UTAH PESTS News

Utah Plant Pest Diagnostic Laboratory and USU Extension Vol. II, Winter 2008-09

Houseplant Pest Blues

Have you ever purchased a beautiful poinsettia for the holidays, only to find out (two weeks later) it was completely infested with whiteflies? How do you try and manage a pest that has spread to all of your favorite houseplants? Unfortunately, indoor pests are a common problem that can become a chronic issue if not controlled properly. Most houseplant pests are transported indoors on plant material, either by purchasing new plants or relocating summer potted plants. Common offenders include fungus gnats, mealybugs, scales, thrips, spider mites, whiteflies, and aphids.

Good to know...

- Most indoor plants are susceptible to insect infestations and disease.
- Most houseplant pest problems begin with bringing infested materials inside the home.
- Carefully check and/or isolate plants before bringing them inside.
- Using sterile potting soil and modifying water schedules can discourage outbreaks on houseplants.

FUNGUS GNATS

Adults are easily disturbed from the plant and are an obvious nuisance. Fungus gnat larvae are the damaging life stage, feeding on roots and organic matter in the soil. Repotting with new, sterile soil and reducing moisture will discourage egg-laying adults. For widespread infestations, consider using a soil drench of Bti (*Bacillus thuringiensis israelensis*) to kill larvae, and sticky cards to trap adults.

SPIDER MITES

Although not an insect, spider mites are common houseplant pests. Small infestations start out on the undersides of leaves and can spread throughout the entire plant. Initially, leaves look speckled or yellow, but eventually heavily infested plants will be grey, dusty, and covered with webbing. Increasing the humidity around houseplants can be helpful; also, vigorously washing the leaves can remove all life stages. Horticultural oils provide more effective control than insecticidal soaps or sprays.

Johnny N. Dell (www.ipmimages.org)

David Cappaert, Michigan State University (www.ipmimages.org)

Top: Fungus gnat adults and larvae thrive in moist soil conditions.

Bottom: Spider mites often go unnoticed until leaves are heavily infested and webbing covers plants.

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NEW *UTAH PESTS* FACT SHEETS

The following can be found on our Web site:

Carpenter Ants
Carpenter Bees
Clothes Moths
Crickets
Dermestids
Fungus Gnats
Human Parasites
Squash Bug
Yellow Sac Spiders

www.utahpests.usu.edu

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MEALYBUGS/SCALES/APHIDS

These fluid-feeding insects can feed on any part of the plant and often go unnoticed until the leaves turn yellow or drop off. Mealybugs and scales are cryptic insects that cover themselves in a protective, waxy or cottony covering. Honeydew will be sticky and obvious on the plant, and can promote a black sooty mold if not washed off. Diluted alcohol (25% concentration), insecticidal soaps and horticultural oils are the most effective management tools. Armored scales are particularly difficult to manage, and insecticidal soil drenches (imidacloprid) may be necessary for large infestations.

HOUSEPLANT PEST CONTROL

Indoor infestations can be minimized with a few simple strategies. The most important cultural control tactic is to keep plants healthy with proper watering and fertilization. Optimal vigor will depend on the type of plant – some like their roots to dry down between waterings while others thrive on having "wet feet." Excessive soil moisture favors soil-dwelling insects like fungus gnat larvae; however, drought-stressed plants can flare spider mites and aphids.

New houseplants or existing outdoor plants should be isolated from healthy indoor plants for at least 2 to 3 weeks to confirm they are pest-free. Regularly and thoroughly examine household plants to detect early infestations. Sometimes the insects are cryptic or live in the soil, and assessing current activity can be difficult. So look for cast molting skins, feeding injury, or honeydew. To confirm an infestation of mites, thrips or springtails, gently shake the plant in a bucket or over a piece of paper and look for moving "dust."

If a houseplant infestation does develop, there are several techniques that may help eliminate or suppress pest activity. Periodic washings of some plant types may help dislodge small insects and mites. Yellow sticky cards are attractive to most flying adult insects and can be used near infested plants. Sometimes, severely infested plants should be discarded because nursing sick plants can be a time-consuming and futile effort.

Whitney Cranshaw, CSU (www.ipmimages.org)

Green peach aphids are common greenhouse pests that are accidentally introduced into homes.

Although many synthetic insecticides are available for houseplant pest control, it is important to recognize many persistent pests are genetically resistant. As a result of overuse in greenhouses and nurseries, many species of whiteflies, aphids, and fungus gnats are no longer susceptible to conventional insecticides. Microbial products made from bacteria, nematodes, or fungi are selective; these products are most effective in humid conditions and multiple applications are often necessary. Horticultural oils and soaps are generally effective against most houseplant pests. Botanical products, like neem and pyrethrins, are relatively fast-acting insecticides with a short residual. Systemic soil drenches target fluid feeding insects, but take time to circulate throughout the plant. Occasionally, a "host-free" period of houseplants may be a more effective (and cheaper!) treatment for a serious indoor plant pest outbreak.

