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UTAH PESTS QUARTERLY

NEWSLETTER

Utah Plant Pest Diagnostic Laboratory

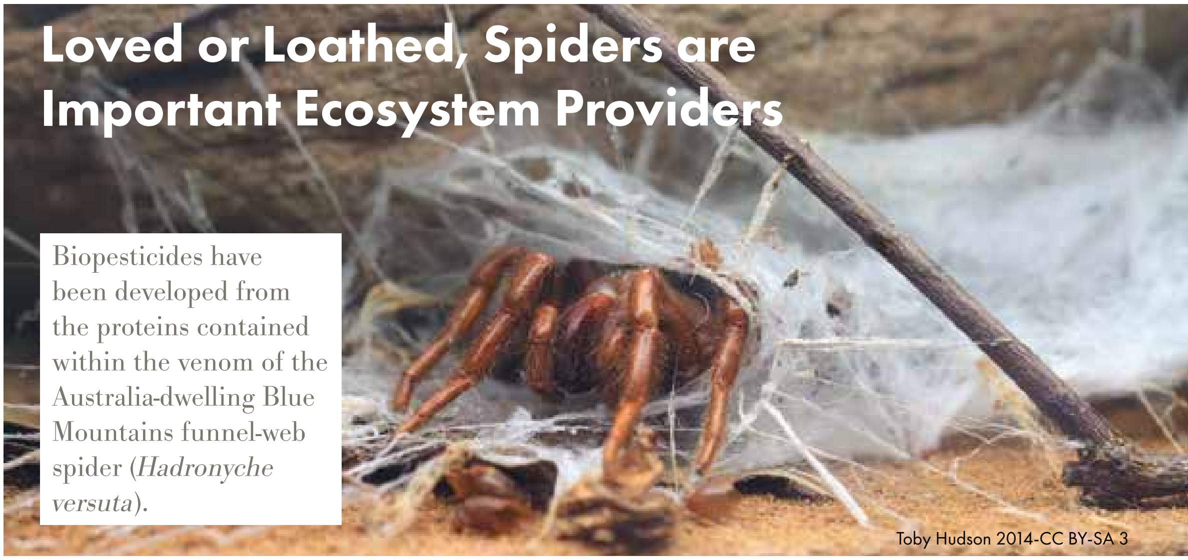
USU Extension

IN THIS ISSUE

NEW FACT SHEETS

EXTENSION
UtahStateUniversity

Loved or Loathed, Spiders are Important Ecosystem Providers



Biopesticides have been developed from the proteins contained within the venom of the Australia-dwelling Blue Mountains funnel-web spider (*Hadronyche versuta*).

Spiders are among the most common and diverse predators in terrestrial ecosystems. Under favorable conditions, spiders can reach peak densities of more than 1,000 individuals per m^2, and more than 45,000 species from more than 110 families have been described. They primarily feed on insects, but will also consume other arthropods, including spiders, and occasionally small vertebrates.

Spiders employ a wide range of foraging strategies, likely as a mechanism to promote coexistence and reduce competition for resources, and utilize multiple other tactics to maximize their foraging efficiency. For example, some spiders are relatively stationary and build webs or sit motionless on flowers before ambushing their prey; others are active hunters that capture their prey in full pursuit. Further, the bright coloration of some orb-weaving spiders attract insect prey; whereas other spiders are camouflaged to match their background and avoid being noticed. In addition, some spiders construct their webs near flowering plants or fecal material, where prey availability is greater and predictable, and relocate their webs when prey availability is limited.

The ubiquitous presence of spiders and their voracious appetites lend well to spiders being used as biological control agents in multiple cropping systems. Although the role that spiders play in keeping insect populations under control has been widely recognized, the effects have varied from considerable to negligible (see Maloney et al. 2003, Michalko et al. 2019, and references therein). Negligible effects are often attributed to spiders being generalist feeders rather than specialized on a particular prey species.

Yet, predator effects can extend beyond consumptive or lethal effects. Non-consumptive (non-lethal) effects, also known as the "ecology of fear," occur when the mere presence of the predator lowers the abundance of the prey or changes prey behavior (e.g., reduced feeding, mating, and/or egg-laying) (Beckerman et al. 1997; Dupuy and Ramirez 2019; Hlivko and Rypstra 2003). This in turn can reduce pest damage to plants. For example, Rypstra and Buddle (2013) quantified herbivore damage on plants in the presence of spider silk, silkworm silk, and no silk controls, and found that even just the spider silk greatly reduced herbivore damage on

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Theridion logan was described as a new species in 2013 (Levi and Patrick 2013), and discovered in Cache County's Green, Logan and Blacksmith Fork canyons by Drs. Lori Spears and Stephanie Cobbold.

Ryan P. O'Donnell and Stephanie M. Cobbold

plants. These studies lend further support to conservation biological control, or the promotion of management strategies that conserve natural enemy populations and the ecosystem services that they provide. For more information about maintaining and enhancing natural enemies, including spiders, consult the Beneficial Insects of Utah guide.

Spiders inject venom to immobilize their prey, followed by digestive enzymes that liquefy the prey, allowing for consumption. Recent studies have found that spider venom contains compounds that can be used as an insecticide (King and Hardy 2013; Windley et al. 2012). Vestaron Corp. launched the products Spear-T and Spear-LEP, whose active ingredient is a protein found in the venom of the Australian-native, Blue Mountains funnel-web spider (*Hadronyche versuta*). Spear-T is labeled for greenhouse application for aphids, spider mites, thrips, and whiteflies on vegetables and ornamentals, and Spear-LEP is labeled for caterpillars of many specialty crops. They work upon contact (Spear-T) or ingestion (Spear-LEP) by disrupting the insect's nervous system. These biopesticides do not harm beneficial species, including pollinators, and are registered for use in Utah.

Despite spider venom being toxic, relatively few spiders are dangerous to humans. In Utah, the spiders that pose the greatest risk to human health are the black widow (*Latrodectus hesperus*) and the desert recluse spider (*Loxosceles deserta*). However, the desert recluse spider is rarely encountered indoors, and occurs only in Washington County. Note that this species is not the same as the brown recluse spider (*L. reclusa*), which does not occur in Utah, contrary to popular belief. So the next time you see a spider, thank it for capturing those pesky insects we continually fight in our gardens, orchards, and fields.

