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UTAH PESTS QUARTERLY

N E W S L E T T E R

Utah Plant Pest
Diagnostic Laboratory

USU Extension

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Despite COVID-19, the Utah Pests Team is Still Here for You!

Under these difficult times of the COVID-19 pandemic, it can be easy to forget or become anxious about pest activity and sustainable pest management practices in the home, garden, or farm. However, these issues still exist, and the [Utah Pests](#) and [Utah Plant Pest Diagnostic Lab](#) team is engaged to assist everyone in Utah with continued pest identification and management services.

Rest assured that like many of you, we are working remotely, and practicing recommended sanitation and social distancing. However, this will not stop us in our responsibility to provide research-based information in a timely manner. Check out the recent [IPM Pest Advisories](#) for fruits, vegetables, and landscapes. See the latest in our [pest guides](#), with an updated [Intermountain Tree Fruit Guide](#), and new chapters coming to the [vegetable production guide](#) soon.

The [Utah Plant Pest Diagnostic Lab](#) is still operating; however, please do not ship a sample without first contacting contact Ryan Davis (ryan.davis@usu.edu). The diagnosticians are working remotely, and are currently making every effort to identify pest issues using images and descriptions. They will discuss shipping options, if a physical sample is needed.

The rest of our pest management services are continuing with as much normality as possible. We are still here, working hard for pest management needs in Utah. For any other needs during this time, please visit the [USU COVID-19 website](#).

So please keep in touch, and let us know how we can best serve you at this challenging time. Keep well!

— Diane Alston,
Entomologist and Head,
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Future Changes to Chlorpyrifos Availability

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Chlorpyrifos is a pesticide that targets insects and mites on agricultural crops, buildings, animals, and other settings. For many years, it has been under heavy scrutiny for [worker safety and children's health concerns](#), specifically low birth weight, reduced IQ, and attention disorders. There have been several attempts to ban or limit use of the product, and currently, the EPA is evaluating the potential risks of chlorpyrifos, with a review deadline of October 1, 2022.

In the meantime, individual states are not waiting for the EPA, and are enacting their own restrictions. In California, it is now illegal to sell the product, and possession of chlorpyrifos will be illegal

in 2021. Hawaii and New York will ban the chemical by 2022, and Oregon, Washington, Connecticut, New Jersey, and Maryland all have plans to implement a ban in the future.

Although it is still available in other states, chlorpyrifos products will become harder to find. A major manufacturer, Corteva, who sells Lorsban and Cobalt, announced that it will stop manufacturing these products in 2021, primarily due to lack of sales. This decision does not affect other chemical manufacturers' ability to produce generic chlorpyrifos products, nor farmers' ability to obtain the product.

—— Marion Murray, IPM Project Leader

Free Access to Sustainable Agriculture Publications

The National Center for Appropriate Technology (NCAT) is a private nonprofit organization, promoting self-reliance and sustainable lifestyles through wise use of technology. One of its sub-programs is called ATTRA Sustainable Agriculture, which is funded through a cooperative agreement with the USDA Rural Business-Cooperative Service.

The ATTRA Sustainable Agriculture Program has provided information and technical assistance to farmers, ranchers, Extension agents, educators, and others involved in sustainable agriculture for decades.

For the first time, they are now providing all the technical resources on the ATTRA website **FREE**, which includes all their pdf publications. They are also offering shipment of printed copies for the cost of shipment only.

The website's library includes more than 500 publications for farmers, gardeners, homesteaders, and more.

ATTRA Sustainable Agriculture

NCAT A program of the National Center for Appropriate Technology • 800-346-9140 • www.attra.ncat.org

Understanding Organic Pricing and Costs of Production

By Jeff Schahczemski,
NCAT Agriculture and
Natural Resource
Economist, and Emily
Prest, NCAT Agricultural
Specialist
Published Sept. 2012
Updated Nov. 2019
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IP441

This publication provides resources to compare organic and non-organic agricultural prices, discuss organic production costs, and offers tips on how to set organic crop prices. Case studies summarize insights gained from organic farmers and ranchers.

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Photo: NCAT

Newer documents include "[Understanding Organic Pricing and Costs of Production](#)" and "[Pruning for Organic Management of Fruit Tree Diseases](#)." See more at [attra.ncat.org](#).

ATTRA also provides a [weekly podcast](#) "Voices from the Field," a [YouTube Channel](#) with over 200 videos, [tutorials](#), and [newsletter subscriptions](#). They offer ask-an-expert services with an agriculture specialist by phone (800-346-9140), email, or online chat.

Because NCAT is nonprofit, they seek funding in a variety of ways, including donations.

