UTAH PESTS News

Utah Plant Pest Diagnostic Laboratory and USU Extension Vol. VII, Winter 2013

What's Inside

News Highlights

UTAH PESTS GROUP ADDS NEW MEMBER!

Congratulations to our Bee Specialist, Cory Stanley-Stahr and her husband, Skip Stahr, on the birth of their baby boy, Seren Anthony, on November 27. He was born a healthy 6 lb 6 oz and 19.5 inches.

NEW FACT SHEET

Streptomycin Resistance in Fire Blight

www.utahpests.usu.edu

Alfalfa Insects - A Year in Review

Clover root curculio feeding injury (top) can lead to invasion by plant pathogens, and resembles *Rhizoctonia* lesions (bottom) in roots.

WEEVILS

The use of organophosphate and pyrethroid insecticides has yielded mixed results in suppressing alfalfa weevil. In 2012, several growers in Utah used Steward (indoxacarb), an insecticide with a different mode of action. A number of growers reported that this product was successful in reducing weevil damage. The insecticide protects alfalfa for 5 to 14 days, but it does not kill larvae immediately. Instead, it causes them to stop feeding and become lethargic. Larvae then die within a few days. USU recommends that when using Steward, growers should evaluate weevil suppression 3 days after treatment.

In Idaho, the often overlooked clover root curculio, whose larvae feed below ground, received attention as a problematic pest. USU surveyed for adult life stages in northern Utah alfalfa fields throughout the 2012 season. Sweep net sampling revealed no more than five adult weevils total (<0.05 weevils/sweep) in each field sampled. In other words, adult clover root curculio were not abundant.

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Alfalfa Insects Review, continued from page 1

Larvae were not sampled specifically; however, one root sample was submitted to USU that had symptoms indicative of clover root weevil feeding. Adults cause a semi-circular chewed pattern, and larvae scar the roots. Feeding from larvae can expose roots to plant pathogens. It is noteworthy that roots infected with the fungus *Rhizoctonia* have lesions that can resemble injury of larval clover root curculio feeding.

Many of the common alfalfa predators are predatory not only in the adult stage, but also in the juvenile stage, such as lady beetle larvae (top) and minute pirate bug nymphs (bottom).

APHIDS AND PREDATORS

USU surveyed the abundance of insects in alfalfa fields with and without weevil insecticide applications and found that aphids were more abundant in insecticide-treated fields later in the season than in untreated fields. In addition, predatory insects were more abundant in untreated fields and may have contributed to the lower aphid populations in those same fields.

Predatory insects are often more sensitive to insecticide treatments than the actual target pest. After treatment, it takes time for the beneficial insects to rebound. Predators, including lady beetles, damsel bugs, big-eyed bugs, and syrphid fly larvae, are important predators of aphids.

The warm spring of 2012 allowed the adult life-stages of beneficial insects to be active in May in northern Utah, with a peak at the end of June. The juvenile stages of predatory insects were evident at the beginning of June and present much of the season. Monitoring alfalfa weevils early in the season, and treating when necessary, can aid in the conservation of predators that buffer against secondary pest outbreaks.

INVASIVE INSECTS

In 2012, pheromone traps were placed in alfalfa fields in Cache, Millard, Utah, and Weber counties for the Cooperative Agricultural Pest Survey (CAPS) program. USU surveyed for three invasive moth species on the National CAPS Priority Pest List that could harm Utah's alfalfa production: old world bollworm, cotton cutworm, and Egyptian cottonworm.

The caterpillars of each of these moths can completely defoliate alfalfa and they have a broad host range. None of these pests were detected, and surveys are anticipated to resume in 2013.

-Ricardo Ramirez, Entomologist

Post-harvest Storage Diseases

BOTRYTIS NECK ROT OF ONION

In Utah, Botrytis neck rot of onion is caused by the fungi *Botrytis aclada* and *B. allii*. The onion bulbs are infected through the neck area during the growing season, but infections are latent, meaning that no visible symptoms occur, and the pathogen remains in the neck area. The fungus is only able to grow into the bulb soon after harvest if the foliage is not allowed to completely dry before it is cut from the bulb.