——— Lori Spears, USU CAPS Coordinator

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Plant Diseases and Wet Soils in Vegetable Production

Spring of 2019 was a rainy season, and that combined with excessive summer irrigation, especially in heavy soils, can lead to infections of soilborne pathogens such as *Pythium* or *Aphanomyces*. Both pathogens belong to the Oomycetes, fungal-like organisms. Pythium is frequently considered a seedling pathogen. However, it can also affect root vegetables such as radishes, or roots and fruit of cucurbits.

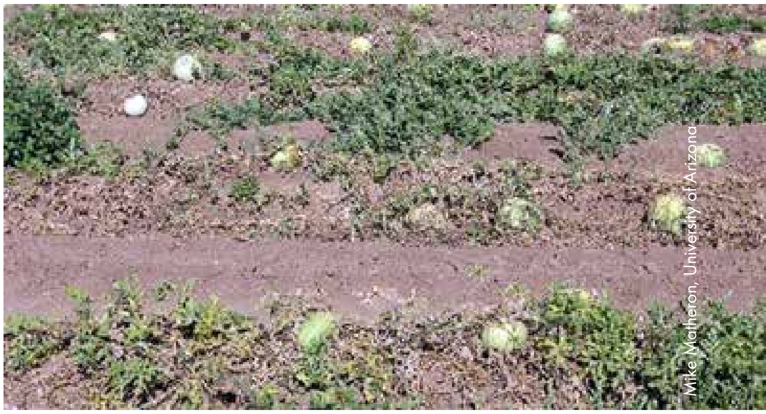
Pythium and *Aphanomyces* both affect radishes, causing very similar symptoms. Both species cause black lesions on the roots and stunting of plants. There are radish varieties available that are resistant to *Aphanomyces* but none that have resistance to *Pythium*. Based on the symptoms, the two pathogens cannot be distinguished. Culturing infected plant material on agar, and in some cases, using molecular tools, are necessary for identification. There are very few fungicides registered on radishes that would control these pathogens. The fungicide, Fosphite, is available, and should be applied with irrigation (following the label).

In the 2018 growing season, watermelons in Utah were affected by root and fruit rots caused by *Pythium*. *Pythium* species are soilborne pathogens that produce motile spores. The spores have flagella, little hair-like appendages that propel them forward in a film of water. Once plants are infected, there is no cure.

Two *Pythium* species were identified – *Pythium aphanidermatum* and *Pythium ultimum*. Both species have a large host range including alfalfa and small grains that are often used as rotational crops in vegetable fields. The above-ground symptoms consist of poor vigor, and wilting and dying plants despite wet soils. On vegetables, the fruit-rot symptoms start as brown spots on the underside where the fruit comes in contact with the ground. Eventually, cottony mycelium develops, and the fruit liquefies.

Reducing soil moisture levels may reduce the spread of *Pythium* to neighboring plants. In fields that had disease problems in the past, using plastic mulch and drip irrigation can be very effective. The fruit will not come in direct contact with the soil. Drip irrigation reduces the moisture levels in the soil without affecting plant growth. Chemical control options are very limited. A soil drench with mefenoxam (following the label) can be used to control the root rot but it will not help with fruit rot.

—— Claudia Nischwitz, Extension Plant Pathologist



Black lesions on radishes infected by Pythium (top).

Watermelon infected by Pythium. The lesion started as a brown spot, and enlarged to a soft rot with a cottony mass of mycelium (middle).

Watermelon field showing the spread of Pythium from plant to plant (bottom)

Vegetable Leafminer Survey

There is concern that an invasive European leafminer of onions and related plants may show up in Utah, the allium leafminer, *Phytomyza gymnostoma* (Loew). In the U.S., the allium leafminer has been detected only in the Northeast in MA, MD, NJ, NY, and PA. The adult is a small fly in the Family Agromyzidae; the feeding larvae can cause severe stunting, wilting, and leaf distortion. Onion (bulb and green), leeks, garlic, chive, shallot, and ornamental alliums are all susceptible hosts.

To survey for this and other leafminers that attack vegetable crops, gardens, and weeds growing in the vicinity of vegetable plants in Utah, we are seeking samples of plant leaves with active leafminer larvae. The Nischwitz Lab is using DNA techniques to identify leafminers species. If you suspect leafminer damage to your vegetable crop, please contact Claudia Nischwitz (claudia.nischwitz@usu.edu) or Diane Alston (diane.alston@usu.edu) to arrange for sample collection.

Leafminer larvae form tunnels as they feed within leaf tissue. Mining activity can affect the market value of vegetables harvested for edible foliage, such as beets, chard, and spinach. Four leafminer species are known to occur in Utah vegetable crops: American serpentine leafminer (*Liriomyza trifolii*), pea leafminer (*L. huidobrensis*), vegetable leafminer (*L. sativae*), and spinach leafminer (*Pegomya hyoscyami*). Beet leafminer (*P. betae*) most likely also occurs, but has not been confirmed in Utah with molecular tools. These leafminers attack a wide range of vegetable crops and ornamental flowers. To learn more about leafminers in Utah, see the Utah Pests Vegetable Leafminers fact sheet.

——— Diane Alston, Entomologist

—— Claudia Nischwitz, Extension Plant Pathologist

Leafminer 'mine' in spinach leaf in a Utah garden.

Sven Spichiger, Pennsylvania Dept. of Ag.

