UTAH PESTS News

Utah Plant Pest Diagnostic Laboratory and USU Extension Vol. IV, Summer 2010

Vegetable Garden Insect Pests

Common and problematic insect pests vegetable growers encounter during the late spring and early summer include flea beetles, spinach leafminer, and cabbage worms.

FLEA BEETLES

Flea beetles (Fig. 1) are small, black and brown beetles that jump quickly when disturbed. Adults spend the winter in protected places in the garden under soil clods and plant debris, and begin feeding on seedlings in the spring causing stunting and seedling death (Fig. 2). They damage Brussels sprouts, corn, beans, and other vegetables. Management tactics include good seedbed preparation to accelerate seedling growth, high seeding rates and removal of affected plants, floating row covers to exclude adults, and insecticides [carbaryl (Sevin), spinosad (Success, Entrust), azadirachtin (Aza-Direct, Neem Oil), bifenthrin (Aloft, Hi-Yield Bug Blaster II), permethrin (Hi-Yield 38 Plus, Green Light Conquest), pyrethrin (Fertilome Triple Action Plus, Maxide Insect Killer, Worry Free Home Pest Control), and diatomaceous earth].

Fig. 1 (left). The western flea beetle is shiny black, and jumps when disturbed.

Fig. 2 (top). Flea beetles are particularly destructive to seedlings, but can also feed on mature plants.

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NEW *UTAH PESTS* **FACT SHEETS**

The following can be found on our website:

Codling Moth Mating Disruption

www.utahpests.usu.edu

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SPINACH LEAFMINER

Fig. 3. Spinach leafminer is a fly whose maggots tunnel within the leaves of spinach, beets, Swiss chard, and other greens.

Tan and brown blotches on the leaves of spinach, Swiss chard, beets and other leafy greens indicate infestation with spinach leafminer (Fig. 3). The adult is a true fly, or Dipteran, that emerges from soil in the spring and lays white egg masses on the undersides of leafy greens. The young maggot burrows within the leaves forming "leafmines". There are several generations per year. Early spring and fall plantings may escape infestation. Cover young plants with floating row cover (Reemay), and pick and destroy infested leaves to reduce the leafminer population. Frequent cultivation around plants can destroy overwintering pupae in the soil. Insecticides can protect leaves, but be mindful of the required interval between application and harvest (read the label). Effective insecticides include spinosad, azadirachtin, permethrin, and pyrethrin.

CABBAGE WORMS

There are two common caterpillars that attack cabbage and its relatives (e.g., broccoli, cauliflower, kale, etc.) in Utah – the imported cabbageworm and the cabbage looper. The imported cabbageworm adult is a pretty white butterfly that can be seen flitting through the garden as it searches for host plants to lay eggs. The immature stage, or caterpillar, is lime green with short fuzzy hairs on its body. The cabbage looper adult is a brown moth and the caterpillar is light green with white stripes down its body (Fig. 5). Its "looping" crawl causes its back to arch as it pulls its hind end forward like an inchworm. The caterpillars chew ragged holes in the leaves and contaminate the harvested product with their frass (excrement) and bodies. To protect plants from egg-laying, cover them with floating row cover, or use a stiff spray of water from the hose to remove caterpillars. Insecticides that have low toxicity to humans and are effective against young caterpillars include *Bacillus thuringiensis* (Dipel, Thuricide), spinosad (Success, Entrust), and insecticidal soap (Safer's).

Fig. 4. Cabbageworm larvae are sluggish in movement, and have velvety hairs.

Fig. 5. Cabbage loopers move like an inchworm, and are hairless.

-Diane Alston, Entomologist

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COOPERATIVE EXTENSION

Ticks and Associated Diseases Occurring in Utah

Moisture from spring rains and snowmelt creates environmental conditions conducive for tick activity in many Utah mountain ranges. Traveling into the canyons this time of year could result in a tick encounter. The Rocky Mountain wood tick (*Dermacentor andersoni*) (Fig. 1) and American dog tick (*D. variabilis*) (Fig. 2) are the most frequently encountered ticks found feeding on people in Utah.