In optimal harvest practices, onions are undercut when the bulbs are mature and when at least 25% of the crop's foliage has fallen over. The onions are then left in the field to cure until the necks are dry, after which the foliage is removed. If the foliage is cut from the bulb before the neck is dry, the latent *Botrytis* infection can start to invade the bulb through the soft, juicy neck. Once onion bulbs are placed in storage at temperatures above 35°F, the fungus starts rotting the bulbs from the neck down. *Botrytis* can sporulate heavily, infecting neighboring bulbs in storage bins. In severe cases, losses to Botrytis neck rot can reach 100%.

Management of Botrytis neck rot starts at harvest. Onions should be undercut when they are fully mature (and the foliage has fallen over) and the necks should be fully dry before cutting the foliage. If this is not an option for weather-related reasons, onions should be stored at 33-34°F to prevent activity of the fungus.

Botrytis neck rot may occur in the bulb if the foliage is still moist when it is cut from the bulb at harvest. The rot moves quickly from the neck region (top) to the center of the bulb, and is active at temperatures of 35°F and above.

RHIZOPUS MOLD OF WINTER SQUASH

Rhizopus stolonifer is a mold fungus that is ubiquitous: in the air, soil, and on plant material. If fruits or vegetables are damaged in the field by insects, hail, blowing sand, or strong winds, the fungus can invade the tissue through even the tiniest wounds, causing a soft rot. After infection, the fungus produces abundant spores within a few days. In storage, the spores are released and can infect nearby fruit. Under favorable conditions, the time from infection of the fruit to a complete soft rot is about 4 to 5 days.

Damaged fruit will not hold up in storage. The fungus sporulates at temperatures above 46°F, but temperatures below 50°F injure squash fruit. The best management tool is to prevent damage to the fruit in the field by harvesting carefully and avoiding insect damage. If strong winds or even hail damage fruit, it may be best to use the squash that is salvageable as quickly as possible and not keep it in storage.

-Claudia Nischwitz, Extension Plant Pathologist

Rhizopus mold of winter squash causes a soft rot. The white fluffy mass at the stem is the fungus sporulating.

What Causes Trees to Grow Haywire?

winter is the perfect time to spot odd growths

Galls

are enlarged areas of leaves, branches, or trunk, caused by insects or plant pathogens. If the overgrowth is caused by enlargement of individual cells, it is called hypertrophy, and if it is caused by an increase in the number of cells, it is called hyperplasia.

Insects can induce rapid cell division or growth by stimulating or releasing plant growth hormones (such as auxins) through egg-laying or salivary secretions during feeding (poplar twig gall, lower right). The plant isolates the toxins, forming the mass of tissue. Gall formation benefits the insect via shelter and an abundant food supply.

Like insects, pathogens induce formation of galls through the synthesis of auxin. Some pathogens can insert a plasmid in plant cells' DNA that induces the formation of "tumors" (crown gall on apple, lower left). As the cells divide, the tumor-inducing plasmid spreads.

A fasciation

occurs when the growing point (apical meristem) of a twig or stem enlarges and flattens at the same time, causing what appears to be a fusion of many flattened stems. Fasciations can occur on many different types of plants, and usually appear on only one part of the plant. Identifying the cause of the fasciation is not always obvious. Most of the time it is a genetic mutation or herbicide injury, but some insects, mites, fungi, or bacteria can also disturb the growing point.

Witches' brooms

consist of a mass of short, stubby twigs growing very close together. The name of this malformation dates back to medieval times, when mysterious occurrences—like strange tree growths—were blamed on witchcraft, and the growths in the trees resembled actual brooms used at that time. Diseases or parasitic plants are the primary causes of witches' brooms.

In the mountains of Utah, hikers may encounter two common causes of brooms: dwarf mistletoe (a parasitic plant, left) or spruce broom rust (a fungus, right).

Some brooms, however, are caused by genetic mutations. Mutations like these are more common in conifers, and will only occur in one area of the tree. Seedlings or cuttings taken from these brooms have led to a number of dwarfing conifer varieties for use in landscapes.

Burls

are prized by woodworkers for their intricate grain patterns. The exact cause of burls is unknown, but they are formed when dormant buds grow inward, twisting and turning under the bark, and never emerging as branches. Most often, burls do not negatively affect tree health.