T. Elkner, Pennsylvania State University Extension

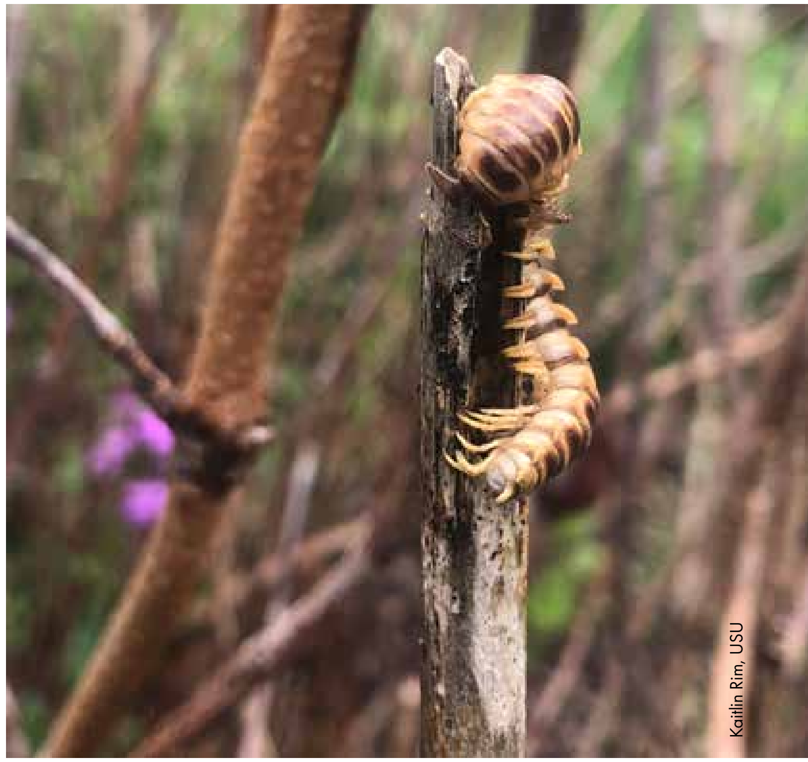
Sven Spichiger, Pennsylvania Dept. of Ag.

Allium leafminer causes onion plants to twist and deform (top).

Female allium leafminer adult puncturing an onion leaf with her ovipositor. Note the linear puncture marks, an indication of adult activity (middle).

Allium leafminer larvae feed in the developing onion bulb (bottom).

"Sick" Approaches to Pest Management



Sometimes entomopathogen-infected arthropods behave strangely, almost like the disease is controlling their mind! Virus infected caterpillars like this soybean looper (left) will climb up and die with their hind limbs firmly grasping the undersides of leaves or stems. When the insect exoskeleton breaks, virus particles drip onto the leaves below. This millipede (right) is infected by an entomopathogenic fungus that forces hosts to climb about 3 ft high before they die. This climbing behavior helps the fungus grow and disperse to other areas.

Like humans, insects are exposed to and can be affected by many diseases. Usually insects will eat or be exposed to surfaces in their environment that have bacteria, viruses, fungi, and nematodes that enter and infect the insect. When insects are sick, they feed less, develop slowly, and usually die within a few days to a week. Insect diseases (entomopathogens) naturally present in the environment can contribute to pest suppression. Many of these entomopathogens have been commercialized so they can be used as a biopesticide.

Insect pathogenic bacteria are microscopic, single-celled organisms that produce toxic gut proteins when ingested by immature insects. These chemicals are only toxic to insects because the environment in insect guts is unique for activating these proteins. This makes these types of bacteria safe for humans, pets, and wildlife because their digestive systems kill these types of bacteria and the proteins they produce. The most commonly formulated bacteria for commercial use is *Bacillus thuringiensis* (Bt). There are different types of Bt that target specific groups of insects (mosquitoes, flies, beetles, and caterpillars). The chemicals produced by Bt have also been genetically incorporated into some crop varieties of corn, cotton, and soybeans, targeting specific insects.

Insect-infecting viruses are microscopic, non-living particles. If the virus is an entomopathogen, insects (usually caterpillars) will ingest particles when they eat virus-coated plant material. Insect viruses are very specific, and can only infect and reproduce inside the target insect species. Once the insect is infected, the virus hacks its cell machinery and quickly multiplies. Eventually, the insect dies and liquefies within its exoskeleton. When the exoskeleton breaks, virus particles ooze out into the environment and infect nearby target insects. The availability of insecticidal viruses is limited, but products for codling moth (CYD-X), corn earworm (GemStar LC), and beet armyworm (Spod-X LC) are available.

Fungi are multicellular organisms that absorb nutrients from dead, decaying, and living hosts. Most entomopathogenic fungi infect insects by attaching to the insect exoskeleton, dispersing in insect blood, and digesting the insect from the inside out until death. When the nutrients inside the insect run out, you will see the fungus growing outside of

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the insect body. Fungal insecticides, including Mycotrol, Botanigard, and Met52, generally target many different types of insect pests.

Entomopathogenic nematodes are microscopic roundworms that live and search for insects in the soil. When they encounter an insect host, they will enter through the insect mouth or other natural openings. The nematodes release symbiotic bacteria that quickly kill (within 24-48 hours) and break down the insect tissues while the nematodes reproduce inside. In some instances, these nematodes will persist, exiting the dead host and searching for a new living host. *Steinernema* and *Heterorhabditis* are the two main groups of nematodes produced commercially. Different species in these groups have differing environmental requirements and host insects.

Using entomopathogens to manage crop and garden pests can be a great option for an IPM program. For instance, Cydia pomonella granulovirus (CYD-X) infects early stage codling moth larvae, while S. carpocapsae nematodes attack a broad range of insect pests and can be effective against larvae and pupae later in the season. Determining which pathogen matches the pest type and life stage is important, but it is essential to consider the environmental conditions that support a successful entomopathogen establishment, given that many of these are living.

Nematode species suitable to certain pests

Pest	Key Crop	Nematode Species to Consider
Armyworms, Corn earworm	Vegetables, Corn	*Steinernema carpocapsae, S. feltiae, S. riobrave*
Billbugs	Turf	*Heterorhabditis bacteriophora, S. carpocapsae*
Black cutworm	Turf, vegetables	*S. carpocapsae*
Fungus gnats	Mushrooms, greenhouse	*S. feltiae, H. bacteriophora*
Scarab grubs	Turf, ornamentals	*H. bacteriophora, S. carpocapsae, S. glaseri, S. scarabaei, H. zealandica*
Strawberry root weevil	Berries	*H. marelata*
Black vine weevil	Berries, ornamental	*H. bacteriophora, H. downesi, H. marelata, H. megidis, S. carpocapsae, S. glaseri*
Mole Crickets	Turf	*S. capocapsae, S. riobrave, S. scapterisci*
Small Hive beetle	Bee hives	*H. indica, S. riobrave*

Adapted from Pacific Northwest Extension Publication PNW 554

Advantages, disadvantages, and considerations when deciding to use entomopathogens as biological control agents.