Most tick submissions to the UPPDL occur in May and June, but due to extended moisture this year, high tick activity may occur into mid-summer. Ticks, in the order Acari, are closely related to other arachnids such as spiders, mites, and harvestmen. Ticks have eight legs and no wings. They appear to have one body segment (Figs. 1, 2), which contains the head, abdomen, legs and large mouthparts that project forward from the head. One key feature of the mouthparts that makes ticks so difficult to remove is the barbed hypostome (Fig. 3).

The tick life cycle consists of four stages: egg, larvae (only six legs), nymph, and adult. *Dermacentor* ticks require three unique hosts throughout their life. Ticks find new hosts by a process called questing, whereby they climb to the top of vegetation and extend their legs when they sense a host approaching (Fig. 4). If the host contacts them, they latch on and search for a suitable feeding site. After each feeding, the tick will fall from its host to the ground where it will molt and wait for another host to pass by. Generally, these consist of a small animal or rodent for the larva stage, a medium-sized animal for the nymph stage, and a large animal, such as cattle, dogs, or humans, for the adult stage. Feeding ticks greatly increase in size during the feeding process (Fig. 5). Adults mate and feed on the final host. The female falls to the ground, digests her blood meal, and can lay over 4,000 eggs (Fig. 6).

Fig. 1 *(top)*. Rocky Mountain wood tick (female, left, male, right).

Fig. 2 *(middle)*. American dog tick (female, left, male, right).

Fig. 3 *(bottom)*. Tick mouthparts (hypostome) showing the barbs which make ticks difficult to remove. Ticks also emit "cement" around the hypostome during feeding that helps them stay in place.

Three-host ticks normally take 2-3 years to complete development, completing one molt or more per year depending on conditions and questing success. Since ticks are mostly passive in their host finding, they may or may not readily find new hosts. Ticks can survive extended periods without feeding. Larvae can survive for a few months, nymphs for over half a year, and adults can survive for over 2 years without a blood meal. If a host is not located before mid-summer, ticks will retreat to the leaf litter until the following spring when favorable conditions prevail.

While there are about 12 species of *Dermacentor* ticks in North America, two closely related species of ticks are responsible for most human bites in Utah, the Rocky Mountain wood tick and American dog tick. Unfortunately, ticks have the

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Ticks, continued from previous page

Fig. 4 *(top).* An American dog tick questing on a blade of grass.

Fig. 5 *(middle).* Rocky mountain wood tick showing multiple stages of engorgement.

Fig. 6 *(bottom).* Female winter fern tick (*Dermacentor albipictus*) laying eggs.

ability to vector viral and bacterial pathogens which may cause serious human and animal diseases. In fact, ticks are second only to mosquitoes in transmitting disease to humans. Being closely related, the Rocky Mountain wood tick and American dog tick transmit many of the same diseases (Table 1). Ticks contract diseases from hosts, and then can carry them through successive molts or transmit them to offspring.

Immediately consult a doctor if you have been fed on by a tick. Early detection of a pathogen could lead to a quick recovery, and a reduction/elimination of chronic health problems. Tick paralysis (TP) is a condition caused by the feeding of some ticks. Saliva injected into the human body during feeding causes paralysis which starts at the feet and moves up the body. In severe cases, TP can cause respiratory failure and death. Mortality from TP occurs most frequently in children under 7; adults are rarely paralyzed by ticks. Fortunately, the paralysis is fully reversible by removing the tick. Always complete a thorough "tick-check" after leaving tick habitat. *Dermacentor* ticks may take at least 2 hours to find a suitable feeding site and even longer to get mouthparts into skin to feed. Transmission of disease usually occurs 12 hours after feeding has begun.

Proper tick removal is simple, but requires the use of forceps or tweezers. There are many suggested methods for tick removal, but to greatly reduce your chance of contracting a tick-borne disease, there is only one proper removal method, as outlined by Intermountain Health Care:

For larger hard ticks:

- Use tweezers and grasp the tick as close to the skin as possible, targeting the mouthparts. If tweezers are not available, use a loop of thread around the mouthparts or a needle between the mouthparts.
- Carefully pull the tick straight upward without twisting or crushing it. Use steady pressure until it releases. Crushing or squeezing a tick can cause it to regurgitate stomach contents into your blood stream, which can transmit tick-borne diseases.