—— Marion Murray, IPM Project Leader

Conservation Biological Control in Utah

Author Laura Arneson Horn is owner and operator of the [Wild Bee Project](#), which helps vegetable farmers attract insect predators and pollinators with targeted plantings. She also teaches about wild bees.

First-year planting of an insect hedgerow at Borski Farm, Davis County. The planting will be used to evaluate its effect on cabbage aphid populations by promoting beneficial insects.

Conservation biological control (CBC), or “farmscaping,” is the practice of planting or conserving habitat on a farm for the purpose of supporting the beneficial insects that attack crop pests. The habitat provides alternate food and shelter, and because it can result in fewer chemical insecticides, it fits well within a larger IPM program.

Utah Case Study – Cabbage Aphid Control

The cabbage aphid is a familiar brassica pest. It occurs on brassica crops, and in northern Utah, the population increases to infestation levels by late June or early July. Organic growers typically prune off infested leaves or spray with water or soap, and regardless of management, most producers that grow these crops in the summer months experience some level of loss. CBC is a useful strategy for aphid control because these aphids have numerous natural enemies.

To help Utah producers prevent those losses, I wanted to answer the question: Could permanent, flowering, linear shrub plantings (“hedgerows”) encourage beneficial insects to attack more aphids during the early stages of the northern Utah summer cabbage aphid infestation?

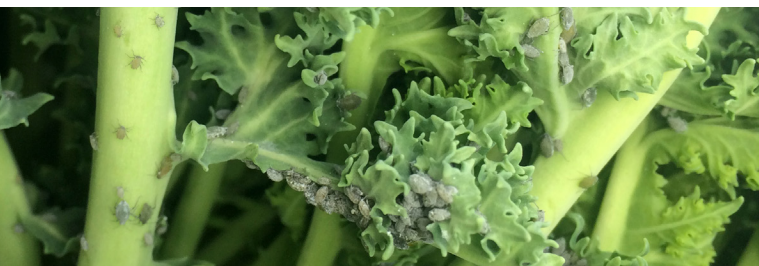
My observations from 2019 suggest that hoverflies, also known as syrphid flies (family Syrphidae), whose larvae eat aphids, are the most likely predator to reduce aphid infestations during this period. Small hoverflies such as *Toxomerus* spp. were found through mid-summer on most farms surveyed in Salt Lake County. Hoverfly females require pollen and nectar to power their flight and maintain egg-laying capacity; they also benefit from wind protection that a hedgerow could provide.

In 2020, I will test the hypothesis that syrphid fly females will lay more eggs on infested kale that is adjacent to a flowering hedgerow of rabbitbrush, Russian sage, goldenrod, coneflower, grasses, and others. I will compare the aphid levels and number of predaceous syrphid larvae on kale plants adjacent to hedgerows versus on kale grown further away. To make a meaningful difference to brassica growers, syrphid larvae must reduce aphid infestation levels to a degree that saves (management) time or prevents the typical drop-off in yield, even with the natural lag between aphid increase and predator “arrival.”

Planning for CBC on a Farm

To implement an effective CBC planting design, careful planning is required. The table on the next page will help you do the following:

- 1) Determine the pest to target.
- 2) Identify the beneficial insects that attack this pest.
- 3) Determine the floral and habitat requirements of these beneficial insects.



Kale infested with cabbage aphids.

continued on next page

When planting flowers, those in the carrot (Apiaceae), mustard (Brassicaceae), and daisy (Asteraceae) families with smaller flowers will be accessible to the widest range of beneficial insects. Time the blooms to coincide with the month prior to and during the pest outbreak, or plant enough species to bloom throughout the growing season.

Options for Implementing CBC

A CBC strategy can involve short-term or long-term tactics. Many farmers implement both strategies, but when trying something new, start small. If you have the space, set up a mini “experiment” where you can observe your crop yield with the tactic in place (and as close as possible to the crop, for best results) and without it (some distance away). You may have to repeat the experiment over several seasons to see results.

The primary short-term CBC tactic is to seed rows or blocks of annual wildflowers or flowering cover crop species around the farm or between crop rows (approximately one insectary row for every 10 rows of crops). The advantage of short-term plantings are flexibility and low cost.

Long-term tactics include perennial or permanent plantings, such as flowering and wind-blocking hedgerows or woody shrub borders, wildflower meadows, mounded perennial grass banks, or ground covers in orchards. Advantages of long-term plantings include initiating a long-



Use of alyssum as an edge insectary planting at the B.U.G. Farm in the Glendale neighborhood, SLC. Although the alyssum bloomed in May and August, the planting alone was not enough to help prevent cabbage aphid damage in 2019.

term solution, using non-cropped or suboptimal growing areas, and realizing ecological benefits (e.g., soil and water retention).