Trees Need Attention to Prevent Winter Injury

Winter injury to trees and shrubs is caused by extreme cold temperatures, temperature oscillations, wind, accumulating snow and ice, road salt, and wildlife. Damage may not be visible until spring or even months to years after the injury occurred. Minimizing winter injury is important for overall tree health.

DESSICATION

Desiccation, or the drying-out of plant tissues, occurs frequently on evergreen trees and shrubs in Utah. During warm winter periods, evergreen plants will transpire through their leaves which requires available water in the soil. If the soil is dry or frozen, the water demands of the plant will not be met and leaves become scorched. Desiccation is worse in wind and intense sunlight, which increase transpiration. Leaf scorch is most prevalent on sides of the plant that face prevailing winds or on south and southwest sides of the plant.

To minimize winter desiccation injury on evergreens, use the following techniques:

- shield plants from wind and intense light with burlap or fencing
- do not plant trees close to highly reflective surfaces like light-colored walls
- water plants properly (click here for more information), including during warm spells in winter
- anti-desiccant sprays are available, but may not be very effective and need frequent re-application

COLD INJURY

Trees and shrubs can be injured by exposure to extreme temperatures in spring, fall, or winter. Low-temperature injury to plants includes injury or death of flower and terminal buds, leaves/needles, cambial tissue, exposed roots, or plant parts that have not adequately hardened off in fall. Severe damage to cambial tissue becomes apparent in late spring, where the plant leafs out normally, but dies after stored sugars are depleted. Tissues damaged by cold temperatures appear brown to black, water soaked, or dehydrated. If cold injury is suspected, wait until late spring to prune dead wood so the extent of damage can be accurately assessed.

The following steps can minimize cold injury:

- use plants rated for your hardiness zone and particular microclimate
- avoid fertilizing plants after mid to late summer
- avoid late-season pruning that promotes succulent growth
- water plants properly in the summer, fall, and winter to minimize drought stress
- mulch around plants that have tender or shallow root systems

SUNSCALD

Perhaps the most common winter injury that occurs to tree bark in Utah is sunscald. Sunscald is bark death caused by exposure to direct and snow-reflected light, typically on the southwest side of trunk and scaffold branches. On sunny days, bark and cambial cells heat up and break dormancy, and are then frozen and killed after a night of severe cold. The dead tissue may not flake off for a few months to a year later, exposing the wound and surrounding callous tissues. Young and thin-barked trees are most susceptible to this kind of damage.

The best prevention for sunscald injury is to wrap the tree trunk from the lower limbs to the ground with white tree wrap from December to April, or use full strength or a 1:1 ratio of latex paint and water.

FROST HEAVING

Freeze and thaw cycles can cause new transplants or plants with poorly developed root systems to heave, exposing roots to drying and cold exposure. Mulch around plants to buffer soil temperatures from the air and replant heaved plants as soon as possible in the spring.

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Winter Injury, continued from previous page

SNOW AND ICE BREAKAGE

Accumulations of snow and ice on tree and shrub branches can lead to breakage. This damage is most pronounced in the fall when leaves are still on the plants. Plants located partially under roofs, leaky gutters, and other plants can receive extra loads of snow and ice. In rare instances, highly saturated soil coupled with a heavy snow or ice load can cause plants to uproot and fall over.

To prevent breakage, prune to reduce surface area where ice and snow can accumulate. Prop up branches that have heavy loads or that may be susceptible to breaking. Tie up branches of smaller trees and shrubs for the winter so that snow will slide off. Clear snow off limbs by pushing up gently on the branches with a broom. If breakage has occurred, remove damaged branches to allow proper healing.

FROST CRACKS

A rapid drop in temperatures can sometimes cause tree xylem to crack, creating vertical splits in the tree stem. This is caused from a temperature differential in the inner and outer layers of the xylem. The outer layers become cold much faster than the inner layers and contract, causing the xylem to split. This is especially true of trees that already have wounds or had a frost crack previously. Because this damage occurs from low temperatures it is difficult to manage.