For smaller hard ticks:

- Scrape the tick with a knife blade or credit card edge, being careful not to cut yourself.
- Place tick in a sealed container and have it identified.

General treatment:

- If the head accidentally breaks off and remains in your skin, clean the area around the bite and use a sterile needle to carefully lift or scrape the head from the skin.

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Ticks, continued from previous page

Table 1. Bacterial, viral, and toxic-based diseases vectored by American dog tick (ADT) and Rocky Mountain wood tick (RMWT).

Disease	Cause	Vector	Type	Symptoms
Rocky Mountain spotted fever	*Rickettsia rickettsi*	RMWT; ADT	bacteria	sudden onset chills and fever, headache, blood-shot eyes; leakage of blood from capillaries over the entire body
Q-fever	*Coxiella burnetti*	RMWT; ADT	bacteria	fever, headache, chills, weakness, malaise, severe sweating
Tularemia	*Francisella tularensis*	RMWT; ADT	bacteria	chills, fever, prostration, ulceration at bite location, and tender, swollen lymph nodes
Colorado tick fever	Orbivirus	RMWT; ADT	virus	sudden onset, intermittent fever, headache, muscular pain, leukopenia
Powassan encephalitis	Flavivirus	RMWT	virus	occurs 7–10 days after bite; fever headache, partial paralysis, confusion, nausea, coma
Tick paralysis	saliva toxin	RMWT; ADT	neurotoxin	paralysis spreading from feet to upper regions of body; may cause death

- Wash the wound and your hands with soap and water after removing the tick. Apply an over-the-counter antibiotic ointment to help reduce the chance of catching a tick-borne, or secondary infection.

Consider these tips to avoid coming in contact with ticks.

- Avoid grassy and bushy areas along edges of woodlands and fields, from March to mid-July.
- Apply tick repellent to clothing before entering tick habitat.
- Wear long pants and long-sleeved shirts. Tuck shirts into pants and pants into socks.
- Wear light-colored clothes to make it easier to detect and remove ticks.
- Conduct tick checks everywhere on your body, including armpits, waistline, belly button, scalp and crotch areas.

Based on data collected 20 years ago, Lyme disease-carrying ticks are not believed to exist in Utah. However, Utah is home to the black legged tick (*Ixodes pacificus*), which is a carrier and vector of the disease in other states. This tick is much smaller than the *Dermacentor* ticks commonly encountered in Utah. Given recent increasing reports of Lyme disease in Utah, the Center for Disease Control (CDC) is trying to determine the status of Lyme disease here. Regardless, always practice sound tick avoidance and thorough tick checks to avoid contracting tick-borne diseases of any kind. Remember, different ticks carry different diseases, so be sure to collect any tick that has bitten you, and have it identified by the Utah Plant Pest Diagnostic Lab.

-Ryan Davis, Arthropod Diagnostician

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CAPS Update

As the name suggests, the European grapevine moth (*Lobesia botrana*) is a troublesome pest of grapes throughout Europe, Asia, and Northern Africa, but it also attacks a variety of other fruits. Despite the fact that introduction of this pest was considered unlikely in the U.S., it was first detected in Napa Valley, California in October 2009, and has since been found in five California counties, resulting in quarantines.

These moths usually have three generations per year. The larvae feed on flowers, buds, and mature fruit. Damage to fruit may also lead to secondary fungal infections. Hosts include plants from 27 different families, but only a few species within each family are at risk.

In Utah, potential hosts include grape, blackberry, cherry, and peach. In response to the threat posed by this invasive species, the Cooperative Agricultural Pest Survey (CAPS) has begun monitoring cherry and peach orchards in Northern Utah. Please be on the lookout, and if you believe you've found a European grapevine moth, contact Cory Vorel, USU CAPS Coordinator (cory.vorel@usu.edu).

Figure 1. Adult European grapevine moth.