References

Ambrosino, M. 2005. Guidelines for establishing, maintaining, and assessing the usefulness of insectary plantings on your farm. Oregon State University, Integrated Plant Protection Center (IPPC), Corvallis.

Cannon, C., M. Murray, R. Patterson, and K. Wagner. 2016. Beneficial Insects of Utah. Utah State University Extension IPM Program.

Bugg, R. L., R. G. Colfer, W. E. Chaney, H. A. Smith, and J. Cannon. 2008. Flower flies (Syrphidae) and other biological control agents for aphids in vegetable crops. UC ANR Publication 8285.

High-value Beneficial Insects and Their Needs

Beneficial Insect	Prey	Ways to Attract / Conserve
Lady beetles (adults + larvae)	Aphids and others	Bunch grass plantings; Mulch; Hedgerow or insectary strips with small flowers blooming continuously all season
Ground beetles (adults + larvae)	Wide variety of pests, above- and below-ground	Bunch grass plantings; Mulch and infrequent tilling
Syrphid flies (larvae)	Wide variety of soft-bodied pests	Insectary strips with small flowers, especially in summer
Lacewings (larvae)	Aphids and others	Hedgerow or insectary strips with small flowers; Allow some prey to help build lacewing population
Western predatory mite	Wide variety of mite pests	Cover crops or ground covers; Pollen plants; Allow some prey to help build predatory mite population
Spiders (adults + spiderlings)	Wide variety	Undisturbed natural woody borders; Cover crops; Mulches and infrequent tilling
Minute pirate bug (adults + nymphs)	Thrips, aphids, mites, and insect eggs	Undisturbed woody or grassy borders; Hedgerow or insectary strips among crops
Tachinid flies (larvae – parasitoid)	True bugs; larvae of various beetles, moths, and sawflies; grasshoppers	Insectary strips with small flowers blooming continuously; Allow some aphids to provide alternative prey
Parasitoid wasps (larvae – parasitoid)	Aphids and others	Insectary strips with small flowers blooming continuously all season; Undisturbed natural woody borders

Keys to Managing Alfalfa Weevil in 2020

Author **Steven Price** is a USU Extension Assistant Professor in the Carbon County office, specializing in Agriculture, Natural Resources, and 4-H.

Steven's article originally appeared in USU's [From the Field](#) e-newsletter, and is reprinted with permission here.



Alfalfa weevil damage in front of a grassy field border in Carbon County.

Alfalfa weevil is one of the most damaging alfalfa pests in Utah. Some producers rely on calendar spraying, where an insecticide is applied at the same time each year. However, weevil activity and growth rate is affected by temperature, and changes dramatically from spring to spring. In addition, weevil population size is affected by their ability to survive winter conditions. By spraying on the same date annually, applications may be too early or too late. Once severe plant damage is noticeable from the roadside, significant yield losses have already occurred and an early harvest is probably required. Instead of annual treatments, use field-scouting to determine whether weevil larvae have reached levels requiring treatment. This practice can also assist in timing treatments, when necessary, before economically significant damage occurs.

Sweep-Net Scouting

Using a sweep net is the standard method to estimate larval numbers, and should start when the alfalfa is approximately 10 inches tall. Sweep-netting involves a

15-inch diameter canvas net that is briskly swept through the plant canopy in multiple 180° sweeps from one side of the body to the other while walking through the field. Take a consecutive sweep with each step forward so that arcs do not overlap. Swing vigorously enough to dislodge the larvae from the alfalfa, but not so forceful to damage plants. Special care should be taken to angle the net so that insects are knocked into the bag and not onto the soil.

The recommendation is to take ten consecutive sweeps from one location and count the larvae inside the net ([see this video](#) for more instructions). Using a handheld counter or mobile app counter helps to accurately count large numbers of larvae. For each location, divide the number of larvae counted by 10 (the number of sweeps) to generate the average number of larvae per sweep. By repeating this multiple times throughout different areas of the field, an overall field average can be calculated and compared to established thresholds.

When scouting early, very small larvae can be difficult to dislodge from inside the protective leaf whorls where they

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A mix of adults and large- and medium-sized larvae from a sweep net.

feed. As the season progresses, larvae grow and become easier to dislodge. Scouting should occur more frequently during this time to assess potential damage.

Treatment Thresholds

The current threshold for alfalfa weevil is 20 larvae per sweep. This number is our best approximation that requires an insecticide application to prevent economic loss. Below this number, an insecticide application is not warranted

because it may cost more than the expected yield loss. If the average is 10 to 19 larvae per sweep, sample the field again in three to five days. If the average is less than 10 larvae per sweep, sample the field again in seven days. If the field is very close to the threshold and is scheduled to be cut in less than two weeks, producers should consider harvesting early before significant yield loss occurs.