For more information, go to the UTAH PESTS Web site and search for the fungus gnats and soft scale fact sheets at www.utahpests.usu.edu/insects/htm/factsheets.

-Erin Hodgson, Extension Entomologist

A New Virus Possible on Utah Tomatoes

Pepino mosaic virus, also known as PepMV, is a relatively new disease of tomatoes in the U.S. The virus was first identified on pepino (*Solanum muricatum*) in Peru in 1974, and on tomatoes (*Lycopersicon esculentum*) in the Netherlands in 1999. Since then, PepMV has steadily spread throughout tomato producing regions, especially in greenhouse production facilities. It was found in the U.S. in 2001 in California, Colorado, Texas, and Arizona, and has been identified in many other states since.

PepMV can cause a wide assortment of symptoms depending upon the tomato variety, the plant growth stage at the time of infection, and climatic and growth conditions. Symptoms usually appear 2 to 3 weeks following infection. In general, the virus causes stunted growth and distorted, needle-like leaves on plant terminals. Leaves can also have yellow spots and bubbly areas associated with mild interveinal chlorosis (yellowing). Stems and flowering clusters will display brown streaks while fruit can show mosaic yellowing and irregular or uneven ripening.

The virus is easily transmitted by mechanical means either on hands or tools. Infected seed can transmit the virus as well, although at a lower frequency.

To avoid this disease, plant only seed of certified origin, varietal purity, and guaranteed to be virus free. There is some research that suggests the virus can be inactivated in the seed-coat by soaking seed in the highly alkaline tri-sodium phosphate (TSP).

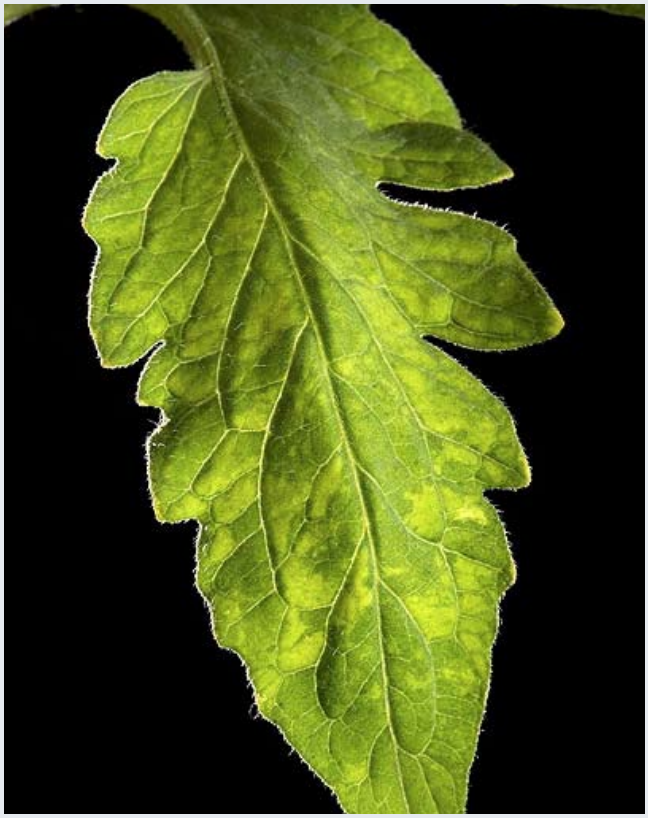
In greenhouse culture, maintain a sanitary working environment, and immediately quarantine and dispose of suspected virus-infected plants. To prevent or minimize mechanical transmission of PepMV and other viruses, always work on the healthiest plants first, and then on the less vigorous plants.

Once a plant is infected, the only recourse is disposal and thorough clean-up of hands and tools before returning to the garden.

We suspect that PepMV probably occurs in Utah. Some tomato samples submitted to the Utah Plant Pest Diagnostic Laboratory this summer did not appear to fit any viral symptomology I had encountered before. Upon learning about PepMV, I believe this virus is what I was seeing. At that time, we did not have a suitable diagnostic test to identify the disease. Now, we have access to several options to readily and accurately diagnose PepMV.

-Kent Evans, Extension Plant Pathologist

Look for these tomato symptoms and report suspects to the UPPDL



Mottled yellowing on a leaf infected with pepino mosaic virus.

Infected fruit shows irregular ripening and a mottled pattern.

Abiotic Diseases of Spruce and Other Conifers

The Utah Plant Pest Diagnostic Lab received several spruce samples this fall with abiotic diseases. Abiotic (meaning "non-living") diseases can be caused by water stress, nutrient deficiency, salt accumulation, or chemical damage. Abiotic symptoms are typically uniform, where all needles on a branch (Fig. 1) or all branches on a certain part of the tree are affected, whereas symptoms caused by pathogens are random. The three most common problems on spruces are over or under watering, salt stress, and chemical damage.

