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N E W S L E T T E R

Utah Plant Pest
Diagnostic Laboratory

USU Extension

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Feeding by this non-native insect causes swellings (gouting) on fir twigs.

William W. Ciesla, Forest Health Management International, Bugwood.org

Research Efforts to Curb Balsam Woolly Adelgid

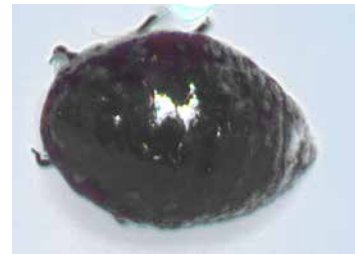
Guest authors Liz Rideout and Grayson Jordan are each pursuing a M.S. degree at USU, and researching balsam woolly adelgid. Liz is in the Dept of Biology, under Diane Alston, and Grayson is the Dept of Wildland Resources, under Justin DeRose.

True firs are important high-elevation trees that are threatened by numerous stressors. Adding to the list of stressors is the balsam woolly adelgid, a small plant-feeding insect that was discovered in northern Utah in 2017. USU research is investigating the adelgid life cycle, host susceptibility, and site factors to predict outbreaks.

Balsam woolly adelgid (BWA) has been a pest of eastern North American firs for over a century, initially found attacking balsam fir in eastern Canada and Maine. Native to southern and central Europe, it is believed to have been introduced on nursery stock. By 1960, populations were established along the east and west coast regions of the U.S. and Canada, likely from independent introductions from Europe. During the adelgid’s initial spread in the 1960s and 70s in the Appalachian Mountains, Fraser fir populations declined by 80%.

BWA are found on bark, feeding on plant cells (parenchyma) of all members of the *Abies* genus including balsam fir, Fraser fir, grand fir, white fir, and subalpine fir (its

Close-up of an adult adelgid, showing body shape (normally covered in cottony wax). Its length is a little over 1 mm.



primary host in Utah), with differing levels of intensity. The ubiquity of fir in mountainous areas of the Intermountain West may allow for continued spread of BWA. True firs are important sources of food and shelter for high-elevation wildlife, and in mixed stands, they provide diversity in the event of pine or spruce beetle outbreaks.

Identification and Symptoms

In its native European range, BWA has a complex life cycle alternating between spruce and fir host trees, causing very little damage to these trees due to their long evolutionary relationship. In North America, only asexual reproduction occurs, and tree damage has been severe.

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Balsam Woolly Adelgid, continued

In the heaviest of infestations, matrices of white, woolly masses of adelgids occur along the tree bark, branches, and twigs. Toxins in the adelgids' saliva cause swellings (also known as gouting) along the nodes of young branches. Extended feeding leads to dieback and flagging of branches, and tree death may occur within five years of initial infestation. Asexual reproduction creates BWA offspring that are nearly genetic clones of the parent, increasing the likelihood of pesticide or environmental resistance that can be passed on to the next generation.

Evidence suggests that fir species have differing levels of resistance, and a better understanding of this is needed as BWA continues to colonize white and subalpine fir in Utah. In addition, BWA is difficult to detect during early establishment, and rates of establishment can vary. Learning its adaptability to gradients of climatic conditions is essential.

Research at Utah State University

With funding from USDA Forest Research and Development, researchers at Utah State University and the US Forest Service-Rocky Mountain Research Station are conducting several studies in the Intermountain West, including:

- **Improving understanding of BWA's seasonal phenology (development) on subalpine fir:** We are sampling stands in northern Utah with a range of elevation and site characteristics for BWA presence and intensity. We will collect bark samples to count and identify adelgid life stages.
- **Providing predictions for risk of spread and establishment:** We will lab-rear BWA at USU to identify the minimum temperature at which development begins. From this, we will generate a model to use in combination with local climate data to provide insights to timely management of BWA in Utah's subalpine fir forests.
- **Developing a rating system that can be used by stakeholders to assess the risk of BWA in their stands:** Through an interagency effort, we have identified sites across northern and central Utah and southern Idaho where BWA and associated damage are present. For each stand, we will collect assessment data such as composition of tree species, sizes, ages, and health, elevation, and soil type. On individual fir trees within each stand, we will also record BWA symptoms such as crown flagging, extent of dieback and gouting, and level of bole infestation. Stand characteristics that appear to contribute to susceptibility, spread, and damage will be identified and quantified. Individual variables included in the rating system may be used to identify areas of concern within stands (such as structure or average size) and guide preventive or responsive treatments to balsam woolly adelgid.