Management Options

When control is warranted based on scouting, producers should consider the chemicals used in the past. Each insecticide is assigned to a "mode of action classification" based on its chemical structure and how it kills the insect pest. As a result, each product will have a specified group number that represents how it is classified. Find this number on the pesticide label or on the [IRAC website](#). There has been evidence of alfalfa weevils becoming resistant to pyrethroids (Group 3 insecticides) in some areas of the U.S., but this has not been validated in Utah. It is important to rotate insecticides in different group numbers so that different modes of action are used from year to year to reduce the potential for building up weevil resistance to the few insecticide classes currently available.

In conclusion, for weevil management, it is important to combine scouting, the use of thresholds, and insecticide rotation for the most effective and economical results.

PLANT PATHOLOGY NEWS AND INFORMATION

Summary of Diseases on Hemp in Utah

Pythium Root and Crown Rot

Several plants from field-grown hemp were diagnosed with root rot or crown rot caused by *Pythium* in summer 2019. Two species were identified, *Pythium ultimum* and *P. dissotocum*. Plants infected early in the season were stunted, wilted, and the roots were rotten. The outer layer of the roots easily sloughed off, leaving only the core layer. In the case of crown rot caused by *P. dissotocum*, the pathogen entered the plant at the soil line and colonized and rotted the crown area (shown at right), and did not cause root rot. *P. ultimum* has a large host range, including many vegetables and field crops. *P. dissotocum* is known to infect lettuce. Management of *Pythium* on hemp in the field is difficult, since no conventional fungicides are currently registered for this crop. As with *Pythium* in other crops, switching to drip irrigation and avoiding stem wetting



are important. In greenhouses, pots and trays should be new, or if they are reused, disinfected by soaking them in a 10% -15% bleach solution for about an hour and then

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rinsing well with water. Potting mix should be prepared on a plastic tarp and not allowed to contact bare ground that may contain *Pythium* or other soilborne pathogens.

Curtoviruses



Curly top is a viral disease caused by a group of viruses known as curtoviruses, and has been found on in field-grown hemp in Utah. Curly top has many hosts in Utah, including vegetables and hemp. Infected hemp plants become stunted and show a yellow mosaic pattern on leaves, or leaves become completely chlorotic (shown above). Curtoviruses are transmitted by beet leafhopper. Once plants are infected, there is no cure. In other crops, the use of floating row covers to keep leafhoppers away from young plants has been effective. In addition, hemp plants should be grown further away from other susceptible crops, like beets or tomatoes.

Fusarium Wilt



Cynthia M. O'camb, 2006

Fusarium wilt is caused by the fungus, *Fusarium oxysporum*, and so far in Utah, we have only seen it in greenhouses. This pathogen is soilborne, but spores can also sometimes be airborne. There are two formae speciales that can infect hemp – *F. oxysporum* f. sp. *cannabis* and *F. oxysporum* f. sp. *vasinfectum*. Formae speciales are usually very host-specific. Neither species will infect other plants, with the exception that *F. oxysporum* f. sp. *vasinfectum* that can infect cotton. Hemp plants with fusarium wilt will initially have chlorotic leaf tips, followed quickly by wilting and death. The vascular tissue in the stem will turn brown (shown above). A major difference with this disease versus

Pythium is there is no associated root rot with fusarium wilt. Management of fusarium wilt in greenhouses is similar to *Pythium*, above. If the disease should occur in the field, it will be important to clean field equipment between fields to avoid spread.

Fusarium Crown Rot

Fusarium crown rot is caused by *Fusarium solani*, and was also only detected on greenhouse plants. This pathogen can also infect vegetables like tomatoes. Just like *F. oxysporum*, it is a soilborne fungus. The symptoms consist of brown and rotten roots, and a darkened discoloration and rotting of the crown, right above the soil line. Plants will eventually wilt and die. Symptoms can look similar to fusarium wilt, but with fusarium wilt, there is no crown discoloration on the outside of the stem and no root rot. Management for fusarium crown rot is the same as for fusarium wilt. In addition, hemp should not be rotated with tomatoes or other susceptible crops if this pathogen has been a problem in the past.