Fig. 1. *Abiotic symptoms occur in uniform patterns. Symptoms of varying causes can be similar, so it's important to give a detailed history of the site.*

Fig. 2. *Salts accumulate at the tips of the needles and progress toward the base. Soil analysis from this site showed high levels of salt.*

WATER STRESS

Water stress is caused by either a shortage or an excess of water. Spruce trees are shallow-rooted, and native to the mid-mountain range of the Rockies where optimal water occurs. Mimicking the native environmental watering regime takes practice, and when inadequate, can result in disease. In general, a water deficit develops when plants lose more water from transpiration than they are absorbing from the soil. In dry soil, roots cannot absorb as much water as has been lost and stress symptoms begin to appear. If water in the tissue decreases enough, the tree will significantly deteriorate and die. Drought-stressed trees may show symptoms such as drooping or wilting, yellowing, browning at the tips (scorch), curling, or a combination of these symptoms. In conifers, the oldest needles will show symptoms first and may drop prematurely. Dieback of twigs and limbs will occur as symptoms progress over the years. Drought conditions will often appear throughout a group of trees because the soil conditions will be similar. Severe drought can also predispose spruce to infection by opportunistic pathogens and insects.

Too much water can also cause problems in spruce, which are more sensitive to saturated soils than deciduous trees. Excess water stifles the roots through a reduction in available oxygen. Roots deprived of oxygen are unable to absorb water and nutrients, and plant metabolic processes stop, growth ceases, and trees begin to decline or die. Excess water can also predispose trees to root rot caused by *Phytophthora* and *Pythium*, which need periodic flooding for germination and dispersal.

SALT STRESS

Saline soils are common in the West because an arid climate, inadequate rainfall, and poor drainage cause naturally occurring salts to concentrate. Spruces have a low to moderate tolerance to salts. When growing in saline soils, roots are unable to absorb water, resulting in symptoms similar to scorch. Nutrient availability is also diminished because sodium ions replace calcium and other nutrients on soil particles. In highly salty soils, roots eventually start to absorb salt ions where they accumulate in needles and twigs at toxic levels (Fig. 2). Needle damage starts with browning at the tips and progresses inward toward the base. Consecutive years of salt injury results in dieback.

Although not as commonly used in the West as in the eastern U.S., de-icing salts applied to roads during winter can also cause toxic effects in spruces. When moisture is present, salt ions from road spray are able to enter and accumulate in needles. Symptoms include brown needle tips, premature needle drop, and twig death.

To combat salt stress, add large amounts of water to the root zone to leach salts further down into the soil profile. Do not use irrigation water that is already saline, such as from a water softener. Reducing soil compaction will aid in water absorption.

CHEMICAL DAMAGE

Common causes of herbicide injury include using more than the recommended amounts, applying them unevenly or unintentionally to the root zone of trees, or drift to non-target trees. Herbicide damage is greater on plants exposed or treated during hot weather. Drought and heat stress can enhance the toxic effects.

Symptoms of herbicide damage will vary depending on the type of herbicide used (Figs. 3 and 4). Hormone-type (phenoxy) herbicides will be translocated to growing points and cause abnormal growth in new needles or leaves. Symptoms can develop several days or several weeks after exposure,

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Salt Lake County Jail Horticultural Program

By Maggie Shao, Horticulture Agent for USU Salt Lake County Extension.

Hope is hardly a word one associates with a jail or prison. There is a three-acre garden at the Salt Lake County Jail for which there is hope. The Salt Lake County Jail Horticulture Program provides an opportunity for individuals in a "correctional facility" to turn their lives around. The program started in the fall of 2006 when Sgt. Raelene Eppard of the Salt Lake County Metropolitan Jail Programs, contacted me about starting a garden adjacent to the jail. Sgt. Eppard and I walked the weedy, vacant lot with compacted and nutrient-poor soil, and formulated a plan. Education and sustainable practices would be top priorities. The inmates would grow crops without chemicals, to serve the growing interest for organic produce at the local farmers market.

The Salt Lake County Sheriff's program fully supported the initiation of this program with funds for two tool sheds, a trailer, irrigation supplies, tillers, tools, and seeds. The work to reclaim the land began with several soil samples that were sent to Utah State University Analytical Laboratories. The pH and salinity looked fine, but we needed to remove the existing weeds and add a lot of organic matter to improve the soil texture. After discing the field and tilling in several truckloads of organic compost, we seeded a green cover crop of hairy vetch and winter rye. Cover crops suppress weeds, build productive soil, and help control pests. Over the winter of 2006, Master Gardener Kathy Dennis, Sgt. Eppard, and I, selected the variety of seeds and starts, and planned the rows. In the spring, a large gaggle of Canada geese descended upon our garden, aiding the soil's organic matter with their "gifts."