Advantages of Entomopathogens	Disadvantages and Considerations
• Safe for the environment and vertebrates • Can target specific insect groups • Insect resistance to biopesticides is slower or reduced • Many can be bought from companies and applied similarly, using the same equipment as chemical insecticides • Some compatible with chemical insecticides • Most are approved for organic farming	• Sensitive to light and heat. Apply on a cloudy day or at dawn or dusk. • Sensitive to low moisture. Apply with water and/or irrigate application areas before and after applications. • May take a few days or multiple applications to see results and achieve pest control. • Can cost more than chemical insecticides. • May have a shorter shelf life than chemical insecticides.

For more information

National Pesticide Information Center, Bt Fact Sheet

Cornell University, Baculoviruses

UCANR E-Journal: Entomopathogenic microorganisms: modes of action and role of IPM

Penn State Fact Sheet: Insect-Parasitic Nematodes for the Management of Soil-Dwelling Insects

——— Kaitlin Rim (USU Biology Graduate Student) and Ricardo Ramirez (Extension Entomologist)

Western Yellowjacket: The Uninvited Picnic Guest

The western yellowjacket (top) is a late-summer nuisance pest with quite a sting. Like the yellowjacket, the European paper wasp (far right) and bald-faced hornet (near right) are social wasps.

Some people have a fear of many insects and arachnids, whether or not that fear is deserved. One insect, however, that is of legitimate concern due to its large populations, potential to sting, and habit of interacting with humans, is the western yellowjacket. Yellowjackets are one of the most dangerous insects concerning human health in Utah and across the country. From mid-to-late summer, yellowjackets love to scavenge sweets and meat, often during our fun outdoor gatherings.

Yellowjackets are considered social wasps. In Utah social wasps include the ground-nesting yellowjackets (*Vespula pensylvanica*), paper wasps (*Polistes* spp.), baldfaced hornets (*Dolichovespula maculata*), and *D. arenaria*, another aerial yellowjacket, all with a similar life history. Every fall, almost all members of a social wasp colony die. Prior to the onset of death, the colony will produce males and females which will mate. The males perish, but mated female queens overwinter in protected areas outdoors.

In spring – I've seen queen flight as early as April in Northern Utah – queens begin to emerge and look for places to construct new nests. They prefer voids such as old rodent burrows, behind siding, cement stairs, light posts, soil openings, or in other protected areas. Queens construct a new paper nest from scratch and lay eggs; each queen will provision her larvae with insect prey until they develop into workers, which will then take over nest construction, food collection, brood rearing, and defense. The number of workers increases slowly from April through June, but by mid-to-late July, populations start to boom. By the end of August and into September, colonies of western yellowjackets may contain over a thousand individuals in northern Utah.

Yellowjacket nests that are located on a person's property are straightforward to manage, albeit potentially dangerous. Most people should consider hiring a pest management professional to safely eradicate nests in places around the property. Professionals will puff a pyrethroid dust into the entrance hole of the nest with a bulb or bellows duster. Optimal timing for this application is early morning or night when most individuals in a nest are present. Applying directly into a yellowjacket nest is very dangerous, and anyone attempting this should wear protection such as a bee suit. Some extension pole applicators, such as the Gotcha Sprayer Pro, can hold aerosol insecticides as well as small bellows dusters. This can make applying dust to nest entrances somewhat safer for the user. Lightweight pyrethroid dusts, such as Delta Dust, are good choices for this purpose because dust is effective at finding its way into the nest. Aerosol formulations can be effective, but in some cases may not adequately penetrate the nest, resulting in incomplete kill.

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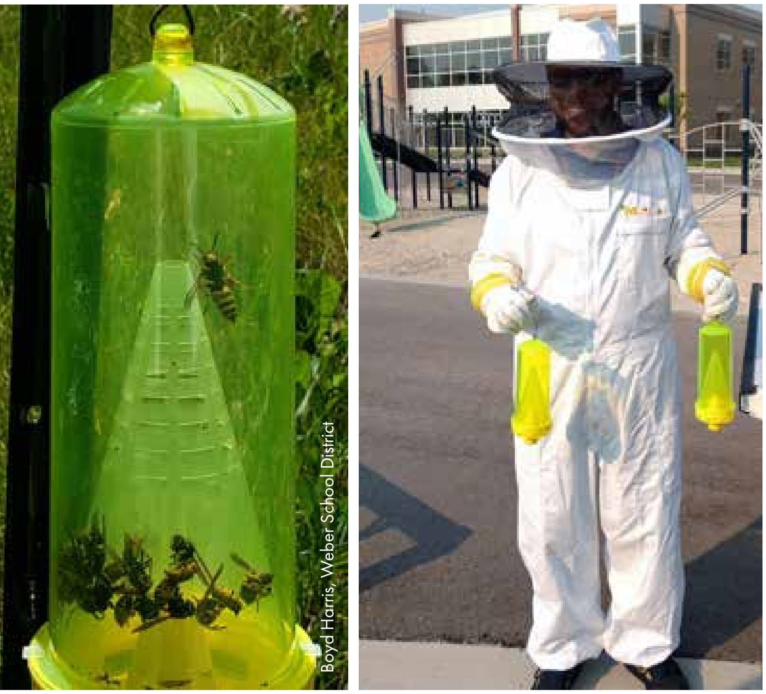
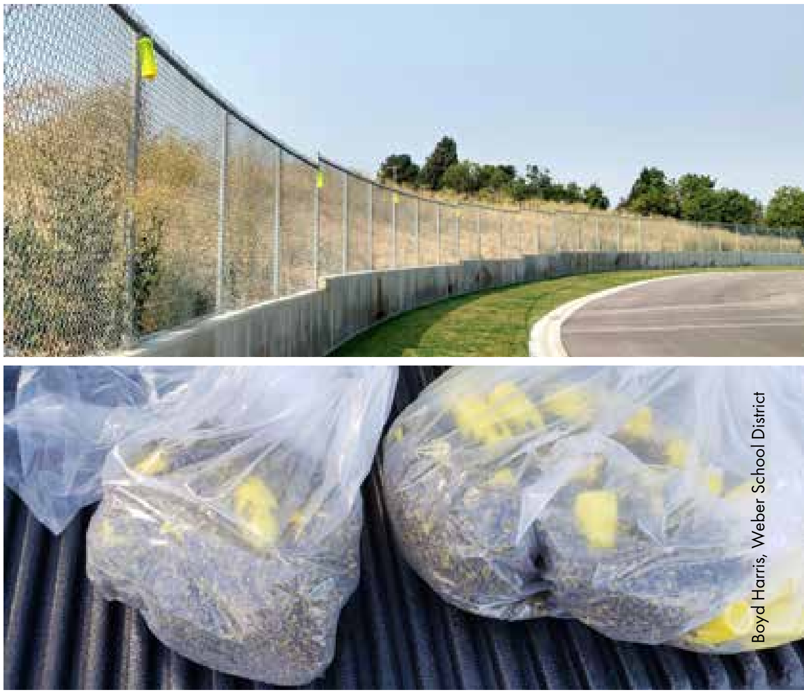