-Cory Vorel, USU CAPS Coordinator

Invasive Vinegar Fly Threatens Western Fruit Crops

Trap captures of the invasive vinegar fly, spotted wing drosophila (SWD, shown at right) (*Drosophila suzukii*), are on the increase in California and Oregon in 2010. This insect caused substantial fruit crop losses in these two states in 2009, and there is concern that infestations are spreading this year. Dr. Cory Vorel, USU Cooperative Agricultural Pest Survey Coordinator, has placed monitoring traps (shown lower right) in 10 orchards in northern Utah, encompassing key fruit production areas of Box Elder, Davis, Weber, and Utah counties. No SWD have been caught in Utah to date. Traps contain either apple cider vinegar or a yeast-sugar water solution. All tree and small fruits, and vegetable fruits, such as tomato and pepper, are hosts for SWD. SWD is of particular concern as a fruit pest because the female inserts eggs into fruit as they ripen on the plant.

Oregon State University is recommending that sweet cherry growers reduce SWD populations in the early season with insecticides. Utah fruit producers applying insecticides for other insect pests, such as cherry fruit fly, raspberry horntail, or peach twig borer, should consider using insecticides with activity against SWD in case the insect is present. Cherry fruits become susceptible to SWD beginning at light straw color; slightly less mature than when they become susceptible to cherry fruit fly. Insecticides with documented efficacy to SWD include acetamiprid (Assail), spinetoram (Delegate), spinosad (Entrust, Success), imidacloprid (Provado), carbaryl (Sevin), malathion (Malathion), azinphosmethyl (Guthion), and most synthetic pyrethroids. Avoid overuse of pyrethroids, malathion, and carbaryl as they can flare spider mites. Rotate chemical types and be mindful of re-entry intervals (REIs), pre-harvest intervals (PHIs), and maximum residue limits (MRLs) when selecting products to use.

-Diane Alston, Entomologist

Increasing the Number of Pollinators on the Farm

Growers are well aware of the contribution of bees and other pollinators on the farm. But how can you increase the number of pollinators on your farm? Many growers do not have time to manage honey bees, and renting hives has become increasingly expensive. However, it is possible to attract wild bees, including feral honey bees and native bees, without too much difficulty.

A three-step approach is recommended for increasing pollinator populations on your land. First, evaluate the bees and bee habitat that already exist on your farm. Second, adjust your farm management practices to protect bees and their habitat. Third, provide new bee habitat. Increasing pollinator populations should be easy to work into your time and financial constraints, and also easy to adapt to your unique situation.

Fig. 1. The beautifully iridescent *Osmia ribifloris* is a bee that you might encounter on a Utah farm.

A simple, yet important, first step is to become aware of the pollinators and habitat that are already present on your farm. As you go about your day's work, be alert to what bees you see and where you see them. Remember, not all bees look like honey bees. Some bees are quite tiny, and others can be quite large. Many bees are black and yellow, but some are bright green or iridescent bluish-black (Fig. 1). When you spot bees, observe them. Do they seem attracted to a particular plant? Often the flowers that bees find most attractive are the simple, wide-spread native wildflowers, rather than the fancy, highly-bred flowers that people find pleasing.

In addition to noting where bees are foraging, pay attention to where they are nesting. Wood-nesting solitary bees can be found in beetle tunnels in old trees or in soft-centered twigs, such as raspberry canes. Ground-nesting solitary bees like undisturbed soil where plants are not growing. If you see them flying low in a flower-free area, and it looks like they are searching for something, they are probably close to their nest. Bumble bees also nest in the ground, often in old rodent burrows or under small, protected piles of leaf debris or grass.

The second step is independent of the first step. Management practices can be adjusted to protect bees even if you have not surveyed for them on your property; however, knowledge of bees' whereabouts will result in more efficient and productive management adjustments. One thing that every grower can do is to minimize the risk that pesticides pose to bees. Scouting for pests and only spraying when pest populations are high will decrease the chance of killing bees, as will choosing "softer" pesticides. The pesticide label is a useful source of information about risks to bees, but it is important to note that most pesticides are tested for toxicity to honey bees. As more research is being done, it is apparent that not all bees are affected in the same way as honey bees, and the effects of pesticides on most bees are not known. Spraying when bees are not active (either very early or very late in the day) can help minimize risk. Another good practice is to establish buffer zones, areas around the outer edge of the crop that will remain unsprayed.

