



# UTAH PESTS News

Utah Plant Pest Diagnostic Laboratory and USU Extension

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## Winter Cover Crops for Plant and Soil Health



Dennis Woorwood, USU Extension

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### News Highlights

#### WORKSHOP PLANNED FOR UTAH FRUIT GROWERS

Fruit growers in the state will be invited to attend a February 26 workshop on spotted wing drosophila and brown marmorated stink bug, where they can learn from experts from West Virginia, Oregon, and California. The stink bug has been found in 33 states but not yet in Utah. Spotted wing drosophila was found in Kaysville, UT in 2010, in Fruit Heights in 2011, and recently in Layton in 2012.

#### NEW FACT SHEET

Pink Root of Onion Bark Beetles

[www.utahpests.usu.edu](http://www.utahpests.usu.edu)

Avoid lugging manure or compost to the garden or field and save money on fertilizer by using winter cover crops instead. A cover crop, also known as green manure, is easy to grow if the right crop is chosen, and it is planted and killed at the right time.

Winter cover crops will not take any space out of production, and should only be used in beds that will be planted with warm season crops (tomato, pepper, summer squash, etc.) so that spring crops won't be delayed in planting. They should ideally be seeded between mid-August and early October, depending on location. If the cover crop is planted late, the seeding rate should be increased. Most crops need about 30 to 40 days to germinate and grow before a killing frost.

**Hairy vetch** (*Vicia villosa*) is a hardy, viney, moderately drought tolerant legume that fixes nitrogen. Vetch will survive winter temperatures to -20°F. It should be planted in early September at a rate of 1-2 lb/1000 ft<sup>2</sup>. The seed requires inoculation by *Rhizobium* bacteria, which comes as a dry peat-based powder and is shaken with the seeds just before sowing.

Vetch will begin to grow in the fall, with the majority of growth in the spring. The longer it is allowed to grow, the more nitrogen it adds to the soil. Hairy vetch residues decompose rapidly and release nitrogen more quickly than most other cover crops.

The downside of vetch is that it may be difficult to remove or till. Its heavy growth



Dennis Woorwood, USU Extension

Triticale planted in late September (*top*); fall-planted hairy vetch in May (*bottom*)

may clog a rototiller. Several low mowings or cutting the tops off at the crown with a sharp hoe or machete can also kill the vetch. It must be killed before it seeds or it will become weedy.

**Austrian winter pea** (*Pisum sativum* subsp. *arvense*), also known as field pea or Canadian field pea, is an annual that is only hardy to 10°F, and may die in winter in northern Utah. This plant will establish quickly (planted at 2-4 lb/1000 ft<sup>2</sup>) in fall, and produce a significant amount of residue before winter. The stems will grow up and over other plants, so it is best to combine it with an upright winter grain. In spring, if the plants have not been winter-killed, pull them up when they are about 2 feet high, and compost or turn under.

**Winter rye** (*Secale* sp.) is an annual grain that is cold hardy and vigorous. Rye seeds are

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## Fall Color Early in Utah

Usually day length drives trees to begin the process of entering dormancy, but weather and tree health also play a role. By early September 2012, high elevation aspens and maples in the Intermountain West had already started turning color, several weeks earlier than in years with typical temperatures and precipitation.

Landscape trees that have not received enough supplemental irrigation, or are under other stresses (insects, diseases, compaction, root loss, etc.) will also show early fall color.

The areas of the country that experienced the worst of the 2012 drought (north-central and midwest) have average fall color due to earlier symptoms of scorch and early drop.

In the northeast, fall color is exceptional and on-time, due to milder effects of the drought, and warm days and cool nights that started in late summer.



## New Specialty Crop Registrations

The Interregional Research Project-4 (IR-4) of the USDA is a program to obtain pesticide registrations on minor/specialty crops, such as fruits, vegetables, herbs, and ornamentals. New minor crop federal registrations that were completed in the spring and summer of 2012 that may be of interest to Utah growers are:

Kanemite (acequinocyl), a miticide – melon, cucumber, caneberry, low-growing berry, and cherry crop groups were added to the label.

Tilt, Quilt, Inspire (propiconazole), a fungicide – legume vegetable and stone fruit crop groups were added to the label.

Actigard (acibenzolar-s-methyl), a plant growth regulator – low-growing berry crop group was added to the label.

## 2011 Utah Forest Conditions Report

The [Utah Forest Insect and Disease Conditions Report](#) for 2011 was published recently by Utah DNR and the USFS. Aerial detection surveys found that insect and disease-caused tree mortality generally decreased as compared to past years.

Mountain pine beetle in lodgepole pine decreased by 70% from 2010 findings. Western spruce budworm and Douglas-fir beetle decreased by 80%, and subalpine fir mortality decreased by 50%. The number of acres affected by aspen decline was the lowest since first observed. The surveys also found a decrease in the damage caused by the urban pest, black pineleaf scale.

The decrease in mortality is attributed to the favorable cool and moist weather of 2008-11, depletion of suitable host types, and insecticide treatments for urban pests.

cheaper than legumes, and tolerate a later planting at 2.5 lb/1000 ft<sup>2</sup>. Rye germinates quickly, and grows longer in fall and earlier in spring than other grains.

Rye's deep and fibrous rooting system helps to build soil organic matter and is excellent for breaking up soil particles and preventing compaction. It also has excellent weed preventing benefits. The decomposing mulch not only smothers weeds, but also chemically suppresses weed seeds through allelopathy. Vegetable seeds can be planted within 3 weeks, and transplants are not affected by the allelopathic chemicals.