Prisoners that work in the garden today are first interviewed and selected by Sgt. Eppard. They then must complete 40 hours of classroom training provided by USU Extension Salt Lake County, and pass a final exam. Those that are successful receive a Utah Gardener Certificate. In just two years, we have held three trainings and certified 28 inmates. Master Gardener volunteers are an integral part of the education, working closely with the prisoners and helping them apply what they learned in the classroom to the garden setting, such as weed and insect identification, and recognizing the right time to harvest that butternut squash.

By managing the garden naturally, without chemical fertilizers or pesticides, we meet consumers' increased desire for local, organically grown produce as well as create a sustainable garden that is relatively inexpensive to maintain, environmentally safe, and encourages beneficial insects. The garden conserves water and reduces weeds through a drip tape irrigation system that applies water only to the desired plants. To manage weeds and other pests, prisoners scout the garden regularly and when needed, employ the primary control method: hand-picking. The garden also generates a lot of compost that is used for new plantings. This year we installed a hay bale compost system, with the walls of the bin created with hay bales that are easily moved when turning the compost. We also planted 150 thornless blackberry plants, 'Chester' and 'Triplecrown,' and are looking forward to harvesting them in 2009.

The 3-acre Salt Lake County Jail garden is fully organic.

The inmates have taken ownership and pride in the garden, and work hard to keep it maintained.

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IN THE SPOTLIGHT...., continued

Salt Lake County Jail Program, continued from previous page

One of the desired outcomes of the Salt Lake County Jail Horticulture Program was to be financially secure by selling the produce at Pioneer Park Farmers Market in Salt Lake City. From the three acres, prisoners harvested 17,000 pounds of vegetables in 2007 and 19,000 pounds in 2008. The majority of the produce was sold at the farmers market, while 10% was donated to local missions and food pantries (a value of $8,160). For 2008, sales generated over $16,000, to be used to offset the initial investment and further the growth of the program.

We are hopeful and looking forward to another productive year. The biggest hope for all of us involved in the program is that, from the support of Salt Lake County Sheriff's department, education through USU Extension Salt Lake County, positive reinforcement from Master Gardener volunteers, and continued support from the community who purchased the produce, those prisoners who have gone through the garden have a chance to turn their lives around.

Some of the bounty from the SLC Jail garden: 'Detroit' red beets (top) and a variety of squashes (bottom).

PLANT PATHOLOGY NEWS , cont.

Abiotic Diseases of Conifers, continued from page 4

or they may appear in the spring after exposure in the fall. Conifers are relatively tolerant of phenoxy herbicides, but the shoots may curl and the needles may drop in response to damaging doses. If affected, spruce trees will outgrow the symptoms in one or two years.

Herbicides applied to turf can often injure trees in the area when taken up by the roots. Non-selective herbicides (such as glyphosate, paraquat, or picloram) can persist in the soil for 45 days to a year or more, causing residual effects on later plantings. These herbicides tend to stop growth and cause chlorosis in new and old leaves or needles. Trees injured by these herbicides are less likely to recover than trees injured by hormone-type herbicides.

Contact herbicides (such as paraquat) can cause a localized necrosis similar to spots caused by some fungi. The Plant Pest Diagnostic Lab does not have the ability to test for chemical toxicity. Any further testing should go through Clark Burgess at Utah Department of Agriculture and Food.

-Erin Frank, Plant Disease Diagnostician

Fig. 3. *The abnormal growth of the new needles in this sample is indicative of a symptom seen with chemical damage.*

Fig. 4. *Chemical damage is the suspect cause of the symptoms in this spruce, causing chlorophyll disruption.*

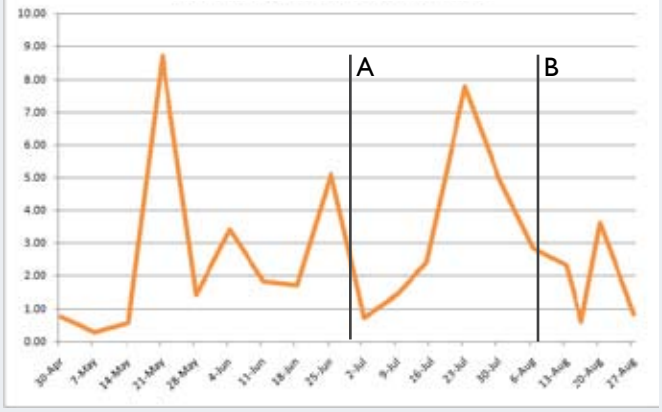
Tree Fruit Monitoring Report for Summer 2008