Powdery Mildew



Whitney Granshaw, Colorado State University, Bugwood.org

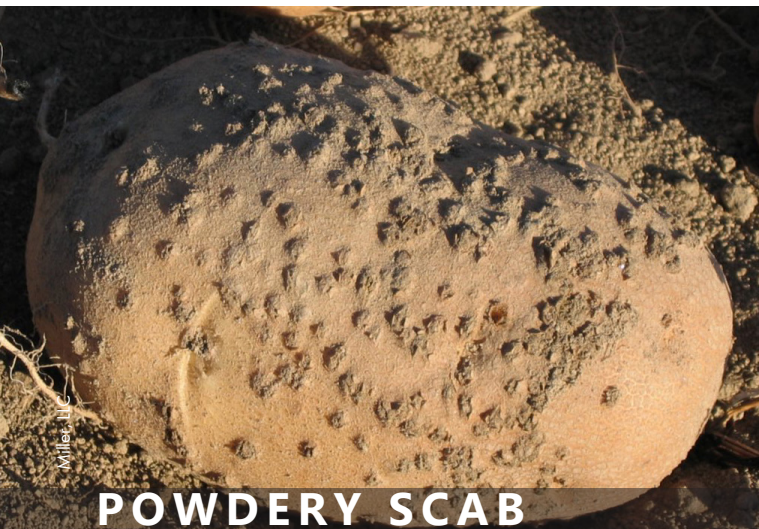
Powdery mildew of hemp was suspected in a Utah greenhouse in 2019. There are two species of powdery mildew that can affect hemp - *Podosphaera macularis* and *Golovinomyces chicoracearum*. Both have also been found on other crops in Utah. *G. chicoracearum* occurs on bindweed and some ornamentals. *P. macularis* infects strawberry and hops. The first sign of infection is white powdery spots on the surface or underside of leaves (shown above). Currently, it is unknown which species affects hemp in Utah. Management options are limited, but some products registered in Utah include oils (corn, neem, soybean, thyme) and biofungicides (*Reynoutria sachalinensis*). You can find more information on the [EPA hemp products web page](#); however, not all products listed there are registered in Utah, and some are specific to field or greenhouse-grown crops.

— Claudia Nischwitz, Extension Plant Pathologist

Idaho Study on Disease Susceptibility of Russet Potato Cultivars

A recent study in Idaho evaluated new potato varieties for disease susceptibility and their relative response to fungicide programs. This ongoing research is being conducted by [Dr. Jeff Miller \(Miller Research LLC\)](#) and [Dr. Nora Olsen \(University of Idaho Extension\)](#). With their permission, we report some of their findings here.

The diseases evaluated include powdery scab, fusarium seed piece decay, rhizoctonia stem/stolon canker, early blight/brown spot, pink rot, and white mold. The eight potato varieties tested are Burbank, Ranger, Norkotah, Alturas, Umatilla, Teton, Clearwater, and Dakota. Disease presence (natural and inoculated) is monitored on treated and non-treated plots for each of the pathogens studied. The pesticide products used throughout the study included CruiserMaxx Potato Extreme (fludioxonil), Mancozeb 6% Plus Bark (a dust formulation of mancozeb plus zinc), Elatus (azoxystrobin and benzovindiflupyr), Bravo Weather Stik (chlorothalonil), Luna Tranquility (pyrimethanil and fluopyram), and Resist 57 (a phosphite fungicide).



POWDERY SCAB

is caused by the fungus-like organism, *Spongospora subterranea* f. sp. *subterranea*. Powdery scab thrives in cool, moist conditions. The pathogen infects lenticels and other wounds on the tuber surface. This stimulates the tuber cells to divide and become enlarged. Eventually, small, dark raised lesions appear on potatoes (shown above). Powdery scab galls were most present on Burbank, Umatilla, and Teton cultivars. There were no significant effects with the fungicides tested (CruiserMaxx Potato Extreme, Mancozeb 6%, and Elatus).



FUSARIUM SEED PIECE DECAY

is caused by various species in the fungus genus, *Fusarium*. Early signs of decay include dark spots that slowly form depressions on the surface of cut seed pieces (shown above). Fusarium seed piece decay reduces crop yield, plant size, possibly increases blackleg. In the trial, Ranger, Umatilla, and Dakota cultivars were most naturally susceptible to Fusarium seed piece decay. The fungicide program that included CruiserMaxx Potato Extreme and Mancozeb 6% provided the greatest reduction in disease.