In spring, rye should be killed via removal or top-kill herbicide when it is about 6-8" tall or killed with mowing at flowering. Do not let it go to seed or it will become a weed. To kill by mowing, wait until the anthers are extended, and pollen falls from the flower heads when shaken. The residues are high in nitrogen and can be left on the ground or composted.

Some gardeners will mix rye with a legume to get the properties from both crops. The grain will provide an upright support, allowing for better growth of the legume and easier killing by mowing in the spring. If the crops are to be mixed, a little trial and error may be necessary to optimize the seed ratio to prevent the grain from outcompeting the legume. In general, rye should be seeded at about 40% of full rate and the legume should be closer to 80% of the full rate.

**Pacific gold mustard, rapeseed (canola), forage radish, and other brassicas** have received much attention due to some species' biofumigant properties that may suppress soil-borne pathogens and plant-parasitic nematodes. Results in research trials have been inconsistent, and more research is needed to clarify under what conditions the plants' chemical compounds work. Most brassicas are probably best utilized in a long rotation to get the full effects, rather than as a winter cover crop.

**Forage radish** is one brassica that some are trying as a winter cover crop. It will die in northern Utah winters, but it grows quickly



Dennis Wynn, Food, USU Extension

### A winter cover crop can:

- increase organic matter in the soil when it is incorporated
- increase nitrogen balance in the soil, especially if a legume cover crop is used
- suppress weeds
- enhance soil physical properties
- mitigate high phosphorus in soils caused by heavy applications of manure

in the fall, "trapping" soil nutrients for release the following spring, thus preventing nutrient leaching and adding soil organic matter. Because the radish dies back, there is no worry about killing it in the spring, or waiting for it to decompose. In addition, its long taproot breaks through compacted earth, leaving the soil in friable condition and improving water and root penetration for the next crop.

### KILLING THE COVER CROP

Although herbicides or tillage are often used to kill cover crops before planting the main crop, a well-timed mowing is just as effective. Backyard gardeners may instead choose to remove the plants entirely and compost them or use them as mulch. Another option for cover crop removal that some farmers have used is to pen chickens in the field to feed on the crop until it is gone. (Note that seeds of hairy vetch are poisonous to chickens.) Unless the plants are pulled out, wait 3 weeks before planting the vegetable seed or transplant crop to lessen problems of nitrogen immobilization and allelopathic effects.

### PEST SUPPRESSION

There have been many research reports on the effects of cover crops on pests. Most pest management benefits have been documented from the use of long rotation cover crops rather than a seasonal winter rotation. Much information about pest management benefits from winter cover cropping is anecdotal, and often difficult to replicate.

In general, the primary pest benefit is against weeds. A heavy surface residue suppresses perennial weeds, and the allelopathic effect of some crops suppresses weed seeds. An indirect effect of winter cover crops is through the increased health of the soil (increased organic matter, nitrogen, and friability) leading to improved growth and vigor of crop plants.

Winter cover cropping is not for every farmer or field, but in the right situation, can be an important tool in nutrient management, and indirectly, pest management. First timers should start small to determine the crop that works best and to prevent possible pitfalls such as generating an unintended weed problem if the cover crop is allowed to go to seed.

For a video on cover crops, visit the [Peaceful Valley Farm and Garden Supply website](#).

-Marion Murray, IPM Project Leader

# The USU Student Organic Farm: Our Methods for Coping with Pesky Plant-eaters

By Amanda Hawks, Farm Intern and summer co-manager of the USU Student Organic Farm, located on 800 East in Logan, Utah. On 1 acre and in 2 hoophouses, the students grow dozens of vegetable varieties and run a CSA and a fresh market stand on campus, which serves 55 or more customers in the Cache Valley. To find out more about the farm, or to join the CSA for 2013, [click here](#) or email them at [organicfarm@aggiemail.usu.edu](mailto:organicfarm@aggiemail.usu.edu).

An organic farm has many enemies: artificial fertilizers, lack of soil fertility, never-ending paper records, unimpressed certifiers, pesticides, and yes, pests themselves. A farmer's pests can come in all shapes and sizes; from the large and hungry deer, to the tiny flea beetle. But, deal with the enemy we must, if we are to successfully bring delicious organic produce to our CSA member's door.

At the Utah State University Student Organic Farm, we have different methods ranging from not very effective to somewhat effective for dealing organically with the insects that call our farm home and feeding-ground. These include physical barriers like row cloth, mechanical measures which mostly consist of plucking them up and squishing them, biological methods including trap crops and baits, organically approved pesticides, field management through the seasons, and finally, patient acceptance of some lacey greens.

The little fiends that we know well on our farm include flea beetles, grasshoppers, slugs, Mexican bean beetles, and aphids. Flea beetles feast on younger leafy seedlings and on mustard greens and arugula. Grasshoppers eat everything from Swiss chard leaves to cayenne peppers to green onions to tomatoes. Slugs are usually found munching the undersides of lettuce leaves. Mexican bean beetles, true to their name, are found on the underside of bean leaves, leaving them splotchy and hole-ridden. Finally, aphids tend to attack the undersides of young leaves in seedlings and seem to have a particular appetite for kale and broccoli leaves.