The following can help reduce the chance of frost cracking:

- create a mulch zone around trees and shrubs to avoid injury from mowers and weed trimmers
- brace large frost cracks in winter to allow healing
- monitor cracks for the presence of pathogens and/or insects
- choose hardy plant species

ANIMAL DAMAGE

One commonly overlooked problem is damage caused by animals, in particular mice, voles, and rabbits. Damage most frequently occurs where snowpack forms around tree stems providing protection for rodents who feed on tender bark tissues, girdling the plant. Rabbit feeding damage usually occurs above the snow line. Rodent feeding may be increased where there is excessive mulch or plant material around the trunk.

To minimize animal injury:

- wrap trunk and low branches with screen wire, hardware cloth, or plastic tubing, and bury the barrier below soil level and extend to above rabbit height and estimated snow line
- create a turf and weed free barrier around trees; reduce mulch thickness
- place rodenticides in rodent runways
- trap and remove rodents and rabbits

-Ryan Davis, Arthropod Diagnostician

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Winter Injury. 2012. Cornell University, Department of Plant Pathology and Plant-Microbe Biology, Plant Disease Diagnostic Clinic.

Pecknold, P.C. 2001. Winter Injury of Ornamentals. Purdue University, Cooperative Extension Service. BP-2-W.

Beckerman, J. 2001. Winter Injury on Trees. University of Minnesota, Yard & Garden Brief.

Update: European Earwig Biology and Management in Peach Orchards

This article provides an update to one published in the summer 2011 Utah Pests News (click here).

The European earwig has been known to occur in Utah since the 1930s, and has become a ubiquitous pest and predator in many plant systems. The primary concern in fruit crops is that earwigs chew directly into fruits near harvest-time causing substantial crop loss. However, earwigs also prey upon small, soft-bodied insects such as caterpillars and aphids, providing pest management services through biological control. Thus, in an attempt to balance the "good and bad" of earwigs, we are studying their biology and optimal timing for fruit protection in peach orchards.

Small rolls of one-sided corrugated cardboard (corrugation turned inward, 4-inch wide strips) tied to the base of tree trunks and scaffold limbs were efficient traps for monitoring earwigs. On average, more earwigs were caught in traps placed on lower peach tree trunks than scaffold limbs. However, trap catch by location varied with earwig life stage and time of season. Overwintered adults and summer nymphs (juveniles), active from May through mid-July, were caught in higher numbers in lower trunk traps while summer adults, active from mid-July through September, were equally present in trunk and limb traps. The attraction of ripening fruit in the canopy later in the summer is a likely cause for the change in behavior of summer adults. We have documented two summer generations of European earwig in northern Utah. The second generation is small, and occurs in August and September during the period when peach fruits ripen.

We investigated the timing of leaf- and fruit-feeding by caging earwigs on peach shoots. Adults and nymphs fed on both leaves and fruit. The majority of leaf-feeding occurred in July and August, and slowed down as shoot growth terminated and leaves hardened off. The first fruit injury was observed in mid-July, but levels were low. The majority of fruit-feeding occurred in August and September when fruits softened as they neared maturity, and was greatest in September. Few second-generation nymphs were active late in the season.

Cardboard traps tied to lower peach trunks catch hundreds of adult and juvenile earwigs, and serve as a monitoring tool.

To evaluate biological control services of earwigs, we caged adults on shoots infested by green peach aphid during May and June (see image, next page). Aphid densities were significantly less on shoots with earwigs as compared to shoots without earwigs. Differences occurred within one

continued on next page

Earwigs, continued from previous page

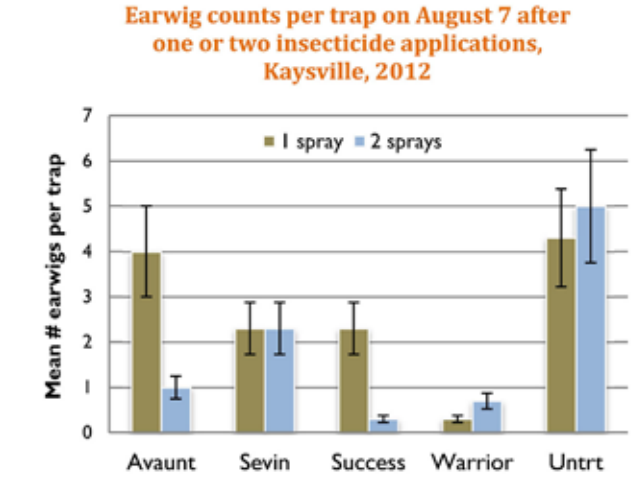
Branches enclosed in a "cage" revealed that earwigs help reduce aphid population, and do not prefer to feed on fruits until they have softened, just before or at maturity.

week after earwigs were added to aphid-infested shoots, and continued for up to 3 weeks.

