, and paraquat is a restricted use product.

### MODES OF BED BUG RESISTANCE

Entomologists at Ohio State University found that bed bugs collected from home dwellings that are resistant to pyrethroids produce enzymes that quickly degrade the pesticide, allowing the chemicals to be excreted without harming the insect. They compared the collected bed bugs to an isolated laboratory colony that had been pesticide-free for decades, and found that 1,000 times the amount of active ingredient was required to kill the collected bed bugs. Ohio's petition for an EPA emergency exemption to use propoxur was rejected in June 2010.

### NEW RICE STORAGE IPM METHODS

Rice is an important food staple to 3 billion people and rising. Storage insect pests, however, are developing resistance to treated rice, leading to huge losses. After 5 years of research, an international team of researchers have developed chemical-free integrated pest management (IPM) methods to protect stored rice that are now being used in

India and other developing countries. When compared to non-managed stored rice, the IPM stored rice was 95% cleaner. The approach involves electronic insect traps monitored with computers, aeration/refrigeration of silos, and carbon dioxide or nitrogen gas to slow pest development. The system could also help small farmers in developing countries get a better return on their rice.

### CANADA GOOSE DECLARED A PEST IN NEW ZEALAND

The Canada goose was introduced into New Zealand as a game bird, but now threatens native waterfowl, spoils waterways, and has become an agricultural nuisance. After several years of campaigning by the Federated Farmers, the NZ Government recently announced that the goose will no longer be protected and can be treated as a pest. One small island now has a population of 35,000, and the NZ Fish and Game will soon implement a pest management program.

### DESTRUCTIVE PEST INTERCEPTED IN ATLANTA

A khapra beetle larva (*Trogoderma granarium*) was identified in a small bag of dried beans intercepted by U.S. customs officers in the Atlanta airport from the luggage of passengers arriving from India. An outbreak of this pest, designated "one of the world's most destructive" occurred in California in 1953 and cost over \$15 million to eradicate.

### EARTHWORMS AFFECT WEED COMPOSITION

Ohio State weed scientists have discovered that earthworms drag 90% of ragweed seeds on the soil surface of crop

fields to underground burrows. This new insight explains why ragweed seeds survive in no-tillage fields. The discovery, made by tying string to seeds and finding the strings' paths created by the worms, shows the importance of earthworms in weed seed distribution.

### NATIONWIDE PESTICIDE USE HAS DECREASED

EPA announced a decrease in American pesticide use by 11% from 1997 to 2007. Recent phase-outs of organophosphates (chlorpyrifos and diazinon for residential use and azinphosmethyl for agricultural use) have led to a 55% reduction in use of this chemical class. As pesticide use goes down, costs increase, particularly for the agricultural sector. Farms in the U.S. spent \$7.3 billion on pesticides in 2006 and \$8 billion in 2007. The most commonly used products in all sectors are herbicides, with glyphosate, 2,4-D, and atrazine at the top. Sales in the U.S. account for 32% of the world market.

### WAR ON BROWN MARMORATED STINK BUG BEGINS

Seven eastern states will be submitting an emergency exemption to the EPA in spring 2011 to use the active ingredient dinotefuran in apple and peach orchards for control of brown marmorated stink bug. Existing agricultural uses of dinotefuran (Venom, Scorpion) include vegetables, grapes, and cotton. This new stinkbug has currently been detected in 33 states, and caused economic losses in 2010, feeding on fruit and causing deformity and brown discolorations. Other management options researchers are investigating are mass trapping and the release of predatory Asian wasps.

## Useful Publications and Websites

- A new database tool provides access to information on pesticide hazards and safe pest management. Access it [here](#).
- A [Washington State University website](#) dedicated to spotted wing drosophila provides information on spread, biology, management, and training.



## Featured Picture of the Quarter

The adult male western black widow (*Latrodectus hesperus*) is unlike the adult female in that it lacks the red abdominal markings, is brown in color, and is smaller. A bite from a male black widow is somewhat harmless whereas a bite from an adult female injects a hefty dose of latrotoxin, a neurotoxin that causes latrodectism (muscle pain followed by severe cramping). The widow name is now considered a misnomer. Although females in captivity have been seen consuming males after mating, in the wild, males typically retreat before being consumed.

-Image by Jabe Huber, Utah IPM Program

## Calendar of IPM-Related Events

April 29, Annual National Pesticide Forum, Denver, CO, [www.beyondpesticides.org/forum](http://www.beyondpesticides.org/forum)

May 5, Bed Bug Conference, San Diego, CA, [www.pcoc.org/upcoming](http://www.pcoc.org/upcoming)

May 9-12, North American Forest Insect Work Conference (NAFIWC), Portland, OR, [kelab.tamu.edu/nafiw2011](http://kelab.tamu.edu/nafiw2011)

May 17-19, Western Plant Board 2011 Annual Meeting, Reno, NV, [www.nationalplantboard.org/meetings](http://www.nationalplantboard.org/meetings)

May 17-19, Western Region Pesticide Meeting, Sacramento, CA, [pep.wsu.edu/wrpm](http://pep.wsu.edu/wrpm)

May 19-21, Food Policy from Neighborhood to Nation, Portland, OR, [foodpolicyconference.org/portland](http://foodpolicyconference.org/portland)

May 24, Bed Bug Conference, Las Vegas, NV, [www.npmapestworld.org/events/bedbugworkshop](http://www.npmapestworld.org/events/bedbugworkshop)

June 21-25, American Public Gardens Association Annual Conference, Philadelphia, PA, [www.publicgardens.org/content/2011-conference](http://www.publicgardens.org/content/2011-conference)

August 6-10, American Phytopathological Association Conference, Honolulu, HI, [www.apsnet.org/meetings/annual/Pages](http://www.apsnet.org/meetings/annual/Pages)

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