One effective control method we have found is to put a physical barrier between the plants and insects in the form of row cloth. Assuming this cover doesn't have holes and is kept tied down close to the soil, it is fairly effective at keeping grasshoppers and some flea beetles away. Unfortunately, flea



Amanda Hawks



Amanda Hawks

The USU student organic farm is run entirely by students with advisory help from Drs. Jennifer Reeve and Dan Drost. Kale (bottom) is sometimes hard hit by aphids, flea beetles, and grasshoppers.

beetles emerge from the soil and hang out near the roots of plants so this method isn't as effective with them.

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USU student organic farm, continued from previous page

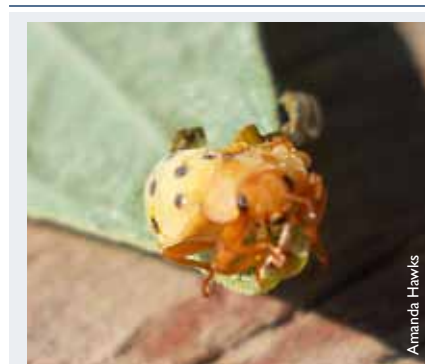
Squishing insects is effective for the individual but not so much for the population; though we do use this method on grasshoppers and Mexican bean beetles. Trap crops are supposedly effective at diverting the masses from the main crop of a farm by giving them a more desirable crop away from the farm's main vegetables, but we found that flea beetles seemed to partake in the trap mustard greens as an appetizer before bounding onward to our main crops. OMRI (Organic Materials Review Institute) approved pesticides and chemicals are allowed on an organic farm, but we're always a little hesitant to use something that could potentially harm beneficial insects, especially bees. However, we did use Semaspore Bait, which is a bran bait that contains a naturally occurring pathogen of grasshoppers, and found that we need to treat a larger area next year for better results. For aphids, we found some homemade solutions to be fairly effective including soapy water for broccoli and a cayenne-pepper mineral oil solution for kale, which enabled it to grow back after being nearly destroyed.

Crop rotations are a significant part of organic farming for a variety of reasons. This process, both in rotating between two fields and in rotating placement of vegetable type within the field, not only aids in soil fertility, but also decreases certain

pests. Planting the same family of vegetables in the same place year after year results in a larger probability of insects and diseases that attack that vegetable group; they can lie in wait through the winter and have their preferred meal choice easily accessible the following season.

Crop rotation helps to avoid this problem.

Some of our attempts at organic solutions to pests work fairly well; others seem to make no difference at all. Sometimes all we can do is wait out a pest, such as flea beetles, which slow their attack when the weather gets hot. Ultimately, we monitor, intervene where we can, and hope that enough of our produce manages to survive for harvest.



Amanda Hawks

The Mexican bean beetle, a lady beetle relative, may look cute, but is a voracious plant pest.

CAPS UPDATE

Elm Seed Bug



Idaho Department of

A new bug has been detected in the United States; specifically, in southwestern Idaho. A European native, the elm seed bug (*Arocatus melanocephalus*) was first detected in Ada and Canyon counties, Idaho, in July 2012. Shortly thereafter, it was detected in

Malheur County, Oregon, and suspected in five other Idaho counties. This invasive insect is being considered a nuisance pest because it overwinters indoors in large aggregations. Its effects on elms in the United States are unknown, but it is not currently considered to be an agricultural pest. You can submit suspected elm seed bugs to the [Utah Plant Pest Diagnostic Lab](#) for verification.

-Cory Stanley, USU CAPS Coordinator



Circled area is where elm seed bugs have been confirmed.

The Cooperative Agricultural Pest Survey is a federal program, administered jointly by USDA-APHIS-PPQ and each state, whose purpose is early detection of invasive species that could threaten U.S. agriculture. In Utah, the program is co-coordinated by Cory Stanley (USU) and Clint Burfitt (UDAF).

## Take-all Patch of Turfgrass on Golf Courses

Take-all disease is caused by the fungus *Gaeumannomyces graminis*. The fungus is soilborne and infects through roots, stolons and the crown area. It affects bentgrass (*Agrostis* sp.), fescue (*Festuca* sp.), and *Poa* spp. The symptoms usually appear in late spring to early summer and consist of small round



patches or rings that are light to reddish brown. The patches can persist throughout the summer and recur year after year. They can enlarge by up to 6 inches per year. The grass in the patches recovers very slowly and weeds are often seen invading the dead areas. The symptoms are most obvious during hot, dry weather when plants are stressed.

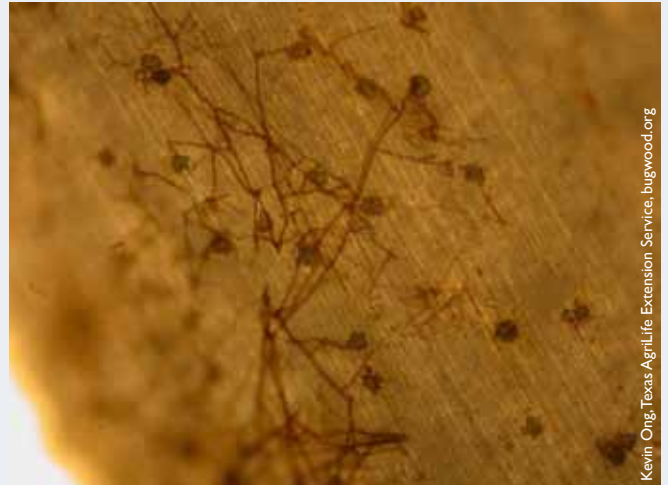
A diagnostic characteristic that can be seen under the dissecting microscope is ectotrophic, dark fungal hyphae on the roots, stolons, or crowns. Hyphopodia, which are small dark fungal structures through which the fungus penetrates the plant, can only be seen with a compound microscope.