CODLING MOTH

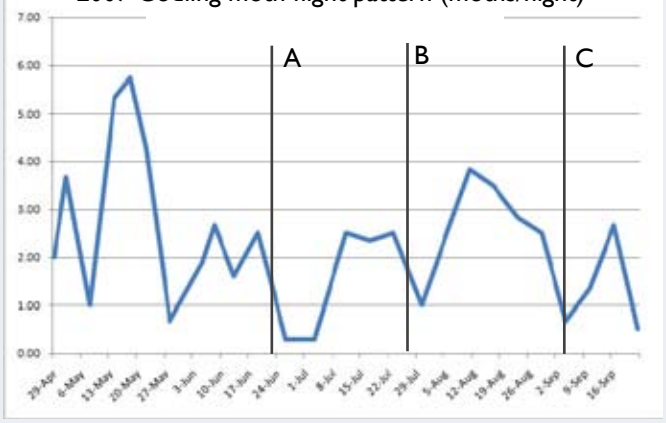
This season we saw a fairly typical pattern of moth flight, with two full generations and a partial third generation in most areas. The cool spring, however, lengthened the first generation flight period by 2 weeks compared to 2007. Another significant difference in flight pattern between 2008 and 2007 occurred during July to mid-August, when one codling moth generation occurred in 2008 and two in 2007.

We predicted that overall trap catch for 2008 would be greater than in 2007 because of the long hot summer. We felt that more moths were overwintering, and warned of a large first generation moth flight. Fortunately, the dips in temperature and intermittent moisture over the spring caused a herky-jerky first generation release, and probably reduced the population quite a bit. After the warm-up, however, many areas—both conventional and non-mating disrupted sites—saw a spike in moth numbers toward the middle of the first generation. If we combine moth trap catch for the entire summer, we found that there was a greater average number of moths per night for 2008 over 2007. In conventional sites, traps caught 2.5 moths/night in 2008, compared to 2.1 moths/night in 2007. In mating disrupted sites, traps caught 0.29 moths/night in 2008, compared to 0.12 moths/night in 2007.

2008 Codling moth flight pattern (moths/night)



2007 Codling moth flight pattern (moths/night)



A=end of moth flight, 1st generation; B=end of moth flight, 2nd generation, C=end of moth flight (estimate), 3rd generation

Our prediction for 2009? Populations (i.e., moth catch per night) should go down. Many farms and homeowners saw a region-wide "off" year for alternate-bearing apple varieties. Growers fortunately maintained control methods on those trees, including mating disruption, preventing those few apples that formed from becoming infested. The lower fruit yield and fewer codling moth generations for 2008 should be good news for apple production in 2009.

GREATER PEACHTREE BORER

This year, we placed three times more pheromone traps than last year in monitoring sites to get a better understanding of the moth flight pattern of this pest. We saw that start of trap catch depended on the site's population size, where orchards with typically low populations did not see moths until July 8, and highly populated sites saw moths starting June 16. Peak moth flight occurred from late July through mid-August. Sites with heavy populations still had high numbers in mid-September. Flight ended in early October.

As far as numbers of moths, we caught a far greater number of moths across all sites in 2008 compared to 2007. Because there is only one generation, this phenomena is not easy to explain. Certainly 2007's long season probably contributed to mating success and survivorship of larvae, especially those laid late in the season. Other contributing factors include changes in control methods of individual growers, changes in peach production acreage, and tree health.

OTHER PESTS

In general, most other pests appeared as we typically expect. Because of the cooler summer, spider mite damage was low except in isolated areas. European red mite was nowhere to be seen, and leafrollers were easily controlled as a result of codling moth pesticides. Pear psylla incidence and damage was much lower than in 2007, and fire blight was not as severe as in 2007, although damage was sporadic throughout the apple and pear growing regions. Damage from white apple leafhopper was also minor.

Where established, woolly apple aphid populations continued to explode during the summer months, and should be monitored for further population increases over the years as growers continue to shift away from stronger codling moth control products, which in the past kept this pest at bay.

-Marion Murray, IPM Project Leader

Biocontrol Agents Are Working Hard in Utah

Classical biological control involves searching for and introducing organisms (usually insects or pathogens) that target a specific pest (invasive plants or insects). Typically the target organism is one that has co-evolved with the pest in question in their native habitat. With biocontrol, eradication is not the goal; rather, it is reducing populations to a tolerable level. Many years of research are required before releasing one non-native organism to target another.

MORMON CRICKET

The Mormon cricket population in the West is cyclical, regulated by weather, predators, and disease. High population levels result in economic damage and require chemical control. According to Dr. Donald Roberts, USU Insect Pathologist (retired), the cricket population has reached outbreak levels for the past 15 years. The latest peak was in 2004 where 3 million acres were infested in Utah alone. Control is best achieved via broad-spectrum pesticides such as carbaryl; however, their non-selective nature leads to collateral damage.