In addition to pesticide considerations, there are other adjustments that can make management practices more bee-friendly. Allowing crops to flower before tilling can provide additional forage and extend the reproductive season for some bees. When you do till, remember that many bees nest in the ground, about 8-18 inches deep (depending on species), sometimes right next to the plants that they pollinate. If you know that an area contains bee nests, consider tilling less deep or finding an alternative to tilling if possible.

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News from the USDA-ARS Pollinating Insects—Biology, Management and Systematics Research Unit in Logan, UT

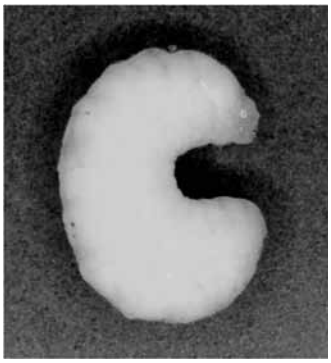
By Rosalind James, Research Leader of the "Logan Bee Lab" on the Utah State University Campus. Click here for website.

With the warmth of summer sun comes the first round of flowers that are quietly being pollinated by bees. Most of us are familiar with the honey bee, as it buzzes around flowers gathering nectar and pollen, creating stores of sweet, golden honey. But in addition to the honey bee there are several other bees, some smaller, some larger, all with their own interesting life stories. North America is the native home of some 3500 different species of bees, and Utah is the native home to just over 1500 of those.

The Pollinating Insects Laboratory is part the USDA Agricultural Research Service, located in Logan, UT, on the Utah State University campus. We specialize in the study of these native bees, the ones that so often go unnoticed by the casual observer. Most people are familiar with the large, fuzzy, black and yellow bumble bee, but even that is not only one species, but actually many different species. Unfortunately, bumble bees are in a crisis. At least five North American species are disappearing, with one species thought to have already gone extinct within the last 5 years. We have developed a method for determining the extent and cause of these losses using geographic information systems (GIS) and historic records of bumble bee collections, creating models that predict the geographic range of bees at different times in history. These models will help scientists identify possible causes for the disappearance of these bees.

Another bee extensively studied by our research group is the alfalfa leafcutting bee, which is used by alfalfa seed growers for pollination. Unlike honey bees and bumble bees, the alfalfa leafcutting bee is a solitary bee, meaning that it does not form large colonies headed by a queen. Instead, every female forms her own nest and lays eggs, in this case the nests are built inside holes in wood, or most any hole a female can find that is the right size.

Alfalfa seed growers are actually beekeepers of this special bee, and release them in their fields with boards containing rows and rows of holes made for the bees to nest in. You may have seen the shelters for these bees in alfalfa seed fields as you drive by on the highways. Unfortunately, this bee is prone to health problems in the U.S., and most leafcutting bees used in the U.S. are imported from Canada.



Top: Rosalind James (front) and Theresa Pitts-Singer collect field samples in an alfalfa leafcutting bee shelter in an alfalfa seed field in Cove, UT.

Bottom: One of the lab's projects is developing methods to improve the health of the alfalfa leafcutting bee. On the left is a healthy bee larva, and on the right is a larva infested by the fungal-caused chalkbrood disease.

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IN THE SPOTLIGHT...., continued

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Approximately 30 million leafcutting bees are imported into Utah from Canada every year. Nationwide, it is approximately 2 billion bees—although these are really purchased by the gallon, so more accurately, about 200,000 gallons a year. Our laboratory is working on developing methods to improve the health of U.S. bees, and have made some important discoveries about the immune system in leafcutting bees, and how weather and pesticide use can keep this bee from reproducing successfully.

The blue orchard bee is also a solitary bee. It nests in the spring, making it an excellent pollinator for fruit trees like cherries, apples, pears, and almonds. Utah is among the top two suppliers of blue orchard bees for California almond pollination, and this market is the direct result of methods developed by our laboratory. We continue to work to improve the effectiveness of this bee for almond production.