The standard yellow Rescue trap has been shown to be an effective trap. It is important to wear protective clothing when treating yellowjackets or checking traps.



Interceptive trapping placement, out of reach of children (top). Yellowjackets removed from traps was one of three trap cleanouts from late summer 2018 (bottom).

When conducting yellowjacket management, never plug nest entrance holes, particularly if those nests are associated with a home or structure. Trapped yellowjackets may end up entering the home or structure. Nest entrances should also be left open to allow workers to return to the nest, dragging insecticidal dust into the nest with them. In some situations, it may be desirable to remove the nest from a void and seal, or to cave-in a ground nest to prevent future use of those areas by yellowjackets.

What can we do about yellowjackets that ruin our picnics where no nest is found? In this situation, using a trap is the next best option. Trapping can help reduce foraging yellowjackets within limited areas, but is not effective at controlling them over large areas. The yellow Rescue traps have been shown to be effective. It is important to note that these traps contain an attractant, heptyl butyrate, and they are only attractive to yellowjackets. These traps will not attract paper wasps or baldfaced hornets.

Western yellowjackets may forage around 3,000 feet from their nests for food, though 95% forage within 1,800 feet of their nest, or about 1/3 mile. Given there may be multiple nests per acre and there are about 233 acres within a 1/3 mile radius of a particular spot, the number of nests and foraging workers can be high. The primary trap method is to create a border of yellowjacket traps around the area you are trying to protect. The goal is to intercept workers before they reach the desired area to reduce interaction with people and hopefully, stings.

Tips for Trapping Yellowjackets

- **Plan ahead**. Optimal timing for trap placement is two weeks prior to the start of an event, though traps could be used throughout the season if properly maintained. Traps should be kept in place for as long as control is desired, typically July through October. Spring trapping for queens may not reduce the overall number of workers or stings in late summer.
- **Define the area to be protected**, such as a patio, play equipment, etc.
- **Hang traps** at 15-25 foot intervals around the perimeter. Do not place traps too close to the area of protection; about 20-30 feet away should be adequate. Keep traps out of reach of children and pets, which may require using tall posts or poles. Wear protective clothing if yellowjackets are active, as they are readily attracted to the heptyl butyrate lures.
- **Bait the trap**. The "Rescue Reusable Yellowjacket Traps" come with small packs of heptyl butyrate lure that last 2 weeks, but 4- and 10-week lures can be purchased separately. Adding meat may enhance trap catch. Research suggests that hanging lures on the outside of traps and putting meat (e.g., chicken) on the inside of the trap may significantly increase trap catch. However, traps with meat will have to be maintained every few days once meat starts to rot.
- **Monitor regularly**. If some traps catch many yellowjackets and some aren't catching any, consider

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moving those low-catch traps to areas where trap catch can be increased. Yellowjackets will need to be dumped out of the trap once they get above the cone.

For larger areas, traps can be hung at 100-150 foot intervals around the area perimeter. Traps can be checked for yellowjacket catch every few weeks and traps that do not catch many individuals can be relocated to areas where trap catch is higher. Additional traps can also be placed in areas of high activity.

In addition to trapping, it is important to reduce attractants in the area. Clean garbage cans and other receptacles and keep lids closed. Locate these containers away from areas where people frequent. Do not leave food or drinks outside. Clean up fruit that have dropped from trees. Eliminate standing water which can attract many types of stinging insects.