Bark samples are removed from the tree and a photo is taken weekly of the tacked square to track "woollies" (woolly masses produced by the adelgids) over time.

Die-off in fir stands contributes to ecosystem decline including increased erosion, loss of forage and habitat for wildlife, and declines in watershed quality and forest resilience. Losses may also affect tourism, in particular, in Utah's ski industry where subalpine fir is common along ski slopes. Stakeholders in various organizations such as the USDA, the US Forest Service, and USU are coordinating efforts to monitor and study BWA's potential spread and impact in Utah. Our study results will help support forest management agencies and landowners in timely and specific management practices based on site characteristics.



Cold Fall Temperatures Injured Many Northern Utah Trees

On the morning of October 26, 2020 in northern Utah, after temperatures during the day averaged 70 to 80°F and at night from 40 to 50°F, the temperature dropped to well below freezing. At that time, trees were still fully leafed out and were not fully dormant. The cold snap resulted in tree damage that was not visible until spring, in the form of dead flowers on fruit trees, and injured vascular tissue on other trees, causing dieback of the outermost branches, or complete death of the above-ground portion of the tree.

Tree Acclimation to Cold Temperatures

The process of trees becoming dormant is a gradual one that starts in late summer and concludes in late fall. Over this time period, trees become the most cold-hardy when they experience temperatures that cool slowly but steadily with few swings from warm to cold. This prolonged slow-cooling is required to promote starch degradation into cold-protectant proteins and sugars which protect against ice formation in cells.

Shorter day-length triggers the first step to acclimation, called a pre-conditioning period, where above-ground growth ceases, chlorophyll is lost, and leaves change colors. Warm daytime temperatures (60 to 70°F) and non-freezing evening temperatures (ideally, 40°F) accelerate acclimation during this phase. The second stage of acclimation further increases cold-hardiness and occurs at colder evening temperatures (23 to 27°F). The final stage

Average temperatures (F) for weather stations in northern Utah counties, and the drop in temperature from the daytime high on October 25 to the low temperature on October 26.

| County | Oct. 25 high temp (4 pm) | Oct. 26 low temp (6 am) | Temp drop in 14 hr |
|-----------|--------------------------|-------------------------|--------------------|
| Box Elder | 48 | 15 | 33 |
| Cache | 49 | 10 | 39 |
| Davis | 47 | 17 | 30 |
| Juab | 49 | 8 | 41 |
| Utah | 47 | 11 | 36 |
| Weber | 47 | 17 | 30 |

of acclimation, resulting in maximum cold tolerance, is initiated by exposure to temperatures approaching 0°F.

Daytime temperatures during early fall 2020 were warm, and were followed by mild evening temperatures, creating a prolonged pre-conditioning period, leaving trees susceptible to injury during a cold snap. The table above shows the drop in temperature for several northern Utah counties, with many locations having a shift of 30 to 40 degrees from the daytime high on October 25 to the low temperature that occurred around 6 am on October 26.

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Cold Injury and Trees, continued

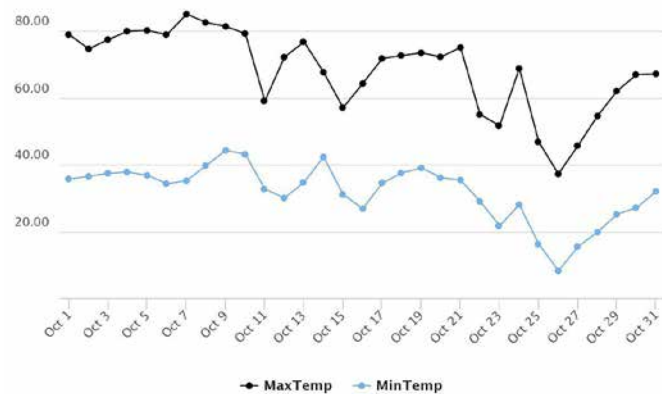
This fast-cooling swing contributed to the severe damage by interfering with starch degradation, freezing cell-water contents, and leaving trees susceptible to cold injury.