The disease is favored by high sand content in the soil, low organic matter, low fertility and pH above 6.5. It is also more common when golf course turfgrass is planted on fumigated sites or recently cleared natural areas like forests. The reason for higher disease levels in recently fumigated sites is the lack of antagonistic microorganisms that compete with *Gaeumannomyces* or attack it. When testing soil pH, it is more important to test the pH in the rhizosphere (root zone) rather than the pH of the entire soil. Liming the soil can also increase the disease.

To control take-all patch, an integrated approach is necessary. Mixtures of bentgrass with *Festuca rubra* can reduce the disease severity. When fertilizers are applied, use acidifying fertilizers such as ammonium sulfate instead of nitrate based fertilizers and avoid manganese deficiency. Root



Paul Bachi, University of Kentucky, Research and Education Center, bugwood.org



Kevin Ong, Texas AgriLife Extension Service, bugwood.org

Ectotrophic hyphae on Bermuda grass (**top**), and hyphopodia (**bottom**) are both signs (fungal structures) of the disease, take-all patch of turf, caused by *Gaeumannomyces graminis*.

growth restrictions due to too much water or high nitrogen applications should be avoided. Removing thatch can reduce not only take-all patch but also other fungal diseases that survive in the thatch. Fungicides should be applied either in the fall before dormancy or in early spring to be effective. Effective fungicides that treat take-all patch include Banner Maxx II, Insignia, and Heritage. This disease rarely occurs in residential lawns.

-Claudia Nischwitz, Extension Plant Pathologist

## Breakout Season for Pest Mites

The hot, dry summer of 2012 was favorable to pest mites on a variety of crops in Utah. An early summer visit to a peach orchard in Weber County revealed trees with a silver sheen to the leaves, the classic representation of damage caused by the peach silver mite. These trees were also found to be teeming with the more cosmopolitan two-spotted spider mite. Visits to corn, melon, pumpkin fields and turf fields from Millard to Cache counties also showed flare-ups of two-spotted spider mites and the Banks grass mite.

Spider mite damage is commonly seen as “stippling” or yellow to white speckling where the mites have fed and killed the plant cells. Eventually, heavy feeding results in the yellowing and bronzing of leaves. Spider mites and their webbing can best be detected on the undersides of leaves with a hand lens.

Mites are usually held in check by predatory arthropods such as the *Stethorus* lady beetle, minute pirate bug, and predatory mites. One of the main contributors of mite outbreaks is insecticide applications that have non-target effects. Some insecticides, such as pyrethroids and organophosphates, kill predatory arthropods that would normally feed on pest mites. Other insecticides, such as carbaryl or neonicotinoids, can trigger increased mite activity and egg production that lead to mite outbreaks.

Recent research suggests that neonicotinoid insecticides alter plant chemical defenses, making plants more susceptible to mites. During warm, dry conditions, like in 2012, mites have shortened generation times and the population can build up rapidly. Mites feed more in dry conditions because low humidity evaporates excess water that they excrete. Unfortunately, predators are unable to keep up with this rapid increase in the population in part because they are less effective in hot, dry conditions.

It is not uncommon in our region, particularly during an extended, dry season, for plants to become drought-stressed, which benefits mites. Water-deprived plants undergo changes in plant chemistry such as increased availability of amino acids, allowing mites to thrive. Proper irrigation practices can reduce plant stress and help plants from succumbing to mite feeding and damage. Also, frequent overhead irrigation and rain can physically wash mites from plants and help decrease mite populations. Note that overhead irrigation will not reduce mites that are already at economically damaging levels.

Mite management needs to be proactive and preventive. Strategies include conservation of mite predators by avoiding broad-spectrum insecticides, correct identification of the pest mite, monitoring the mite’s population growth, and using action thresholds when available. Dust buildup on



The *Stethorus* lady beetle (aka the spider mite destroyer, **top**) is one of many important mite predators. Both the small adult (left) and larva (right) are predators of spider mites (**bottom**).

foliage from dirt roads, which benefits pest mites and hinders predators, should be kept to a minimum by washing plants or altering the road surface.