RHIZOCTONIA STEM/STOLON CANKER

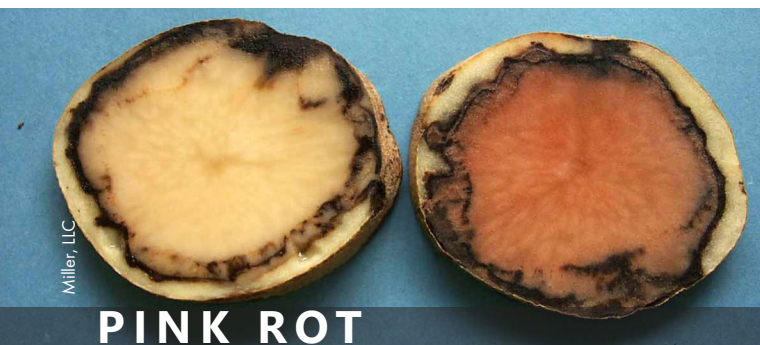
is caused by the fungus *Rhizoctonia solani*. Yield loss to this pathogen is most common under cold and wet soil conditions. In western Idaho, damage is normally seen after the crop is established. Reddish brown lesions form on the stolons and lower part of the stems (shown above). Disease was shown to be severe in all cultivars in the trial. The fungicide program that included CruiserMaxx Potato Extreme, Mancozeb 6%, and Elatus provided the greatest reduction in disease.

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EARLY BLIGHT/BROWN SPOT

is caused by the fungus *Alternaria solani*. It is most significant in Idaho and northern Utah. Early blight affects both the foliage and tubers. Brown lesions appear on older leaves (shown above), and if infections become severe, harvest yields can be drastically reduced. Early blight was most notable on Norkotah and Teton cultivars starting in August. The fungicide program that included Luna Tranquility and Bravo WS provided the greatest reduction in disease.



PINK ROT

is caused by the fungus *Phytophthora erythroseptica*. Pink rot is a tuber decay that occurs throughout western

North America. *P. erythroseptica* infects the potato's roots, stolons, and tubers, causing the plant to wilt and potentially die. As tubers decay, they become spongy. When cut and exposed to the air they will turn a deep pink color (shown at lower left). At harvest, the Umatilla cultivar was found to be the most susceptible to pink rot. The fungicide, Resist 57, was tested as a postharvest application and significantly reduced the incidence of pink rot.



WHITE MOLD

is caused by the fungus *Sclerotinia sclerotiorum*. White mold favors conditions where water is present on stems and leaves. It tends to be most prevalent in the wettest parts of fields. The mold develops on stems and leaves and appears as white lesions (shown above). Infections were primarily associated with irrigation. Highly susceptible cultivars included Alturas, Clearwater, Ranger, and Norkotah. The fungicide program with Luna Tranquility and Bravo significantly reduced the incidence of white mold.

— Nick Volesky, Vegetable IPM Associate

News on Rocky Mountain Spotted Fever

Many different tick-borne diseases are not transmitted from the tick to the host until after a set period of host attachment. It is well-established that a tick requires 36-48 hours of attachment to its host before it can transmit the Lyme disease bacterium. It was thought that this was the case for Rocky Mountain spotted fever as well, which is caused by the bacteria *Rickettsia rickettsii* spread in American dog ticks.

A new study in the *Journal of Medical Entomology*, researchers from the Centers for Disease Control and Prevention in Georgia allowed American dog ticks to

attach and feed on guinea pigs in the lab. Using molecular tools, they found that both unfed and fed ticks carried infection in their salivary glands. When it came to clinical signs of infection, time mattered. Guinea pigs exposed for less than 30 minutes were not affected, but just 4 hours caused symptoms while longer exposures resulted in more severe symptoms. The finding that the "grace period" for Rocky Mountain spotted fever could be very short or even nonexistent means that prompt tick checks and removal of any attached ticks is the best way to avoid falling ill.

— Marion Murray, IPM Project Leader

Utah TRAPs for Weather and Pest Management Information

Accurately-timed pest management practices are more effective than calendar-based applications because they ensure not only that the target pest is susceptible to treatment, but result in fewer wasted pesticide applications. Consider codling moth, a major pest of apple and pear. Poor management can result in 10 to 25% loss of yield (about \$4,000 to \$10,000 loss per acre).

Utah TRAPs (Temperature Resource and Alerts for Pests) was formed as a partnership between the Utah Climate Center (UCC) and the Utah Integrated Pest Management (IPM) Program to address this concern. It is a decision-aid website and app that has helped over 500 producers in four western U.S. states, plus thousands of backyard and hobby producers lower their production costs, reduce pesticide use, and generate healthy crops and landscapes.

The FGNet Orchard Weather Stations

Utah TRAPs utilizes data from a variety of weather networks across Utah, as well as from USU-owned weather stations. Over the past two decades, the Utah IPM Program and the UCC have installed new weather stations and updated existing stations in 25 orchards in the state, known collectively as "FGNet." They use a battery and solar panel for power, secure 4G modem, datalogger, and have the same suite of sensors, which include air, bud, and soil temperature; relative humidity; precipitation; leaf wetness; wind speed and direction; solar radiation; and soil moisture. UCC technicians calibrate all station sensors once per year. Data from FGNet is run through a series of automated and manual quality control checks before being used for Utah TRAPs.