For more information

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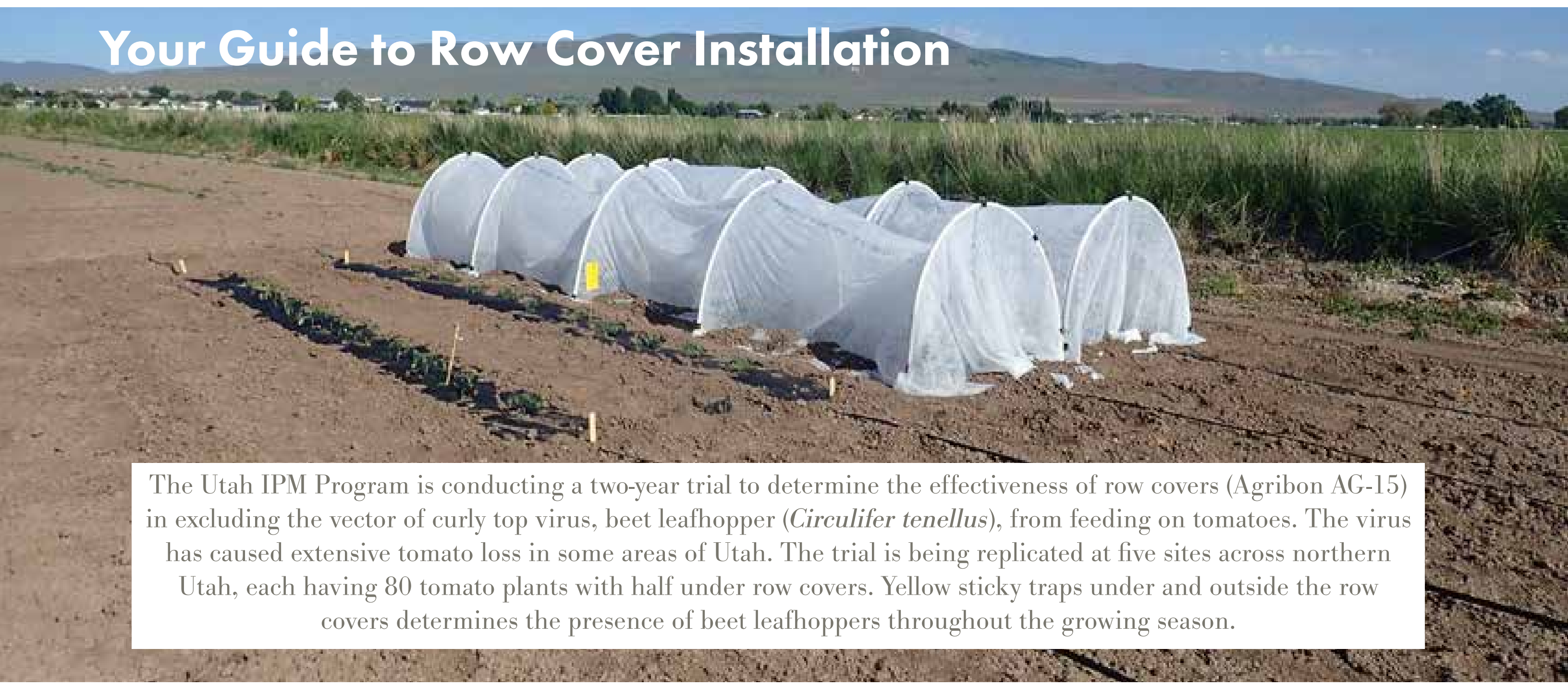
—— Ryan Davis, Arthropod Diagnostician

GENERAL IPM NEWS AND INFORMATION

Your Guide to Row Cover Installation



The Utah IPM Program is conducting a two-year trial to determine the effectiveness of row covers (Agribon AG-15) in excluding the vector of curly top virus, beet leafhopper (*Circulifer tenellus*), from feeding on tomatoes. The virus has caused extensive tomato loss in some areas of Utah. The trial is being replicated at five sites across northern Utah, each having 80 tomato plants with half under row covers. Yellow sticky traps under and outside the row covers determines the presence of beet leafhoppers throughout the growing season.

In agricultural use, a row cover is a transparent (or semi-transparent) material that is used over crops (typically vegetables) for a variety of purposes. As an integrated pest management tool, row covers act as a physical barrier that prevents the movement of pests such as insects, birds, and mammals, to host plants. This form of management is popular in organic production to avoid the need to spray. Row covers are also used to shield crops from environmental factors like cold or hot temperatures, and wind.

What are the advantages of row covers?

- Healthier plants due to pest prevention
- Prevention against late or early frosts
- Earlier crop harvest
- Overall increase in yield

What are disadvantages of row covers?

- The covers require regular maintenance and repair due to wind damage or wind removal.

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Insects excluded from various insect netting mesh opening sizes

Species	0.35 mm² 0.0138 inch²	0.85 mm² 0.0335 inch²	1.2 mm X 1.9 mm 0.05 in X 0.07 in	5 mm X 3 mm 0.19 in X 0.12 in
Aphids	x			
Flea Beetles	x			
Lacewings	x	x	x	
Ladybugs	x	x	x	
Leafhopper	x	x		
Lygus Bug	x	x	x	
Moths	x	x	x	x
Root Maggot Flies	x	x	x	
Stink Bugs	x	x	x	x
Spider Mites	x			
Squash Bugs	x	x	x	x
Thrips	x			
Whitefly	x			

Adapted from Proteknet Insect Netting brochure

- Depending on the size of the farm, the costs for supplies and installation may or may not be outweighed by the crop profits, so this would need to be determined before making the investment.
- The timing of installation is critical, whether used for insect exclusion, frost protection, or prevention of sunscald.

Materials

A variety of cover options are available. Lightweight materials (approximately 0.5 oz./yd²) are effective as an insect barrier starting in late spring. The material may be non-woven, spun-bond fabric with 90% - 95% light transmittance. Other fabrics that are heavier in weight (1.5 - 2 oz./yd2) are used to extend the growing season by protecting the crop from early or late frosts. These thicker materials allow for 50% - 70% light transmittance. A few common brands of the spun bond fabrics include Agribon and Reemay. Ventilated plastic covers are also available for heat retention.

Woven materials include thicker fabric or plastic mesh. For example, the Proteknet brand of mesh is available in 6 grades ranging in sizes from 0.85mm2 too 0.85mm x 1.4mm. Ensure the pest being controlled will not be able to pass through the selected mesh grade. Row covers can be purchased online through garden supply and seed companies, or may be available at some select garden centers. When selecting the support structure for row covers, consider whether it will be used for a single season or multiple uses. Options include 3/4" PVC that can be bent, metal hoops, or small wire hoops.

Construction

When constructing your row covers, first decide which crops are going to be covered. Then, identify the purpose of the cover. For example, if the purpose is insect exclusion, be aware that timing is important. Understand when the pests can be most destructive to the crops and plan to leave the covers up for that duration of time.