Meanwhile, we also have worked for many years to better understand the diversity of bees in the West, and the importance of our wild bees for pollination of native plants. Our laboratory houses the National Pollinating Insect Collection, and serves as an important taxonomic resource for scientists who study pollination. We have documented the diversity of bees from several national parks in the West, including Escalante National Monument, Zion National Park, Yosemite National Park, and the Pinnacles National Monument, helping to build a catalog of bees, and identifying several new species in the process. The mission of the Pollinating Insects Research Unit is to help keep our pollinators safe, for both food production and sustaining our wildlands, and to increase public awareness of the importance of native bees.

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A common mistake is to destroy flowers that might distract pollinators from the target crop. Actually, having additional flowers available before and after crop bloom can increase bees' nesting season and increase their populations. You may also consider leaving weeds that are good food plants for bees. Of course, noxious weeds must be removed, but think about letting the less troublesome weeds remain for foraging bees.

If you have implemented pollinator-friendly changes in your management practices, and would like to take the final step to enhancing your farm for pollinators, you can actively create bee habitat. You can start by increasing the amount and variety of blooming plants available for bees. Using native plants is a good idea, but not a requirement. Make sure that you consider their bloom periods, so that there are continuous flowers from season to season. A large assortment of plants is usually recommended, but often growers find that it is easier to manage a few varieties that are particularly suited to their farm conditions. As long as you are increasing and extending available forage, you are enhancing pollinator populations.

Creating additional pollinator nesting sites can also be easily achieved. The majority of bees are ground-nesters, which would benefit from patches of undisturbed, loosely packed soil without extensive vegetation. South-facing slopes are preferable, but any land that is fairly close to forage and is not overly moist will be suitable for nesting bees. A large proportion of the bee fauna are cavity-nesters that would be well served by large pieces of wood with holes drilled in them. Drill holes of several different sizes to attract different bee species. If you have habitat for ground-nesters and habitat for wood-nesters, you have accounted for the majority of the native bees that are likely to take up residence on your farm.

Encouraging more pollinators on the farm does not need to be difficult or time consuming. Keep it simple, especially in the beginning while you are figuring out what works best for your unique conditions. Be aware of the pollinators that you already have, take steps to preserve them, and if it is right for you, increase the pollinator habitat that you have available. The 2008 Farm Bill contains several programs which provide monetary support for growers that implement conservation plans and increase bee habitat. In a future article, I will discuss how you can take advantage of these programs.

-Cory Vorel, USU CAPS Coordinator

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www.xerces.org/pollinator-conservation:
Farming for Pollinators: Native Bees and Your Crops.
Farming with Pollinators: Increasing Profit and Reducing Risk.

In the National News

ALL USES OF ENDOSULFAN TO SOON END

The EPA is planning a phase out of all uses of endosulfan, and is currently in negotiations with the manufacturer, Makhteshim Agan of North America, to develop a timeline. Endosulfan is used on all fruit trees, vegetables, cotton, and ornamentals in commercial use only. Data has shown that risks to humans and the environment are above the agency's level of concern. It has shown to be a bioaccumulant, persistent in the environment, and farm workers can be exposed to endosulfan through inhalation and contact with the skin. The use of endosulfan has declined since 2002. EPA's 2010 revised ecological risk assessment reflects a comprehensive review of all available exposure and ecological effects information for endosulfan, including independent external peer-reviewed recommendations made by the Endosulfan Scientific Advisory Panel.

NEW PESTICIDE PERMIT REQUIREMENTS

On April 9, a 2009 court decision found that pesticide discharges to U.S. waters are considered pollutants, thus requiring a permit. In order to strike a balance between pest control and protecting human health and water quality, the EPA is proposing a new permit for flying insect control, aquatic pest control, and forest canopy pest control. The permit would require that all operators reduce pesticide discharges by using the lowest effective amount of pesticide, prevent leaks and spills, calibrate equipment, and monitor for and report adverse incidents. Additional controls, such as integrated pest management practices, are built into the permit for operators who exceed an annual treatment area threshold. The new permit will take effect April 9, 2011.

GRASSHOPPERS IN THE WEST

Some western states are reporting high grasshopper numbers this year. In some areas of Wyoming there are reportedly 50 plus grasshopper nymphs per square yard. About 7,800 square miles is scheduled for aerial treatment in that state. Huge areas of Montana and South Dakota are also at risk. Spray pilots are reporting an increase from their typical 2,000 acre treatment zones to close to a million acres. The insecticide of choice that has replaced Malathion is the insect growth regulator, Dimilin.