Walnuts and Young Apples Hit Hardest

English walnut trees representing all ages experienced dieback in Cache county and areas along the Wasatch Front. There are several varieties of English walnut, with some being more cold hardy (Carpathian) than others. However, all varieties require several nights of temperatures at or just above 32°F to properly harden off and gain freeze tolerance ahead of sub-freezing temperatures. During the dormancy acclimation period, even low temperatures of 28°F may induce freeze damage (see figure below).

On apples, we saw flowers that emerged but with dead pistils, and in some locations, hundreds of young apple trees were killed to the ground (see image, previous page).

Even though damage was most commonly observed in walnut and apple, several other plants were impacted. In Utah County, autumn blaze maple (*Acer x fremanii*) were affected and in Cache County, we saw dieback of young Japanese zelkova (*Zelkova serrata*) and complete death of many small berry crops. Some conifers showed excessive needle scorching, although the new growth is healthy and hiding the older brown needles.



Recorded maximum and minimum temperatures (F) from Oct 1 – Oct 31 at one Utah County location showing several days below 28°F with the greatest drop on Oct 26.

Some Trees Affected More than Others

Within the same species, some trees were more damaged than others. This was likely due to the individual tree's health and soil-water status.

- Fertilized trees are more vulnerable to frost damage because application of nitrogen fertilizer in late summer or early autumn decreases frost resistance. High nitrogen content affects potential defoliation and the timing of the acclimation process where starches are converted to sugars.
- Moisture at the top of the soil profile preceding the freezing conditions affects tree hardiness. California has also reported widespread walnut tree death and dieback this spring. Researchers there found that trees irrigated only through early October were more severely affected than trees that were irrigated into early November.
- Trees affected by micronutrient deficiencies due to alkaline soil (such as iron, zinc, magnesium, and manganese) are less cold-hardy than trees of the same species that are not affected. Research out of University of California has shown that zinc deficiency especially impacts cold hardiness.

Prevent Losses in the Future

- **Site selection:** Elevation, wetness/drainage issues and latitude all have an impact on tree hardiness.
- **Irrigation:** Summer and fall drought stress results in an increase in cold injury, especially during cold winters with little snow. Conversely, too much water during late summer can keep trees growing later in the fall, also reducing hardiness.
- **Fertilization:** High nitrogen levels causes excessive vegetative growth, and reduced cold hardiness. Do not fertilize after late June. Prevent deficiency of micro-nutrients such as iron and zinc.
- **Pruning practices:** Pruning trees late in the growing season stimulates tree growth and lengthens the duration of the cold-acclimation process. End all summer pruning by early to mid-July.

What to do With Damaged Trees

If impacted limbs have not leafed out by mid-summer, they are dead and should be removed. When trees are especially large, it is wise to hire an arborist. If it is safe and you are able, you can prune individual dead limbs yourself. It is not generally recommended that heavy pruning be performed in midsummer, but there is an exception for dead and diseased branches. Access the [USU Extension fact sheet Pruning Landscape Trees: An Overview](#) for further information on pruning.