The timing and crop size should also be considered for the height of the row cover. The structure can be built over existing beds and rows with plastic mulch and drip line. First install the PVC, metal, or wire hoops, then lay the cover over the frame and secure with binder clips. A tight seal to the ground is important, but avoid using stakes or anything that could tear the material. Use shoveled soil, or place bricks, rocks, or other heavy objects on the fabric. Regularly monitor the structure to ensure the covers are secure and free of any tears or other damage.

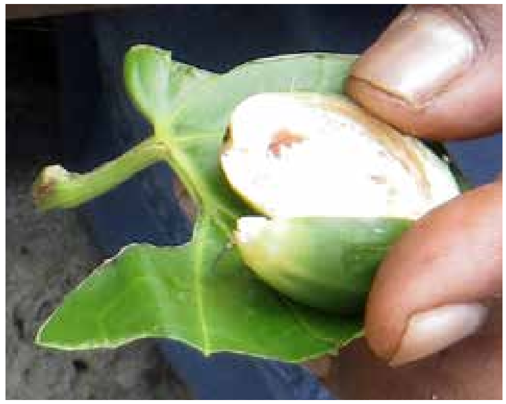
—— Nick Volesky, Vegetable IPM Associate

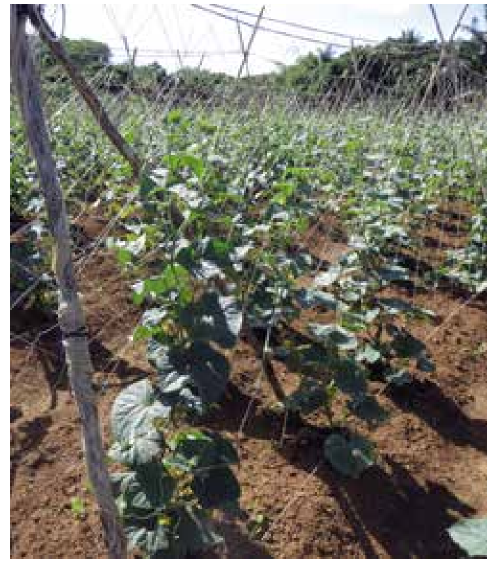
For more information

USU Extension Fact Sheet: Low Tunnels A Low-Cost Protected Cultivation Option

University of Maryland Extension Fact Sheet: Floating Row Covers

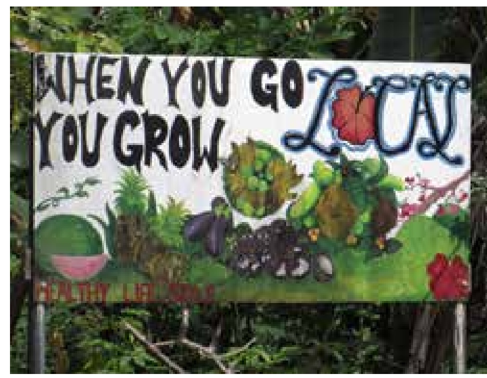
Washington State University Extension Fact Sheet: How to Install a Floating Row Cover





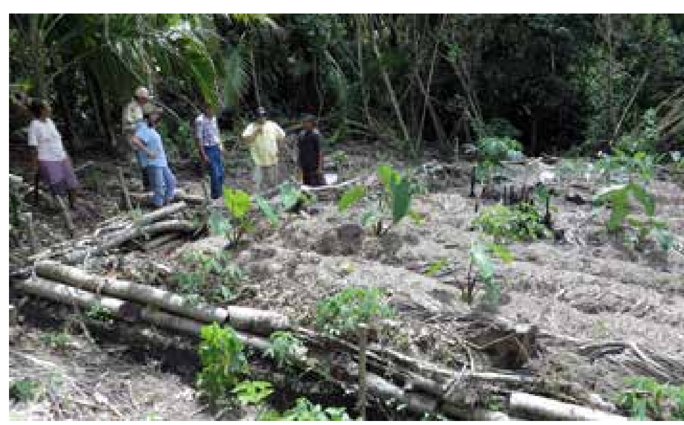
IPM Training in the Pacific Islands

In spring 2019, the Western SARE (Sustainable Agriculture Research and Education) Professional Development Coordinators from each western U.S. state held their annual meeting in Guam. After the meeting, the Coordinators and members of the Advisory Council split into teams and delivered agriculture and IPM training to farmers on the islands of Chuuk, Kosrae, Marshall Islands, and Saipan. The Utah Coordinator's team went to Yap, where they conducted one-on-one training at nine farms and held a full-day workshop for 40 producers.



Clockwise from top left:

- Forest farm of banana, areca palm, papaya, pineapple, and swamp taro
- Betel nut (from the areca palm) is Yap's primary cash crop; it is chewed like tobacco.
- Cucumber beetle is a primary pest
- Promoting local produce consumption is important on the island
- College of Micronesia is testing kale as a crop
- Local "backyard" farm of taro
- Farmers that attended the workshop
- College of Micronesia okra test plots
- Pesticide options are lacking in stores, and farmers have no access to organic options



IPM In The News

Superweeds are getting Harder to Kill

Waterhemp is a broadleaf weed common to corn and soybean fields across the Midwest that has resistance to multiple common herbicides. A study from the University of Illinois reports in Weed Science, waterhemp's newly documented resistance to a class of herbicides known as Group 15s. Herbicides are grouped together in classes, or modes of action (MOA) based on the target in the plant that the chemical attacks. Currently, there are 16 herbicide classes, but due to regulations and biological factors, only a handful of them are allowed per specific crop. About nine chemical classes are available for use on waterhemp, and now in some locations, the weed is resistant to at least seven of the nine. This is most likely due to metabolic resistance, where the plant breaks down harmful chemicals before they have a chance to cause damage. While this is an impressive biological feat, it is worrisome to scientists and farmers as it presents an uncertainty in managing waterhemp in the future.

Onion Thrips that Carry Virus Live Longer

Iris yellow spot virus (IYSV) is an important disease of onion, and is transmitted by onion thrips. A team of Cornell researchers recently discovered that onion thrips carrying IYSV actually live an average of 22% longer than those that have not been infected with the virus. This not only allows them to do more damage to onions through direct feeding, but also to spread the virus further and to more plants. It is still unclear how the virus affects the lifespan of the pest, or if there is a difference in feeding behavior between infected and non-infected onion thrips.