To protect fruit from earwig feeding near harvest, a primary control tactic is application of insecticides. Studies were undertaken to determine the efficacy of conventional and organic insecticides, and effect of application timing.

In a 2011 trial, insecticides were applied only once, about 4 weeks before harvest. The conventional formulation of spinosad (Success) was the most effective in protecting fruit, while the organic formulation of spinosad (Entrust), carbaryl (Sevin), and lambda-cyhalothrin (Warrior*) were intermediate, and all were better than the untreated control. Numbers of earwigs caught in trunk traps were reduced for up to 2 weeks in only the two spinosad treatments as compared to the others.

Results differed somewhat in a 2012 trial where Warrior* was the most effective insecticide. We found that using it once 4 weeks before harvest was just as effective as using it twice, at 4 and 2 weeks before harvest. Success, Sevin, and indoxacarb (Avaunt*) were intermediate in fruit protection. Two



Two applications of various insecticides applied to peaches 4 and 2 weeks before harvest showed that Warrior and Success were the most effective options for earwig control in 2012. In 2011, Success was the most effective (data not shown).

applications of Success and Avaunt were more effective than one application in reducing earwig counts. In conclusion, all insecticides reduced fruit injury. Spinosad showed consistent efficacy in both years while Warrior performed better in the second year. The efficacy of spinosad was enhanced when it was applied two times at about 4 and 2 weeks before harvest.

This research was supported by the USDA Organic Agriculture Research and Extension Initiative, the Utah Department of Agriculture Specialty Crop Block Grant Program, and the Utah Agricultural Experiment Station. Look for research updates in upcoming fruit industry meetings, gardening classes, and publications.

*Registered for commercial orchard use only

-Diane Alston, Entomologist and
Andrew Tebeau, PhD student in Dept. of Biology, USU

Learn How to Monitor for Pests

Timely monitoring of pests is important to keep plants healthy: you will learn what and how many pests or beneficial insects are active, and whether or not a treatment is necessary. UTAH PESTS has developed a series of how-to videos, explaining how to use a beating tray, pheromone traps, homemade traps, and how to identify the pests you are monitoring.

Click here to view!

In the National News

DISCOVERIES ON PLANT DEFENSE MECHANISMS CONTINUE

University of Texas-Arlington and Michigan State University biologists published in the *Proceedings of the National Academy of Sciences* how the hormone jasmonate works at the molecular level to protect plants. In healthy plants, jasmonate plays a role in reproductive development and growth responses. But when plants are stressed from pests or drought, jasmonate signaling shifts to defense-related cellular processes, which is energy-consuming. The biologists showed that a jasmonate signaling repressor protein is able to mediate the jasmonate pathway until defenses for the plant become absolutely necessary. Further work is planned to identify the domain of the repressor protein that is responsible for immunity, which will lead to genetic resistance for use in sustainable agriculture.

SEA ANEMONES–A VALUABLE RESOURCE FROM CORAL REEFS

Scientists at the University of Leuven in Belgium have discovered toxins in the reef-dwelling sea anemone (*Anthopleura elegantissima*) that could possibly lead to a new generation of environmentally friendly insecticides, as reported in *The FASEB Journal*. They have extracted and characterized three main toxins from the anemone venom, and are trying to better understand how each of them work. The discovery of these toxins is similar to discovery of a new drug, and because of their unique mode of action, could lead not only to new insecticides but also treatments for human diseases.

REDUCTION OF UV LIGHT CAUSES APHID DECLINE

An article published in *Horticultural Science* reveals that reducing UV exposure to aphid-infested plants reduces the pest population. In the study, scientists compared plants in two high tunnel greenhouses. In one, they covered crops with standard mesh netting, while in the other, crops were covered with a UV-absorbing netting. Both crops were artificially infested with aphids. The UV-covered crops had significantly fewer aphids than those with the standard netting. Although using UV absorbing nets is not the only solution to aphids, it can have many benefits, including pesticide reduction.