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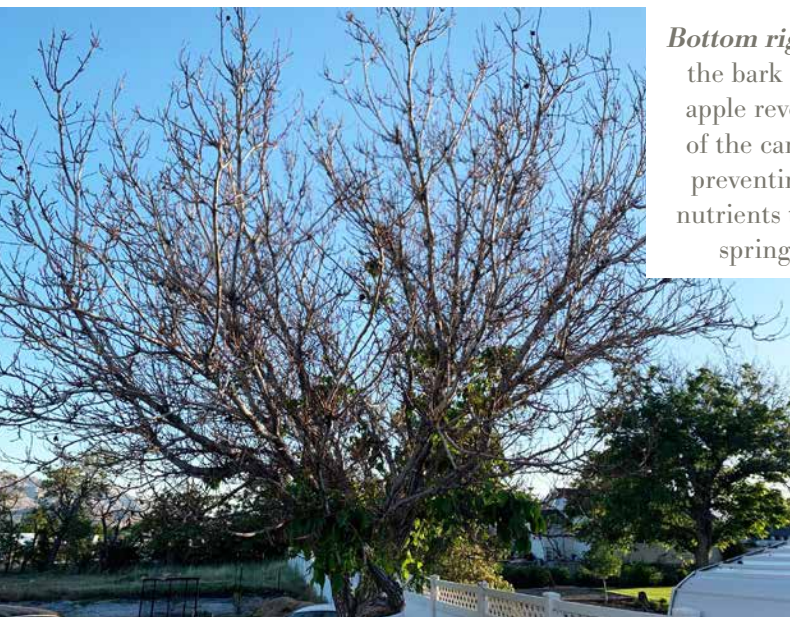


Examples of Tree Dieback in Northern Utah

Top left: English walnut dieback in upper crown, Cache Valley (image by Jaydee Gunnell)

Top right: Dieback of a young honeylocust (image by Jaydee Gunnell)

Bottom left: Severe dieback of English walnut in the foreground, and less significant dieback of another English walnut in the right lower background.



Bottom right: Removing the bark of an affected apple reveals the death of the cambium tissue, preventing the flow of nutrients to the buds for spring budbreak.



References

Beede, R., P. Brown, C. Kallsen, and S. Weinburn. (2021). [Diagnosing and Correcting Nutrient Deficiencies](#). University of California Davis. June 16, 2021.

Beddes, T., M. Murray, M. Kuhns, and J. Goodspeed. (2011). [Walnuts in the Home Orchard](#). [Fact Sheet]. Utah State University Extension, 6 pp.

Fichtner, Elizabeth J. (2021.) [Fall 2020 Caused Cold Injury on Walnut in Tulare and Kings Counties](#). Nut, Olive and Prune Programmatic News. University of California ANR. June 4, 2021.

Milliron, Luke. (2021). [Another Major Autumn Freeze in California Walnuts](#). Sacramento Valley Orchard Source. University of California ANR. May 3, 2021.

Charrier, G., Ngao, J., Saudreau, M., & Améglio, T. (2015). [Effects of environmental factors and management practices on microclimate, winter physiology, and frost resistance in trees](#). *Frontiers in plant science*, 6, 259.

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Box Tree Moth: A New Invasive Pest of Concern

The box tree moth (*Cydalima perspectalis*) is a new invasive pest to the U.S. It is native to temperate and subtropical regions in eastern Asia. It invaded Germany and the Netherlands in 2007, likely via the nursery trade, and is now a serious pest of wild and ornamental boxwoods (*Buxus* spp.) throughout much of Europe, western Asia, and northern Africa. This pest was first detected in North America in Toronto in 2018, and then more recently in the U.S. in Connecticut, Michigan, and South Carolina after infested boxwood nursery stock was delivered from a nursery in Ontario between August 2020 and April 2021. Some potentially infested nursery stock was also shipped to four other eastern U.S. states.

State officials and the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA APHIS) are currently working to determine if these and other states are impacted. To prevent additional spread, USDA APHIS has halted the importation of *Buxus*, *Euonymus*, and *Ilex*. The latter two plant genera are known to only be impacted by this pest in Japan.

Adult box tree moths have a wingspan of about 1.5 inches and are typically white-bodied with a brown head and abdomen. Most moths have a brown border along the outer margins of the wings while up to 10 percent are mostly brown in color. Moths live for two to four weeks and are active between April and July, flying mostly at night and only during daylight hours if disturbed.