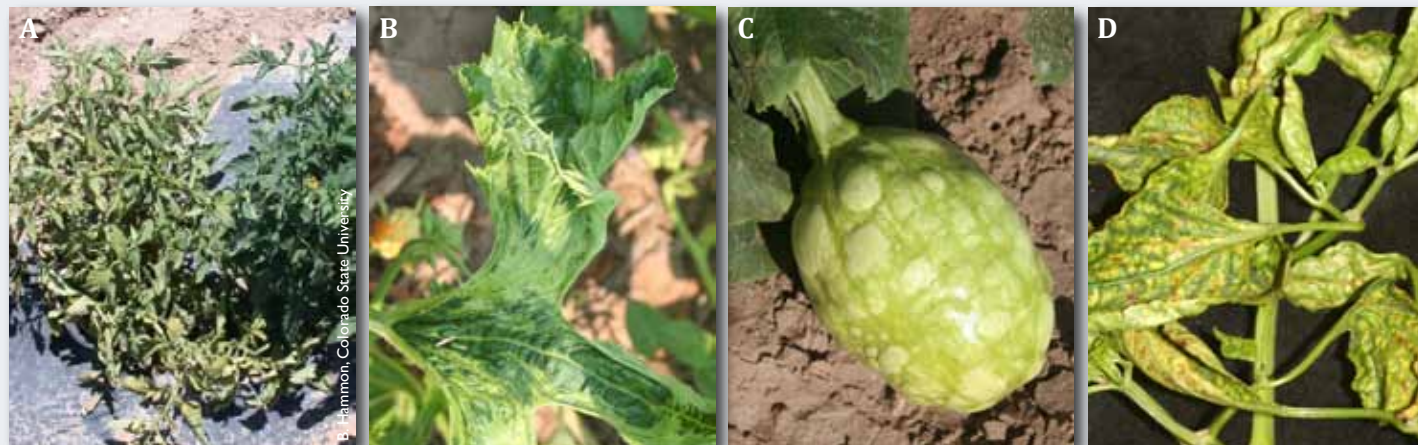
When mite populations exceed predator populations, a selective miticide will provide the best suppression, such as: Acramite, AgriMek, Oberon, Portal, and Zeal for commercial, and insecticidal soap or horticultural oil for residential (check label for listed crops). Be aware that some insecticides such as bifenthrin products list mites on the label as a pest that it controls; however, the results may be less than expected compared to a selective miticide and in some cases, may be worse due to the non-target effects previously described. Crop fields with a long history of miticide applications may also find less favorable results with these products due to resistance in the mite population.

-Ricardo Ramirez, Extension Entomologist

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## Insect Vectors of Vegetable Virus Diseases



In recent years, a number of vegetable viruses have been diagnosed in Utah, including curtoviruses (such as Beet Curly Top virus in tomato and pepper, **A**); Watermelon Mosaic virus, **B and C** (in cucurbits); Pepper Mottle virus, **D** (in pepper and ground cherry); Alfalfa Mosaic virus (in legumes, pepper, and tomato); Tomato Spotted Wilt virus (in tomato and pepper); and Iris Yellow Spot virus (in onion). Viruses are named for the first plant on which they are identified; however, most have multiple hosts.

Aphids, thrips, and leafhoppers are the primary vectors of vegetable viruses in Utah. Plant viruses affect commercial and home garden producers, and can devastate a crop if severe. In Utah, the vegetables most commonly infected with viruses are cucurbits, such as squash, pumpkin, melon, and cucumber, and solanaceous crops, such as tomato, pepper, and sometimes potato. Symptoms may be undetected early in the season, but become more noticeable as foliage expands and fruits develop. Often the populations of insect vectors have subsided by the time disease symptoms are noticed.

Most leafhopper- and aphid-vectored viruses in Utah are non-persistent. This means that the virus is picked up on the insect's mouthparts within a few seconds of feeding on an infected plant, and moved to a new plant by winged adults during subsequent feeding bouts. The virus does not replicate in the insect's body and is not passed to its offspring. The tospoviruses, which include Tomato Spotted Wilt virus and Iris Yellow Spot virus, are vectored by thrips and are persistent. This means that plant hosts of the virus must also be reproductive hosts for the vector in order for the immature stage, which does not move among plants, to acquire the virus. After the virus is acquired by young thrips larvae, it replicates within its gut, and is then transmitted by older larvae and adults. To manage virus diseases in vegetables, it is essential to understand the biology of their insect vectors.

The beet leafhopper vectors Beet Curly Top virus which is primarily a problem in tomato and pepper in Utah; how-



Green peach aphid (**left**) can vector several virus diseases, the beet leafhopper (**right**) vectors Beet Curly Top virus in tomato and pepper, and the tiny thrips (**bottom**) vectors Iris Yellow Spot virus or Tomato Spotted Wilt virus, depending on species.

ever, the insect has a broad host range that includes weeds, ornamentals, and many vegetables. This disease is common in the southern regions of the state, but can also be severe

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### Insect vectors, continued from previous page

in the north in some years. Severity of the disease is dependent on plant age when infected. Infected seedlings often die before setting flowers. Plants infected after the seedling stage survive, but are yellow and stunted. Infected leaves of tomato and pepper become thickened, roll upward, and can have purplish veins (but not always). Leaves of beets become twisted and curly. Immature fruits are typically dull in color and wrinkled. Yields are reduced and fruits ripen prematurely. Curly top tends to be particularly severe in home gardens where a diversity of host plants occurs, including those that attract the beet leafhopper.

Beet leafhopper does not prefer to feed on tomato and pepper, but it only takes a brief feeding bout to transmit the virus. Beet leafhoppers like to feed on Russian thistle and weedy mustards. The leafhopper migrates north each spring, spreading the virus as it moves into gardens and fields to feed. Some tomato cultivars, such as 'CVF III' and 'Saladmaster' have shown some tolerance to the disease, but 'Roma' types are highly susceptible.

Cover young plants with floating row cover fabric to reduce early season infections. "Wall-of-water" cold protection products have also been shown to reduce leafhopper feeding. Good weed control around the perimeters of gardens and fields will reduce attraction of leafhoppers. Planting alternate rows of different vegetables (for examples outside row of carrots or melons followed by a row of tomatoes or peppers) can reduce feeding on susceptible plants. Reflective mulches are ineffective for this disease.