Roberts and his research group have been looking at using fungi pathogenic to the Mormon cricket. From field collections across several western states, they found that *Beauveria bassiana* and *Metarhizium anisopliae* var. *anisopliae* are the most common native fungal pathogens. Isolates of each species were compared for virulence, and the group found a high-heat and UV-tolerant isolate of *M. a.* var *anisopliae* for use in future outdoor field tests. Roberts says that this isolate, and a few others, "show promise for Mormon cricket suppression."

TAMARISK (SALTCEDAR)

Tamarisk is a non-native invasive plant that now covers more than 2 million acres of riparian land. It increases soil salinity, displaces native plants, and lowers the water table. According to the Nature Conservancy, each mature plant "mines" nearly 200 gallons of water per day from the water table, amounting to a loss of 2 to 4.5 million acre-feet of water per year. It is also highly flammable, posing a fire hazard in public sites. Control of the extensive invasion of saltcedar by cutting or by herbicide is ineffective and impractical.

The tamarisk leaf beetle, *Diorhabda elongata*, native to central Asia where saltcedar also originates, was considered a viable biocontrol option. Adults and larvae of the tamarisk beetle feed on the foliage, resulting in reduced photosynthesis and poor plant vigor. In 2001, after 20 years of research by USDA-Agriculture Research Service (ARS), the beetle was released in Utah (in collaboration with USDA-APHIS and BLM) and several other western states. Three years later, a Utah program was enacted allowing beetle collection from Delta for release on state and private lands. As a result, beetles are now successfully established on thousands of riparian acres.

Tim Higgs, Grand County Weed Supervisor

Tamarisk leaf beetles are voracious feeders and offer hope to reclaiming invaded riparian areas.

Worries that the beetle will kill native vegetation are unfounded. USDA-ARS scientists found that although larvae did feed on plants in the genus *Frankenia* (seaheath), they preferred feeding and egg-laying on tamarisk.

Because the beetles feed only on the foliage, plants are not killed immediately. Observations in Delta show that repeated defoliation by the larvae can result in plant death in three to five years. As the tamarisk population declines, so will the beetle population.

KNAPWEED

Three species of knapweed—squarrose, diffuse, and spotted—are all considered noxious weeds in Utah, and have destroyed millions of acres of rangeland. They are Mediterranean natives, and spread through much of the west by seed dispersal on migrating cattle and sheep and on vehicle tires. Removal by mechanical means is difficult; roots can reach as deep as 5 feet. They also produce allelopathic toxins from all plant parts, inhibiting germination of native vegetation.

At least eight insect species have been released in Utah in the past several decades for biological control of knapweeds and several are widely established, including *Larinus* weevils, *Urophora* gall flies, and a root-boring beetle, *Sphenoptera jugoslavica*. A majority of these insects feed on the flower heads, and most of the remaining feed on roots and stems. None of these insects kill plants outright, but in conjunction, they have been shown to significantly reduce density and vigor of plants. Studies have shown that gall flies plus weevils caused a 50% reduction in seed production in Montana, and a 92% reduction in British Columbia. It is estimated that a over a period of 5-15 years, knapweed populations in Utah should start to noticeably diminish.

-Marion Murray, IPM Project Leader

Common Spruce Insect Problems

Spruce health starts with proper watering and fertilizing. Become familiar with your trees through visual inspection on a regular basis (once a week) from February to November. Early detection is critical. The difference of a month or two could be the difference in your tree's survival. Using the information in this article combined with a regular scouting routine, you will be able to recognize arthropods that may be causing damage to your spruce.

COOLEY SPRUCE GALL ADELGID

Adelgids look very similar to aphids, and are sometimes covered with a white, wax-like substance (Fig. 1). You may have seen the cone-like galls formed by cooley spruce gall adelgid (Fig. 2). When these galls dry out and open, adults may migrate to their alternate host, Douglas-fir, to lay eggs, although the adelgid can complete its life cycle on spruce alone. Spruce trees are capable of tolerating damage from this insect, and usually no treatment is warranted. Light infestations can be controlled by pruning the green galls in early summer (before they crack open).

If desired, insecticides should be applied before the galls form. Horticultural oil is effective on overwintering adelgids, applied in fall or in spring prior to bud-break. It is very important to note, however, that oil can remove the white coloration of blue spruce needles for one season or more. Imidacloprid (Merit) is a systemic insecticide that should be applied as a soil drench. Because this chemical takes several months for roots to absorb, apply in fall.