Eggs are yellow and laid singly or in clusters of up to 20 on the underside of leaves. Before they hatch, small black dots become visible in the gelatinous eggs; these dots indicate the larval head.

Larvae (caterpillars) are green and yellow with white and black markings and 1.5 inches in length when mature. They feed on leaves and bark of boxwood, causing defoliation, stem girdling, and death of the plant. Larvae are active from September to October, and after overwintering, they re-emerge to continue feeding and pupating the following spring.

You can help prevent the spread of the box tree moth by inspecting recently purchased boxwoods, as well as those



Top: Adult box tree moth

Bottom: Box tree moth larvae and feeding damage.

planted in your area, for signs of the moth and damage, and then reporting suspicious sightings to the Utah Plant Pest Diagnostic Lab at Utah State University or the Insect and Pest Program at the Utah Department of Agriculture and Food.

Note that the adult stage of the melonworm (*Diaphania hyalinata*) can be easily mistaken for the box tree moth adult. The melonworm occurs throughout the year in parts of Central and South America, Africa, and southern Florida. Although it often migrates to other southeastern U.S. states and even more northern states during the summer, it is not known to be present in Utah.

— Lori Spears, USU CAPS Coordinator

For more information

CABI. (2021). *Cydalima perspectalis* [original text by F. Leuthardt]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.

Capinera, J.L. (2017). *Melonworm*. University of Florida and Florida Department of Agriculture and Consumer Services. EENY-163.

Skvarla, M.J. (2020). *Box tree moth*. Penn State Extension.

USDA APHIS. (2021). *Pest alert: box tree moth (Cydalima perspectalis)*. USDA APHIS 81-35-040.

Abiotic Problems of Tomato



Many problems that gardeners experience with tomato plants are not related to insect pests or diseases. Rather, they are associated with adverse growing conditions due to the environment or production practices.

BLOSSOM DROP occurs when daytime temperatures exceed 90°F and nighttime temperatures stay above 72°F for several days, rendering pollen nonviable and resulting in dried blossoms and no fruit. Blossom drop can also occur if there is no pollination or temperatures dip below 55°F at night. It can be prevented by setting up shade cloth during the hottest periods of the growing season.

BLOSSOM END ROT is the death of tissue on the blossom end of tomato fruits, appearing as brown-black target-like rings. It occurs when plants are unable to move enough calcium from the soil throughout the plant, with the tomato being the farthest location and thus getting the least calcium. Blossom end rot can be prevented by evening out watering so the plant can continually absorb water and calcium. Consider using mulch to prevent water loss.

CAT-FACING is when tomatoes are distorted and misshapen. The damage is caused by one of many factors such as blossom scarring, high nitrogen levels, temperature fluctuations, excessive pruning, or insect feeding. Avoid cat-faced fruit by growing cultivars that are less prone to cat-facing (heirloom varieties tend to be more prone). Provide adequate growing conditions and good pest management.

CRACKING AND SPLITTING occurs when there are rapid changes in soil moisture levels which can cause the fruit to expand quicker than its skin can grow. Openings can leave fruit susceptible to insects and diseases. Prevent this by providing plants with an even watering schedule.

COLD OR FREEZE DAMAGE occurs when tomato plants are exposed to temperatures below 35°F, where plant cells expand, freeze, and die, causing interveinal spots. Leaves on established plants may turn purple and dark. After transplanting, follow weather forecasts closely in the spring and cover plants to protect from any expected frosts.

GREEN SHOULDERS appear when tomato fruits are fully ripening, but the top “shoulder” ends remain green and yellow. This is caused by genetics and environmental conditions (high temperatures and exposure to direct sunlight).

HERBICIDE DAMAGE occurs when a broadleaf herbicide contacts the plant directly or indirectly via drift or vapors. Some herbicides that are sprayed in hot temperatures can volatilize and move as a vapor for long distances, affecting vegetable crops. Herbicide damage symptoms include small misshaped leaves that are thick and tightly curled.