There are three primary species of aphids that occur on vegetables in Utah: green peach aphid, potato aphid, and melon aphid. These aphids can vector Watermelon Mosaic virus, Pepper Mottle virus, Alfalfa Mosaic virus, and others. Reflective mulches have been shown to reduce early-season aphid populations, and insecticides with good aphid-killing activity, including horticultural mineral oil and insecticidal soap, can reduce the incidence and spread of aphid-vectoring viruses. There are resistant or tolerant cultivars for some crops and viruses. Good weed control and separating fields of susceptible crops have shown some success for cucurbits. There are many natural predators and parasitoids of aphids; however, because the virus can be spread quickly and early in the season, reliance on biological control is often inadequate for virus prevention.



Tomato Spotted Wilt virus causes stunting, leaf necrosis, plant dieback, and fruit distortion (external and internal) including ringspots.

The tospoviruses, Tomato Spotted Wilt virus (TSWV) and Iris Yellow Spot virus (IYSV), are primarily vectored by western flower thrips and onion thrips (IYSV) in Utah. TSWV has an extremely broad host range including many weeds, ornamentals, fruit crops, and vegetables. About a dozen hosts have been identified for IYSV so far. Symptoms of tomato spotted wilt on tomato are stunting, fruit color distortion (external and internal) including ringspots, leaf necrosis, and plant dieback. Symptoms of iris yellow spot on onion leaves are spindle-shaped lesions that can coalesce to cause leaf necrosis and early death. For both diseases, it is critical to start with clean transplants and to reduce thrips densities, especially during the early season. Insecticides are the most common thrips control tool, but cultural practices such as reducing nitrogen applications, weed control, and avoidance of planting tomato or onion adjacent to attractive thrips host plants can be helpful. Remove infected plants when detected to prevent spread of the virus.

Better management of insect vectors can decrease virus incidence and spread, and reduce crop loss to common virus diseases in vegetables.

-Diane Alston, Entomologist; Claudia Nischwitz, Plant Pathologist; and Erin Petrizzo, Small Farm-IPM Project Scout

## Drought and Honey Bees

Most of Utah has experienced severe to extreme drought conditions this year. It is easy to understand the direct effects that hot weather and water scarcity have on our crops and other plants. However, we don't often think of the effects of drought on bees and the resultant impacts on our plants, not only now, but in the future. Drought stresses bees in many, often intertwined, ways that we don't consider.

Just like other animals, bees are very dependent on water for drinking. Also like other animals, bees' food sources are water dependent. When water is scarce, plants produce less nectar and pollen, and therefore bees have less food. In the case of honey bees, not only are bees unable to meet the hive's current demand for food, but they are unable to store an adequate supply of honey to get them through the winter. For an unmanaged colony, this means starvation. To sustain managed colonies, beekeepers can feed them in the fall to provide adequate winter stores, but this can become expensive, especially when beekeepers may have already lost income by not having a marketable honey crop.

A beehive should have at least 25 pounds of honey going into winter. If the colony is large or if the winter weather is particularly cold or particularly warm, the hive will need even more honey. At minimum, beekeepers attempting to boost winter food stores will feed their hives sugar syrup. Each hive is different, but my most recent personal experience was that a first year hive required about 25 pounds of sugar per week for 4 weeks during September and October, in order to build up enough food storage to get them through until April, when I supplemented with sugar syrup again while waiting for plants to produce adequate nectar. Sugar syrup isn't nearly as nutritious as nectar, so beekeepers will often add essential oils to the sugar syrup, which are believed to add nutritive value and boost bees' immunity to diseases and parasites. Additionally, in mid to late winter, bee colonies will begin to gradually increase their populations, which requires sufficient pollen stores. If the beekeeper feels that the bees were unable to store enough pollen for this purpose, bees are often fed a pollen substitute beginning in late winter or early spring.

Drought's effect on bees' ability to get adequate food and water may seem obvious, but it also influences their ability to maintain hive temperature, which should ideally be around 95°F for developing brood. If it gets too hot inside of the hive, the first step the bees take will be to increase air circulation by increasing space within the hive. Many of the bees will move outside and cling to the outer surface of the hive, which is called bearding. During extremely hot weather when bearding isn't enough, bees evaporatively cool the hive by



**Top:** Honey bees cool the hive by "bearding," which makes more room within the hive and increases air circulation.

**Bottom:** This hive is being attacked by honey bees from another hive, who are attempting to rob it of its honey. Even if the resident bees successfully fend off the attack, many bees will be killed.

bringing in drops of water and fanning them with their wings. Bees will also align themselves and fan at the hive entrance. If the hive is consistently overheated and water for cooling is hard to come by, foragers will cease searching for nectar and pollen and instead focus on finding water. Extreme heat can dry out bee brood, so it makes more sense to keep them cool and moist than it does to find food for larvae that may not survive anyway. Temperature maintenance, as you can see,

continued on page 12

## Turfageddon: The Chinch Bug Invasion



The Utah Plant Pest Diagnostic Lab received numerous turfgrass samples this summer. The drought of 2012 stressed some lawns, making pest issues common this year. Out of 163 samples submitted between April 1 and September 20, 2012, 37 (23%) were turf-related. Some of the diagnoses included necrotic ring spot (13 samples), summer patch (5), snow mold (4), moss encroachment (1), sod webworm (2), and Banks grass mite (1). The lab also identified chinch bugs in four separate samples; the first the lab has seen of this pest in over 6 years. Chinch bugs may be responsible for undiagnosed turf damage this year, and may be a continuing issue next year.