A Storm of Lady Beetles

In early June, a massive "bloom" of lady beetles fooled southern Californian meteorologists into thinking it was a storm. Their radars showed an 80-mile wide signal on an otherwise calm day, moving south over the San Bernardino mountains. There are over 175 species of lady beetles in California, and although these were not identified, they could have been the migratory convergent lady beetles. Although the event made national news and was covered multiple times on Instagram, some scientists were skeptical that the cloud of lady beetles could have been so large.

Mandarins Outpacing IPM

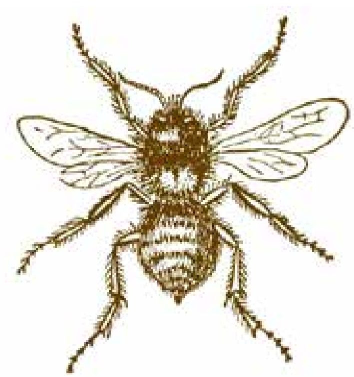
In the past 30 years, mandarin oranges have grown rapidly in popularity in the US. They account for nearly half of the nation's citrus production. The popularity of the small Asian fruit has actually outpaced IPM research for the fruit. Because of a lack of mandarin-specific program, many growers use the guidelines for larger oranges. A new study, however, suggests that these IPM programs may not be the best for mandarins, even suggesting that there is an overuse of pesticides.

Honey Bees Stressed by the Move

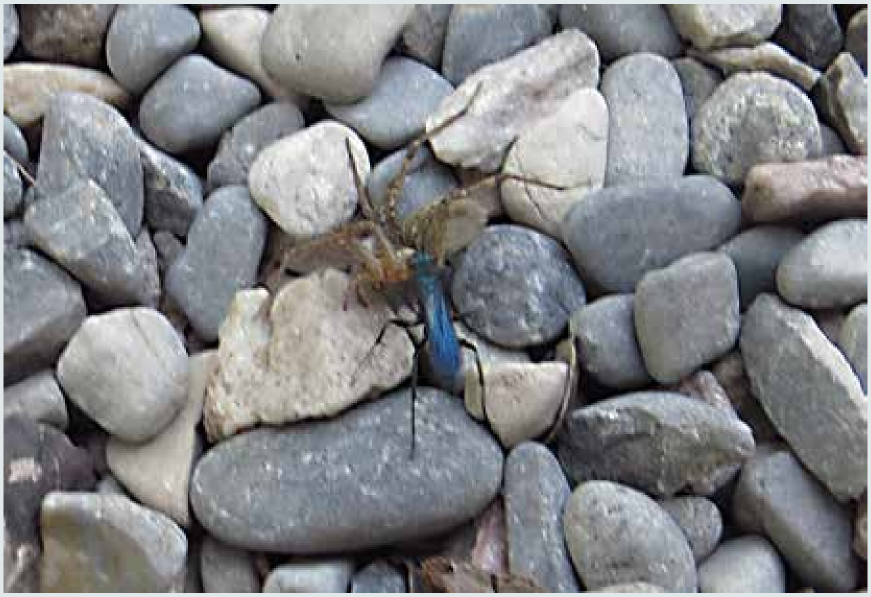
More than 80 percent of U.S. crop types need a pollinator. Renting honey bees is an extremely large business. Certain pollination services have tens of thousands of hives that are rented out throughout the year and driven to sites in need of pollination. Little is understood about the effect these travels have on the hives. A recent study by USDA Agriculture Research Service in North Dakota looked at temperature effects on travel. Honey bees can thermoregulate to an extent, but they rely on stable, warm temperatures. When the temperatures exceed 95F, the colony will quickly die, and cold exposure may result in abnormal brood. Because of the less-obvious damage from colder temperatures, it is viewed as less of a problem. This study has showed that the airflow during travel causes stress on the bees and it may take two weeks to recover. Smaller hives may never recover fully. There are many other factors that the entomologists will be testing.

Improved DNA Techniques

Rapid detection of plant diseases that spread quickly is important, but first part of a molecular assay – extracting DNA – takes specialized equipment and the multi-step process can take hours. A team of researchers from North Carolina State University and University of California-LA reduced that time to one minute by developing a technique that uses a microneedle patch and aqueous buffer solution to collect DNA from plant tissues. The patch is about the size of a postage stamp and is made of an inexpensive polymer. This new method, published in the journal ACS Nano, holds promise for the development of on-site plant disease detection tools.



Featured Picture of the Quarter



The blue mud dauber is a solitary wasp. She captures spiders with a paralyzing sting, stuffs them into a mud tube, and lays a single egg on each one. She caps the tube off with more mud, and the hatched wasp larva feeds on the paralyzed spider as it grows. When mature, the larva pupates inside the tube and emerges the following spring.

—— Image by Marion Murray, IPM Project Leader

New Publications, Websites, Apps

The Western Governors' Association offers and has produced a series of six webinars on issues of invasive species including monitoring, management and distribution.

Understanding Agroforestry infographics are 2-page PDFs that provide descriptions and the challenges and benefits of five common agroforestry practices: riparian buffers, forest farming, alley cropping, silvopasture, and windbreaks.

Leafminers of North America is a self-published 1,857 page e-book released in June 2019, including thousands of color images and full leafminer descriptions.

SARE released Cover Crop Economics, a report that addresses the kinds of short- and long-term economic returns that can be expected from cover crops. The report finds that planting a cover crop as a livestock grazing opportunity is one of the fastest avenues to profitability.

Integrated Insect Pest Management is an open-book document available as a web page or PDF, that covers the full basics of IPM, including terminology, principles, decision-making, implementation, and measuring impacts.

The University of Maryland-led nonprofit Bee Informed Partnership website will soon post the 2018-19 winter colony losses, which preliminarily shows the highest losses ever in winter 2019.

UTAH PESTS people and programs are supported by:

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UtahStateUniversity
WPDN Western Plant Diagnostic Network
NPDN National Plant Diagnostic Network
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