HORN/NOSE DEVELOPMENT (above left) is a physiological and genetic disorder. A few cells divide abnormally and the fruit produces an extra locule (interior segment within the tomato). This mutation often occurs in very cool or very hot temperatures during tomato fruiting.

EDEMA/OEDMA is a physiological disorder identified by watery blisters or swellings that form along the leaf veins. It is induced by high relative humidity and low light quality. Because of this, edema is most commonly observed in enclosed settings such as greenhouses.

LEAF CURLING (above right) is often associated with environmental stresses, such as excessive moisture, nitrogen, heat, drought, pruning, and transplant shock. Other possible causes are viral infection or herbicide damage.

SUNSCALD on tomatoes begins as yellow/brown discoloration on the sun-exposed side of the fruit. Eventually, the flesh becomes tough, white, and leathery. This damage exposes the tomato to potential rot pathogens.

ZIPPERING is a condition that occurs when the flower anther sticks to the developing fruit as it grows. This causes a thin brown longitudinal scar (with transverse scars) extending down the fruit, resembling a zipper. Zippered fruits that are intact are still edible; however, openings can allow pathogen infections or further insect damage.

— Nick Volesky, Vegetable IPM Associate

Say, Don't Spray, Unless You are a Spittlebug

Recently, a large population of spittlebugs was found infesting a carrot patch at a community garden in Salt Lake City. These insects (sometimes called froghoppers) are a part of the superfamily Cercopidea in the order Hemiptera. They are close relatives of leafhoppers. There are dozens of spittlebug species across North America and several species occur in Utah.

Spittlebugs are most known for their nymph stage that produces frothy "spit" around their bodies and on the plants they feed on. Adults average about six millimeters long and have a range of colors from yellow to green to brown.

In Utah, spittlebugs have one generation per year. They overwinter as eggs laid in stems or crevices of plant tissue. Depending on the temperatures, eggs hatch in May. Nymphs develop through 5 different stages, all producing spittle as they feed. The spittle protects their soft bodies from drying out and protects

them from being detected by predators. Adults do not excrete the spittle.

Like other hemipteran species, spittlebugs have piercing-sucking mouthparts with which they extract sap from a wide range of host plants. However, economic damage is seldom observed in Utah's crops.

The main issue with spittlebugs is that they can be a nuisance. The masses of spit can be unsightly on ornamental or vegetable plants for retail sale. This can be managed by spraying a strong stream of water to knock them off the plants. Bugs can also be hand-removed smashed. Pesticides are not recommended because the spittle protects the nymphs from any chemical contact. Adults are highly mobile and drop when disturbed.

— Nick Volesky, Vegetable IPM Associate



Left: Spittlebug nymphs exposed from their masses of spittle.

Right: Spittle covering the upper stem of a carrot.

No 17-year Cicada “Plague” in Utah – But We do Have Cicadas!

Hundreds of cicada exuviae (shed skins) left behind at the base of a tree in Maryland. There can be hundreds of thousands of cicadas emerging per acre in some locations.

In May of 2021, it had been nearly a year and a half since I had seen any member of my family, who all live in Maryland. I would never admit this to them (and please don't tell them), but I was nearly as excited to see the 17-year cicadas as I was about seeing my relatives!

You may have seen the hype surrounding these cicadas in the news and it may leave you with a lot of questions. What are cicadas? Will we see any of these cicadas in Utah? Are cicadas anything to worry about? Now that I have calmed down from the cicada excitement, I feel it's only appropriate to write about my experience, and discuss the impacts of cicadas in Utah.

Cicadas are a type of true bug in the insect order Hemiptera. They have piercing-sucking mouthparts that they use to suck the juices out of plant tissues. The immature stages of cicadas live underground and slowly feed on organic matter and plant roots before crawling up from the ground and molting one final time into the winged adult stage. The adults are some of the larger insects we can find outdoors and they can make a lot of noise. Some call it an annoyance, I call it music!

Cicadas emerge either annually or periodically depending on the species. Annual cicadas, as you might imagine, are species that can be seen in the landscape every year.



A 17-year cicada posing on a flower.