SPRUCE SPIDER MITES

Spruce spider mite is a small, brown to red mite that feeds on many different species of spruce (Fig. 3). A spider mite is not an insect, but an arachnid, having 8 legs. Mites feed by rupturing plant cells with their mouthparts, and then sucking up the chlorophyll from within the cell. As such, their feeding causes a yellow "stippling" on the needles. In severe infestations, needles can turn brown and drop. Because of their small size, detection is difficult. The easiest way to sample for spruce mite is to hold a sheet of plain white paper under a branch and whack the branch about three times. Look closely at the paper for little period-sized black spots moving around. Crush one of these moving spots and it should leave behind a brown/red smear.

Spruce mites are a cool season mite. They cause most of their damage in spring and fall, so it is vital to scout for this pest in late winter to early spring. When the temperatures become too hot in the summer their activity slows drastically, but resumes again in the cooler fall months. Damage from spring and fall feeding is usually not visible until early summer when the affected needles begin to dry.

National Park Service

Fig. 1. *The feeding of immature cooley spruce gall adelgids at the base of needles causes galls to form.*

Fig. 2. *An active gall (l) and a dried gall showing cracks where adults have emerged (r).*

Fig. 3. *Spruce spider mites are hardly visible to the naked eye.*

To control spider mites, first make sure there are mites present by scouting and conducting "beat surveys." Spruce

continued on next page

Common Spruce Insect Problems, continued

spider mite populations can sometimes be reduced by spraying a strong jet of water into the tree twice a week. Other low toxicity methods are horticultural oil sprays, and, to some degree, insecticidal soaps (when webbing is not present). When selecting a chemical for mite control it is critical to understand that mites build resistance to insecticides/miticides very quickly. Any single product should only be used once or twice per year. If subsequent sprays are needed for control, it is vital to select a product from a different chemical family. The following is a list of chemicals from which to choose: avermectin, spinosad, bifenazate, spiromesifen, hexythiazox, acequinocyl, dicofol, and etoxazole. Spinosad is a low toxicity product that can be tried first. Some chemicals can actually make mite outbreaks worse, so it is good to choose a product that controls both the adult and egg stages of development.

BARK BEETLES

In the landscape, ips bark beetles (also known as engraver beetles) commonly attack spruce trees. *Ips* species are small, brown/black beetles (Fig. 4) that emerge from trees in late April or May, seek a new host tree, and bore beneath the bark where they mate, construct parent galleries, and lay eggs. After egg hatch the new larvae eat their way through the phloem, girdling the tree. Often ips beetles will kill the top of a tree first (Fig. 5), and then kill the rest of the tree later in the year, or the following year. Ips beetles can have 3 generations per year.

Fig. 4. *Don't let the small size of ips bark beetles fool you; they are voracious feeders.*

To control ips beetles it is critical to maintain proper tree health. Bark beetles, in general, attack stressed or injured trees. It is also important to monitor the surrounding area for bark beetle-killed trees, because when the beetles emerge from those trees, they may come looking for yours. If you notice beetles in the area, apply a preventative trunk spray. The standard recommendation for bark beetle control is a trunk drench of carbaryl (Sevin) before adults fly in early spring. Spraying your trees after the beetles have made it through the bark will not provide effective control, and is a misuse of chemicals.

If you only have one tree, keep it healthy. Predicting bark beetle attack is impossible, and it is not feasible or recommended to apply preventative sprays for no reason. Scout regularly for signs of bark beetle attack, including: frass (sawdust) around the base of the tree or on the bark, pitch tubes (noticeable globs of resin that are exuded from beetle entrance holes), or discoloration of the needles. Once beetles infest a tree it is recommended to immediately remove and debark the tree if you are saving firewood. Debarking the tree will kill the young beetle larvae and adults present under the bark. While you can't save an infested tree, you can reduce/remove the population of beetles from your property and save the rest of your trees.

-Ryan Davis, Arthropod Diagnostician

Fig. 5. *Ips beetles that attack spruce often kill from the top down.*

Fig. 6. *Typically, galleries of ips beetles have a primary egg-laying chamber (shown above) created by the adult female. These chambers can occur in an X, Y, star, or wavy line pattern.*

In the National News

EUROPEAN COUNTRIES BANNING NEONICOTINOID PESTICIDES

Germany, Slovenia, Italy, and France have banned several neonicotinoid pesticides used for seed treatment based on evidence that they are suspected in honey bee decline. Britains are asking their government to take similar action.

The pesticides–imidacloprid, thiamethoxam, and clothianidin–are used as seed treatments for various plants including rapeseed and sweet corn. No research has shown direct links, but there are reports in Europe of millions of honey bee deaths since 2003 when clothianidin was released by Bayer CropScience.

FARMERS MARKETS GROW

There were 4,685 farmers markets in the U.S. in summer 2008, a 7 percent increase over 2006, according to USDA Agriculture Marketing Service (AMS) statistics.

AMS provides a database of local farmers markets at: http://apps.ams.usda.gov/FarmersMarkets/. The agency also conducts research on farmers market trends in operations and practices and publishes reference materials for vendors, managers, and the general public.