In general, chinch bugs rarely reach damaging numbers, but in severe heat and drought, they can become a problem in turfgrass. Chinch bug damage is most prevalent on perennial ryegrass, fine fescues, red fescue, bentgrass, and Kentucky bluegrass. Periods of drought and heat, coupled with under-irrigation, direct sunlight, and thick thatch can cause chinch bug numbers to soar from mid-summer into early fall.

Typical damage is patchy dieback that forms larger patches and in severe cases, complete lawn loss. Chinch bugs kill turf through mechanical damage to grass stems and by injecting saliva during feeding (piercing and sucking), which inhibits the transport of water within the plant. Feeding damage can often mimic drought stress; however, chinch bug damage will not respond to increased watering as a drought-affected lawn would. Feeding damage is often worse on plants that are already affected by drought.

The black and white chinch bug adults are very tiny, about 1/6 of an inch, and are not readily seen without close inspection. The nymphs are very small and bright orange with a pale strip across their backs. As they increase in size, wing pads develop and the orange coloration begins to disappear. By the time

nymphs reach their 5th and final instar (developmental stage), they are mostly the same black color as the adults. Note that some individuals and populations of chinch bugs have small, or reduced wings as adults. Adult chinch bugs look similar to, and can easily be mistaken for, beneficial insects like the big eyed bug and the minute pirate bug.

Adults overwinter in the turf thatch, along driveways, in foundation cracks, and in other hidden areas. They become active in the spring when temperatures start to climb above 50°F. Females lay eggs in turfgrass blades or in the thatch layer. One female can lay 300 eggs in her adult life, which can last several weeks. Egg hatch can take 20 to 30 days if temperatures are below 70°F, but less than a week when temps are over 80°F. The second generation will begin in July-August and numbers of chinch bugs can reach up to 300 per square foot in areas where conditions are ideal. Because eggs are laid continuously, almost every life stage can be seen at any time in the turf throughout the summer and fall.

Chinch bugs can be monitored by visually inspecting grass blades at the soil level and looking for all life stages. Because they are so small, a hand lens or magnifying glass may be needed to see them. On hot days, adult chinch bugs are often seen scurrying across concrete or brick surfaces or foundations. A monitoring trap can be made from a 6-inch diameter coffee can or similar object with both ends removed to create a metal cylinder. Push the can into the soil approximately 2 to 3 inches, enclosing the turf. Fill the can about 3/4 full of water. Poke or stir the turf and thatch that is

continued on next page

### Drought and bees , continued from previous page

becomes a particular challenge because high heat requires water for cooling, just when water resources are especially scarce.

Another less obvious consequence of drought is the need for bees to increase their defenses. As resources become ever scarcer, bees from other hives, as well as wasps, become desperate and will begin robbing weaker hives of their honey. Wasps will even steal brood. A hive can be completely “robbed out” in just a few days. As a result, bees are forced to devote time and energy to hive defense rather than foraging for food and water.

Drought stresses honey bees in a variety of ways, including food and water shortages, temperature regulation challenges,

and an increased need for hive defense. All of these factors are correlated, and falling short in any of these areas can result in the death of the hive either immediately or over the winter. Therefore, the drought we have experienced this year could impact our plants next year if bee populations are reduced enough to result in a pollinator shortage. Although we can't control the weather, we can take steps to conserve pollinators, thus lessening the blow in years that the weather proves to be a challenge. It is important to consider not just honey bees, but all pollinators, in our pest management plans and in our day to day activities. [The Xerces Society](#) is an excellent source for more information.

By Cory Stanley, USU CAPS Coordinator & Bee Specialist

### Chinch bug, continued from previous page



Chinch bug turf damage can be severe in hot, dry conditions, as happened in Utah in the summer of 2012.

under water. Keep a constant depth of water in the can for about 10 minutes by pouring in extra water to replace the lost/leaching water. Count the number of chinch bugs that float to the surface. Treatment threshold is about 20-25 bugs per square foot, or about 4-5 per can. If numbers are below this threshold, regular irrigation and fertilization can mitigate chinch bug damage.

In Utah, chinch bugs seldom need insecticidal treatment unless the population has exceeded threshold levels and damage is evident. Effective insecticides include bifenthrin and other pyrethroids. For best results apply an insecticide in the spring during adult emergence from overwintering sites. Killing emerging bugs will limit the number of eggs laid

in the first generation and help reduce the population size throughout the summer.

Preventive management practices include proper irrigation, regular fertilization, reducing thatch via power raking and core aeration, avoiding the use of broad-spectrum insecticides that can reduce beneficial insects, and overseeding or replanting a lawn using endophyte-enhanced grass seed. Endophyte-enhanced grasses have been inoculated with a beneficial fungus that grows within the grass, making it more resistant to certain insects and diseases through the production of alkaloid compounds. Endophytic perennial ryegrass is especially resistant to chinch bug feeding. If you suspect chinch bug, collect samples for identification. They could easily be confused with look-alike insects that are beneficial, including the big-eyed bug and minute pirate bug.

-Ryan Davis, Arthropod Diagnostician

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## In the National News

### WEED-WHACKING ROBOT

Weed control is often the most difficult aspect of organic farming. Blue River Technology, in the Salinas Valley area of California, is developing a tractor-pulled, weed-killing robot for lettuce fields, dubbed the “lettuce bot.” The lettuce bot uses a camera and algorithms to detect weeds from the crop, and kills them by fertilizer injection. The company hopes to develop a version that runs at 3 miles/hour and mechanically kills the weeds. Ideally, the robot’s algorithms can be adjusted to a variety of crops, helping organic farmers save time and money in weed control.