While it can take multiple years to develop from egg to adult, there is no synchrony in their development with other members of the species. Periodical cicadas on the other hand have bizarrely long and synchronized development and emergence periods. Some run on 13-year cycles, and others on 17-year cycles. There are also many different broods of periodical cicadas, and each brood is on a slightly different schedule and found in their own general region(s) within the United States.

The cicadas causing a nuisance in some parts of the eastern United States this year are called brood X or the great eastern brood due to the large number of cicadas that emerge.

The nymphs take a whopping 17 years from the point the egg is deposited to the time they emerge as adults in absolutely massive numbers. Billions is a given, but the total numbers may even top one trillion! These massive numbers of cicadas will all emerge synchronously, mate, and their eggs hatch into nymphs and slowly develop until they are ready to emerge from the ground after another 17 years.

Cicadas are quite common in Utah, but only annual cicadas; periodical cicadas are limited to the eastern half of the United States. Most of the cicadas we have in Utah

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are overall black in color with brown to black eyes. Fear not; cicadas aren't much of a concern. While they do feed on plant tissues, the damage is usually minimal, and you can tolerate this insect without worrying about your plants. They do not bite and are a great food source for birds and other animals. Occasionally, they can do some damage to roots as the nymphs feed underground, and they can leave some empty patches of soil as they emerge to molt into adults. But this is uncommon. If you spend any time hiking up in the mountains, they tend to be very common on higher elevation maple trees.

So, we do not have to worry about billions of periodical cicadas annoying us with their loud songs in Utah. If you aren't an insect lover, this is still a great opportunity to appreciate this incredible biological event from afar while enjoying our quieter, less abundant annual cicadas. The next broods of periodical cicadas set to emerge in the United States are brood XIII (17-year cicadas) and brood XIX (13-year cicadas), which are concentrated mostly in the upper Midwest (Indiana, Missouri, Iowa, Wisconsin). It's never too early to book a vacation! And just in case you were wondering: yes, you can eat them! I was offered a generous portion of cicada casserole when I was reunited with my family and friends. Tasty!



Where the great eastern brood is occurring, it is not challenging to find periodical cicadas. These were quickly collected off of a small tree growing the author's Maryland family member's yard.

For more information

Liebholt, A. M., Bohne, M. J., and R. L. Lilja. 2013. [Active Periodical Cicada Broods of the United States](#). USDA Forest Service Northern Research Station, Northeastern Area State and Private Forestry.

—— Zach Schumm, Arthropod Diagnostician

Bee Assassin Bug Predating on BMSB

The bee assassin (*Apiomerus montanus*) is a predatory true bug that waits in hiding to ambush its prey. Although these insects are reported to feed on bees, they are considered beneficial due to their generalist feeding on pest insects such as grasshoppers, beetles, flies, caterpillars, and other plant-eating true bugs.

The assassin bug shown at right was found feeding on a brown marmorated stink bug (BMSB; *Halyomorpha halys*) on a sticky trap designed to attract the stink bug. BMSB is an invasive pest with a host range of over 300 plants, and many of Utah's fruit, vegetable, and nut crops are at risk. BMSB is very resistant to pesticides so beneficial predators like the assassin bug are crucial for keeping it in check.



—— Kate Richardson, Graduate Student, Dept of Biology

IPM In The News

Microtechnology for Bees

Cornell University developed a technology that can detoxify organophosphate insecticides through the use of enzymes. The study, published in *Nature Food*, demonstrated that honey bees who were fed microparticles with enzymes had a 100% survival rate following the consumption of toxic pollen. Bees who did not consume the enzymes died in the following days. This antidote technology offers a simple method in detoxifying and protecting honey bees and potentially other pollinators from the negative impacts of pesticide use.

Controlling Mosquito Populations with Sterile Males

A new study by UC Santa Barbara, published in the *Proceedings of the National Academy of Sciences*, documented the use of CRISPER/Cas9 gene to knock out the fertility gene in male mosquito (*Aedes aegypti*). In lab experiments, sterilized males were released with females, and after four hours, female fertility reduced by 80% and after eight hours, it reduced by 90%. This practice, called sterile insect technique (SIT), aims to decrease insect populations over generations by continually introducing more sterile individuals into the population. If successful over time, the researchers hope that this will help stop the spread of dangerous mosquito-borne diseases.