USDA PLANT HARDINESS ZONE MAP MAY BE OUTDATED

Dr. Nir Krakauer, at The City College of New York, found that the new USDA Plant Hardiness Zone Map is already invalid. The Hardiness Zone Map delineates temperature boundaries for plant survival, based on 30-year averages of minimum temperatures. Krakauer found that winter temperatures in many areas have warmed by at least 2 degrees. As a result, over one-third of the country has shifted a half-zone as compared to the USDA map, and over one-fifth has shifted a full zone. Krakauer has found a method that can keep the map updated each year by adding new temperature data and recalculating.

ULTRASONIC FREQUENCY DEVICES NOT PROMISING FOR BED BUGS

Alternative means of controlling urban insect pests by using ultrasonic frequencies are available and marketed to the public, but are they effective? Authors of a paper in the *Journal of Economic Entomology* compared four commercially available electronic pest repellent devices to no treatment for bed bug control and found that ultrasonic devices have no impact on bed bug populations. They surmise that the devices don't have the correct combination of frequencies to attract or deter the insects.

BEES HELP US UNDERSTAND BENEFITS OF RED WINE

A team of scientists from Arizona State University, the Norwegian University of Life Sciences, and Harvard Medical School found that when the bees were given resveratrol, an antioxidant found in red wine, they lived 33 to 38 percent longer, probably due to diet modification, as published in the journal, *Aging*. Of the food choices provided, the bees given resveratrol chose to consume only highly concentrated sugar, and when given the opportunity to gorge, the treated bees ate less then the untreated bees. The scientists conclude that resveratrol may induce caloric restriction, which in turn extends lifespan.

Useful Publications and Websites

- Suburban Pest ID offers a pest gallery, access to a weekly blog, and the ability to send pest pictures for identification.
- PestWorld has developed a website with kids' activities including videos and games, to help learn about insects.
- Citizens Guide to Pest Control and Pesticide Safety is a publication developed by the EPA to help homeowners learn how to use pesticides, control pests in the home, how to choose a pest control company, and more.
- Climate Change Webinar is an online presentation provided by Washington State University Center for Sustaining Agriculture and Natural Resources. It provides information on climate change of importance to agriculture in the Pacific Northwest.

Featured Picture

On aspen, cottonwood, and poplar twigs, galls formed by the poplar twig-gall fly are most noticeable in winter. Inside the galls, fly larvae are resting until spring, when they will pupate to emerge as adults. Adult females lay eggs within newly forming twigs, and the feeding of the larvae starts the formation of new galls. Empty galls will continue to swell after the insect has emerged, and appear as swollen bands around larger limbs or trunk.

-Image by Marion Murray, IPM Project Leader

Calendar of Events

January 28 - 30, Utah Nursery and Landscape Association Green Conference, Sandy, UT. www.utahgreen.org/events

January 31 - February 2, Utah Hay and Forage Symposium, St. George, UT. utahhaysymposium.eventbrite.com

February 12 - 14, World Ag Expo, Tulare, CA. www.worldagexpo.com

February 14 - 15, Utah Pest Control and Lawncare Association Annual Convention, Sandy, UT. upcla.com/images/stories/2013_Conference_Registration_Form.pdf

February 20 - 22, 10th Annual Diversified Agriculture Conference, Ephraim, UT. diverseag.org

February 26 - 28, USU Extension Agriculture Workshops
February 26: Organic Fruit and Vegetable Workshop, Salt Lake City
February 27: Diversified Agriculture Conference–*Urban Ag* and the Utah Berry Growers' Annual Meeting, Salt Lake City
February 28: Utah Fruit Pests Workshop: Spotted Wing Drosophila and Brown Marmorated Stink Bug, Provo

March 3 - 8, National Invasive Species Awareness Week. www.nisaw.org

April 6 - 11, Entomological Society of America Pacific Branch Meeting, Stateline, NV, www.entsoc.org/branch-meetings

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NPDN National Plant Diagnostic Network · WPDN Western Plant Diagnostic Network · APHIS · NIFA · UDAF Utah Department of Agriculture and Food