### ‘ZOMBEE’ BEES DISCOVERED IN THE NORTHWEST

In early 2012, entomologists in California reported on a new parasite of honey bees, *Apocephalus borealis*, a phorid fly that some have dubbed the zombie fly. It has long been known to be a parasite of bumble bees, and has recently shifted hosts, causing an emerging problem for honey bees. At that time, it was found in honey bee specimens collected from California and South Dakota; in September it was reported for the first time on honey bees in Oregon. Infected bees wander away from the hive at night, often toward light, fly erratically, and then die. San Francisco State entomologists are now studying how the parasite affects bee behavior by monitoring tiny,

24-hr radio trackers attached to bees in outdoor hives. The results will show whether infected bees abandon the hive at night or day, or if they are expelled by the hive. It is still unclear if this parasitic fly is linked to colony collapse disorder. A citizen science project, called [ZomBee Watch](#), was established to help map the parasite’s spread and occurrence.

### TRYING TO ‘WEEVIL’ ITS WAY IN

At the Los Angeles/Long Beach port, a live elephant weevil was found in a container of oranges that came from Australia, heading for Florida. This is the first time this insect has been found in the U.S. Elephant weevils are small insects that feed on roots, stems, and fruit of grapes, blueberry, citrus, and fruit trees.

### USING TRICKERY AGAINST A PEST MOTH

The diamondback moth is a worldwide pest of cabbage and its relatives. An entomologist from the University of Copenhagen used gene technology to deceive the moth and save the crop. He first identified the genes that regulate cabbage’s defense compounds, glucosinolates, a compound that inadvertently attracts the diamondback moth to lay eggs on the cabbage. He then transferred the defense genes into tobacco plants. In the test field, the modified tobacco plants lured moths away from the cabbage crop to lay eggs on the tobacco.

Diamondback larvae cannot survive on tobacco, and quickly died of starvation in the experiment. Using this imaginative technology, a field can be interplanted with the trap crop, in this case tobacco, reducing pesticide use on the primary crop. Future work will focus on gene transfer into other crops that the larvae cannot survive on, like potato, so that a grower can maximize the production from a field.

### NATURAL BED BUG TREATMENTS? THE FTC DISAGREES

Two companies that marketed products containing natural ingredients as curatives for bed bug invasions incurred deceptive advertising charges by the Federal Trade Commission. RMB Group, LLC and CedarCide Industries, Inc. were accused of falsely advertising treatment for bed bugs and head lice that have not been scientifically proven to be effective. “Rest Easy,” a product containing cinnamon, lemongrass, peppermint, and clove oils, was marketed to travellers, claiming to prevent infestation by creating a barrier around the sleeping area. BEST Yet!, cedar-oil-based liquid products, falsely claimed to treat and prevent bed bugs and head lice, and that the USDA endorses the product for the U.S. Army. For more information about protecting yourself against fraudulent bed bug products, and advice for treating infestations, [click here](#).

## Useful Publications and Websites

- [N Price Calculator App](#), developed by the University of Wisconsin, compares the price of various forms of nitrogen fertilizer products in price per pound of nitrogen so that the cheapest source can be identified.
- [Pest Private Eye and the Case of IPM in Schools](#) was developed by The University of Nebraska-Lincoln

for grades 4-6. It is an educational video game in which students play a detective to solve pest problems using IPM.

- [IPMLite](#) is an app developed by seven eastern universities that provides home landscape information from when and how to plant and prune, to identifying and managing major

insects, mites, and diseases. IPMLite also sends alerts coinciding with pest emergence.

- [Pest World for Kids](#), designed for grades 3-5, includes writing assignments, lesson plans and games such as Archibald’s Adventure, in which the character is an odorous house ant on the hunt for food.



## Featured Picture

Watermelon Mosaic virus was fairly widespread in northern Utah this season, shown here on squash. Some growers had to plow their crops under because of the disease, which has no cure. Watermelon Mosaic virus is transmitted by aphids, and as the name implies, causes a mottling of foliage called mosaic. Fruit symptoms can range from subtle color change to severe deformation. For more on viruses and their vectors, see the article on page 8.

-Image by Claudia Nischwitz,  
Extension Plant Pathologist

## Calendar of Events

October 17 (Logan, UT), 20 (Kaysville), and 27 (Salt Lake City), USU Honey Bee Workshop: Preparing your Beehive for Winter, \$5 (pre-registration required), [bees.usu.edu](http://bees.usu.edu)

October 30 - 31, Restoring the West Conference 2012, Logan, UT, [restoringthewest.org](http://restoringthewest.org)

November 11 - 14, Entomological Society of America's 60th Annual Meeting, Knoxville, TN, [www.entsoc.org/entomology2012](http://www.entsoc.org/entomology2012)

January 9 - 11, Western Orchard Pest & Disease Management Conference, Portland, OR, [entomology.tfreq.wsu.edu/wopdmc](http://entomology.tfreq.wsu.edu/wopdmc)

February (date TBD), 10th Annual Diversified Agriculture Conference, Ephraim, UT, [diverseag.org](http://diverseag.org)

February 12 - 14, World Ag Expo, Tulare, CA, [www.worldagexpo.com](http://www.worldagexpo.com)

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, location TBD

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