The nation's financial situation is affecting grasshopper populations, where many ranchers have decided to forgo the $1-an-acre spraying fee for prophylactic grasshopper control, and the federal government is only using funds on protecting federal and American Indian tribal lands.

THE WAR AGAINST BEDBUGS GETS FURRY

Well-trained dogs can detect a single live bedbug or egg with 96 percent accuracy. They can inspect a room in minutes compared to several hours for a human. Bedbug infestations have increased rapidly throughout the U.S. due to increased global travel. Once introduced, they spread quickly because they can crawl through small cracks in walls and along wiring and pipes, hitchhike on clothing, furniture, luggage, etc., and go 3 months without food. Some realtors in the country are recommending that clients get a bedbug inspection before signing a contract. Almost any breed of dog can become proficient in detecting bedbugs, and are trained by certified instructors in a few months. Owners of trained dogs keep them at the top of their game by maintaining bedbug colonies for test runs.

WHY IS WHEAT STRIPE RUST SO ADAPTABLE?

Yeu Jin, ARS scientist at University of Minnesota, recently published a report that barberry serves as an alternate host for wheat stripe rust. Up until now, wheat stripe rust was thought to be monocyclic (no alternate host). Barberry has long been known to be an alternate host for wheat stem rust, a similar disease. Rust diseases have an asexual stage on the primary host, and a sexual stage on an alternate host, which allows for recombination and development of different races that can adapt to resistant host plants. It is this reason that wheat stripe rust has been so adaptable, diverse, and virulent. Stripe rust has been severe in parts of the West, and this new finding will lead to better control of the disease through barberry eradication.

Useful Publications and Websites

- A new course and workbook called "Exploring the Small Farm Dream" is available from the New England Small Farm Institute. The aim is to help those thinking about small-scale commercial farming learn what it will take to start and manage a farm business.
- A new IPM educational video from the National Pest Management Association has been posted to YouTube.
- EPA's new PestWise website has been launched, showcasing non-regulatory programs for reducing pesticide risk through environmental stewardship such as partnerships, grants, and education. The site is called PestWise: Partnerships for Environmental Innovation in Pest Management, and has information for industry professionals, growers, school teachers, and anyone interested in learning more about responsible pest management to reduce pesticide risk. Access it here.

Featured Picture of the Quarter

Spiders are excellent predators of insects. This jumping spider (*Tutelina* sp.: Salticidae) was caught on film attacking a field ant along the Temple Fork River. It kills prey by stalking, pouncing, and injecting venom. The ant is ready to eat after the spider liquefies the contents with digestive enzymes.

-photo by Ryan Davis

Calendar of IPM Events

July 23-28, International Society of Arboriculture Annual Meeting, Chicago, IL, www.isa-arbor.com/conference

July 31- August 4, Botany 2010, Providence, RI, www.botanyconference.org

August 1-6, Ecological Society of America Annual Meeting, Pittsburgh, PA, www.esa.org/pittsburgh

August 2-5, American Society of Horticultural Science Annual Meeting, Palm Desert, CA, www.ashs.org

August 7-11, American Phytopathological Society Annual Meeting, Charlotte, NC, meeting.apsnet.org

September 14-15, IR-4 Food Use Workshop, Summerlin, NV, ir4.rutgers.edu

September 20-24, 17th Ornamental Workshop on Diseases and Insects, Hendersonville, NC, www.cals.ncsu.edu/plantpath/activities/societies/ornamental

September 27-30, North American Weed Management Association Conference and Trade Show, Pueblo, CO, www.puebloconventioncenter.com

October 3-7, Biological Control for Nature Conference: Exploring the Benefits of Biological Control for Forests, Wetlands, Grasslands, and Deserts, Northampton, MA, biocontrolfornature.ucr.edu

November 9-10, Western Plant Diagnostic Network Regional Meeting, Davis, CA,

UTAH PESTS people and programs are supported by:

UtahStateUniversity COOPERATIVE EXTENSION

NPDN National Plant Diagnostic Network

WPDN Western Plant Diagnostic Network

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