Utah TRAPs Tools

Utah TRAPs Online. The main TRAPs website (climate.usu.edu/traps) opens to a Google-based map of 95 stations (FGNet plus 70 additional stations from other networks). After selecting a station, the user can then select either weather data (for FGNet only) or pest management information. Weather data is presented in user-friendly formats of interactive charts and tables.

One of the most highly used pages shows up-to-the-minute weather conditions. Producers of spring-blooming crops



Temperature Resource and Alerts for Pests



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must know when to protect flowers from frost, so when low temperature threats arise in spring, these growers monitor their FGNet weather station page closely to make a decision on whether or not to operate wind machines, which cost \$45/hr to operate. During the growing season, agricultural producers and landscape managers watch this page for wind speed and wind direction for spraying decisions (to reduce drift), and for precipitation and evapotranspiration values for irrigation decisions.

Utah TRAPs also provides three weeks of forecasted pest management information using degree-day models for 12 insect pests, one disease, and 72 degree-day activity timings for pests of woody ornamentals.

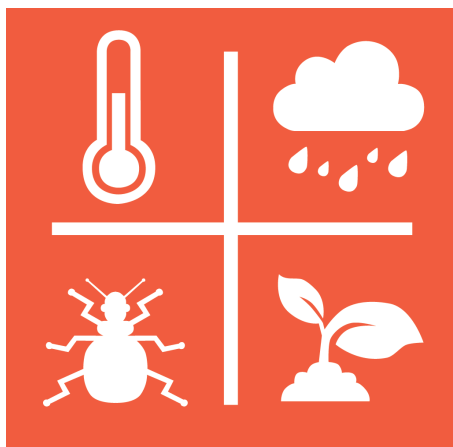
Codling Moth Management Action

Date: 05-30-19
Degree Days: 220-220
Action: Egg hatch for first generation begins.

Apply the first insecticide application (Delegate, Altacor, Assail, Belt, Intrepid, etc.) and continue every 14-21 days until the end of first generation egg hatch, which corresponds to the date at 920 degree days (typically 2-3 additional sprays depending on temperatures).

Example of a management action displayed on the TRAPs website, for a given location and date.

Utah TRAPs App. A [companion mobile app](#) for the TRAPs tool (for Apple and Android) was released in 2017. It was designed to be simple yet highly functional, offering an array of information in a compact format. The app provides a reliable and simple way to monitor for frost protection in the middle of the night, or to look up real-time pest management recommendations from home, out on farms, or any other location.



Effectiveness of Utah TRAPs

We have evaluated the effectiveness of Utah TRAPs primarily through surveys. TRAPs users have increased their knowledge of proper pesticide timing to reduce waste, pest monitoring options and timings, and the importance of not spraying during bloom. TRAPs has also helped to reduce pesticide usage, as some users reported reducing their use of broad-spectrum pesticides or switching to lower-toxicity options. Many users also reduced costs as a result of timely pest management recommendations and temperature and soil moisture monitoring. And finally, users reported healthier plants, more marketable crops, and higher yields.

The Utah IPM Program estimates that the economic impact of Utah TRAPs saves crop producers (in particular orchardists) about \$90/acre (through the reduction of two pesticide sprays and optimizing frost-protection wind machine use). Beyond the public use, data from Utah TRAPs also assists researchers from USU and several western U.S. states in irrigation projects, plant chilling requirements, plant hardiness projects, and pest management research.

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—— Marion Murray, IPM Project Leader

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IPM In The News

New Insight on Climate Warming and Plant Pests

Studies from Michigan State University (MSU) indicate that current models might be underestimating how climate change will impact crop loss. The current models say that as our climate warms up, herbivores and pests will increase, and therefore, cause increased damage to agricultural crops. However, the higher temperatures also have an impact on the plants, causing a second stress. MSU scientists compared the feeding of caterpillars on tomato plants grown at around 80° F and those grown at 100° F. The caterpillars in the higher temperature were much bigger and had almost wiped the plants out. With the plants, they found that the production of jasmonic acid (a plant defense response to feeding) hindered the plant's ability to cool itself. In turn, the hotter plants had lower photosynthesis rates, affecting their ability to produce more biomass.