FUNGUS AIDS IN CONTROL OF POST-HARVEST PESTS

Entomologists at Agriculture Research Service in Washington showed that the fungus *Muscodor albus* has the potential for biofumigation of several post-harvest pests. The fungus emits a cocktail of gases that, in an enclosed environment, kills several insects, including codling moth, potato tuber moth, and others.

Codling moth is a primary pest of apple, chewing through the fruit to feed on the seeds. Apples bound for foreign markets are typically chemically fumigated to kill eggs and small larvae on the apple skin.

More work is needed for the fungus' efficacy, but its use in apple cartons over a 14-day period resulted in 100% mortality.

NEWLY DISCOVERED WALNUT DISEASE FOUND IN WASHINGTON

Thousand cankers disease, previously only known to occur in Colorado, Utah, and Oregon, was identified in summer 2008 in Prosser, Washington.

Recently, pathologists at Colorado State University identified the insect-fungus complex that has been killing walnuts in Colorado, Utah, and Idaho. The insect, walnut twig beetle, spreads the canker-causing fungus, *Geosmithia*, at feeding sites below the bark. Because the insect can attack walnut trees by the hundreds, introducing the virulent pathogen with each entry, the disease complex was named thousand cankers disease.

Useful Publications and Web Sites

PUBLICATIONS

- "Organic Materials Compliance," published by the National Sustainable Agriculture Information Service, is an online guide that provides three basic steps to ensure that material use is compliant with organic standards and certification. Access it here.

- The expanded second edition of **Compendium of Onion and Garlic Diseases and Pests** has been recently released by the American Phytopathological Society, containing over 200 color images.

- **Integrated Pest Management for Strawberries**, 2nd edition, is the newest IPM manual published by University of California ANR. It helps growers and managers recognize pest problems and how to implement IPM methods for control.

- A "Resource Guide for Organic Insect and Disease Management," published by Cornell University, can be accessed by clicking here.

- "Organic Field Guide" is an online pictorial field guide to organic IPM, broken into five parts: beneficials, insect pests, diseases, weeds, and vertebrate pests. Access it here.

WEB SITES

- www.thelandlovers.org is a new Web site sponsored by multiple organizations that raises awareness of green industry careers to junior and high school students.

- www.wateractionguide.com provides information for green industry professionals to address local and regional water use issues.

- farm-risk-plans.usda.gov is a new Web site produced by USDA's Risk Management Agency that helps farmers improve their risk management skills.

- weedid.wisc.edu/weedid is an interactive weed identification tool produced by the University of Wisconsin.

- www.prevalentfungi.org was created by the University of Georgia, and provides listings of pathogenic fungi via a national clickable map.

- www.aphis.usda.gov/emergency_response, is an emergency preparedness and response tool, with a section on plant health emergency and pest watch updates.

Featured Picture of the Quarter

The tiny ant-like flower beetle (*Ischyropalpus* sp.) is an omnivorous feeder, and some species are considered to be important biological control agents. It feeds on eggs, larvae, and nymphs of small prey, as well as sap, pollen, nectar, fungi, and detritus. Males collect droplets of the chemical cantharidin from dead blister beetles and pass it on to females for protection from predators.

-Photo by Marion Murray

Calendar of IPM-Related Events

January 14-16, Western Orchard Pest & Disease Management Conference, Portland, OR, entomology.tfrec.wsu.edu

January 19-21, Utah State Horticultural Association Annual Meeting, Provo, UT, www.utahhort.org

January 19-21, North American Strawberry Growers Association Annual Meeting, New Orleans, LA, www.nasga.org

January 21-24, Practical Tools and Solutions for Sustaining Family Farms Conference, Chattanooga, TN, www.ssawg.org

January 26-28, Utah Green Industry Conference and Trade Show, www.utahgreen.org

January 29-30, Utah Hay and Forage Symposium, St. George, UT, www.utahhay.usu.edu

January 31-February 4, International Fruit Tree Association Annual Conference, Berlin, Germany, www.ifruittree.org

February 11, Northern Utah Fruit Growers Meeting, Brigham City

February 11, Utah Berry Growers Association Annual Meeting, Brigham City, UT

March 24-26, 6th International IPM Symposium, Portland, OR, www.ipmcenters.org/ipmsymposium09/

July 25-30, Mycological Society of America and Botanical Society of America Annual Conference, Snowbird, UT, 2009.botanyconference.org

August 16-20, 2009, Society for Invertebrate Pathology, Park City, UT, www.sipweb.org/meeting

The Utah Plant Pest Diagnostic Lab is part of and receives support from the Western and National Plant Pest Diagnostic Networks:

NPDN National Plant Diagnostic Network

WPDN Western Plant Diagnostic Network