Threats to Firefly Populations

Tufts University led a team of experts to observe species of fireflies around the world, with a mission to determine threats of extinction. Some firefly species require precise conditions to complete their life cycle, and the team found that the biggest threat is loss of habitat. The second most serious threat is the increase in the use of artificial lights at night, in particular the switch to brighter LED bulbs. Fireflies use bioluminescence to identify mates, and these lights disrupt their mating rituals. The final threat that the team identified is indirect exposure to pesticides. The exposure is occurring to the larval stage, which occurs for up to two years in water or underground, where pesticides may enter due to runoff or drift.

Alfalfa Leafcutting Bees Like Nests That Face North, Study Shows

In a study published in *Environmental Entomology*, North Dakota State University entomologists found that the female alfalfa leafcutting bee is pickier about where she chooses to lay her eggs than was previously thought. Nesting blocks were placed out in North Dakota fields and observations were made daily of the temperatures of the different nest sides and which were preferred by female bees. It was found that females preferred to fill the cavities on the cooler, north-facing sides over the hotter, south-facing sides of the nests. Overall, the study found a 15% increase in the number of offspring on the northeast side compared to the southeast orientation. This study demonstrates that growers may be able to manipulate the nest microclimate, leading to increased nesting rates and offspring.

Preventing Maturity of Insects

Entomologists at the University of California-Riverside found that, contrary to previous scientific belief, a steroid hormone required for sexual maturity in insects cannot travel across the blood-brain barrier unless aided by a transporter protein. They discovered this in fruit flies, where they blocked the transporter genes in maggots and found that because the hormone could not reach the brain, the maggots could not mature to adults. The next step is for the entomologists to test this procedure on mosquito larvae to see if it can have a similar effect, which in turn could have tremendous potential in preventing the spread of human diseases.

Mosquito Biopesticide on the Horizon

People around the world have longed for an eco-friendly way to kill mosquitoes. University of New Mexico recently reported in *Parasites & Vectors* that they have discovered a combination of everyday items that can kill mosquito larvae. The team created a biopesticide from orange oil and yeast. The oil is injected into yeast cells, and then the residue is washed from the yeast cell walls and dried into a powder. They tested the powder by applying it to water containing larvae of *Aedes aegypti* mosquitoes, which transmit dengue, chikungunya, and Zika. The mosquito larvae were attracted to, and fed on, the dead yeast cells but were killed by the oil that was also present. The process was repeated in many lab tests, and will be tested next in natural settings.

Study Shows How Prescribed Burns Benefit Bees

Prescribed burns are known to benefit many different forests, but their effect on pollinators is not known. New research from North Carolina State University published in *Environmental Entomology* found that in the last 50 years, sites with prescribed burns had 2.5 times more pollinators and 2.1 times as many bee species as sites not burned. Fires open up the forest canopy, resulting in an increase in the production of flowers. The researchers also looked at fires' effects on nesting. They found that low-intensity burns didn't affect above-ground pollinator nests and that below-ground pollinator nests benefited from more access to bare soil following the burn.

Featured Picture of the Quarter



The early bird gets the worm. Or, in this case, the early worm gets the insect! The green “worm” amongst this sunflower aphid colony is the maggot of a syrphid fly. Along with lady beetles, it is one of the earliest beneficials we see in spring.

There are dozens of species of syrphid flies that occur in Utah. Most overwinter as pupae in mulch and soil, and emerge as adult flies whose coloration resembles bees.

Upon emergence, adults seek out pollen food sources, and options for early spring include willows, grasses, and sedges. This food is required for females to initiate egg-laying. In the image at the left, the tiny, white, rice-appearing structure is the old egg case. The maggot that hatched from this egg will consume up to 400 aphids!

— Image by Marion Murray, IPM Project Leader

New Publications, Websites, Apps

A new article on the [Biology and Management of Varroa Mites](#), published in *Journal of Integrated Pest Management*, discusses how these mites became a problem, what they do, and what the future looks like for honey bees.

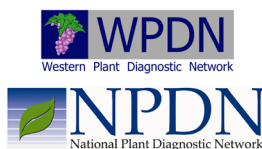
Seed Your Future has introduced a free online [Horticulture Careers Internship Search Tool](#). The tool will help students find internships across the broad diversity of the horticulture profession.

Field to Market and the IPM Institute offer *Trends in Pest Management in U.S. Agriculture*. The report analyzes barriers and opportunities around the implementation of responsible and sustainable pest management across food and fiber value chains.

USDA Economic Research Service has published [Economic Viability of Industrial Hemp in the United States: A Review of State Pilot Programs](#). This study documents outcomes and lessons

learned from state industrial hemp pilot programs and examines legal, agronomic, and economic challenges for commercial production. Challenges identified included difficulty acquiring production inputs and inconsistency between state requirements. The report notes that in the longer term, economic viability of hemp will be affected by competition from other crops, the regulatory environment, and global competition.

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