Bacteria Helps Pest Overcome Plant Defenses

When being fed on by insects, many plants produce defensive proteins and metabolites that prevent the insect from obtaining nutrients from the plant. In turn, some insects are evolving to combat these defensive molecules. Researchers in Japan identified that *Spodoptera litura* larvae are able

to overcome plant defenses. Oral secretions were extracted from the larvae and half the amount was sterilized. Sterilized and unsterilized secretions were then applied to the mechanically-damaged leaves of a thale cress plant. They found that the sterilized oral secretions stimulated the plant defense response whereas the unsterilized samples inhibited the plant defense response. The researchers published in *New Phytologist* that the insect has a symbiotic relationship with a bacterium (*Staphylococcus epidermidis*) that assists in overcoming plant defense mechanisms.

Documenting Pesticide Effects on Soil Health

A recent review published in *Frontiers in Environmental Science* reports that many widely-used agricultural pesticides threaten soil invertebrates. After compiling data from nearly 400 studies, the authors discovered that 71% of the reviewed cases showed that pesticides harm soil-dwelling invertebrates such as earthworms, ants, beetles, and ground nesting bees. These findings raise concern that the EPA is underestimating the risks to soil health by basing their pesticide risk parameters on the honey bee, which is an aboveground invertebrate. The authors believe these results are troubling enough to start the conversation about the urgency of reining in the use of pesticides.

New Option Coming to Manage Varroa Mites

Varroa destructor is a small mite that lives and feeds on honey bees, contributing to Colony Collapse Disorder and causing beekeepers to lose 30-50% of their hives each year. A team of entomologists at Washington State University are seeking EPA approval for a new method for

controlling varroa mites. A new, heat-resistant strain of *Metarhizium* was found to survive inside honey bee hives. The fungus feeds on and kills the mites while bees remain unaffected. The researchers are optimistic that this new finding can significantly decrease the use of chemical miticides while also addressing the varroa mite problem for beekeepers.

Crowdsourced Photos Show Expanding Tick Ranges

Researchers at the University of Rhode Island used photos submitted to their TickSpotters surveillance program to document the geographic ranges of three tick species in the U.S., two of which are known to spread Lyme disease. The three species of interest were the blacklegged tick, the Western blacklegged tick, and the lone star tick. They found that hundreds of counties around the country reported the presence of one or more of these three tick species where they had not been previously recorded. The researchers emphasize the importance of understanding tick distribution as a way to decrease risk and spread of disease.

Climate Change Affects Insect and Disease Pests

A review published by the *International Plant Protection Convention* outlined the negative impact climate change will have on the health of the plant community. It specifically stated that warmer and drier conditions will likely favor insect disturbance and warmer and wetter conditions will favor pathogen disturbance. Furthermore, these conditions will allow common agricultural pests to potentially expand their historical territories and impact new areas.

Featured Picture of the Quarter



It's amazing what's hidden beneath our feet. This rainbow of springtails floating in water was filtered from a 4-inch cube of turfgrass sent to the Utah Plant Pest Diagnostic Lab in early spring 2021.

There are a few springtail species that are occasional pests (especially in greenhouses), but these springtails are beneficial soil decomposers, feeding on decaying organic matter throughout the thatch and soil. So they are a good sign to find in a turf sample.

— Image by Zach Schumm, Arthropod Diagnostician

New Learning Tools

UC Agriculture and Natural Resources has released a few new, free publications:

[Burrowing Rodents: Developing a Management Plan for Organic Agriculture](#) includes organic IPM practices for managing pocket gophers, meadow voles, and ground squirrels.

[Herbicide Symptoms on Hemp](#) includes symptoms that could be expected in hemp that has been exposed to specific herbicides that are widely used in a range of crops during the summer hemp growing season.

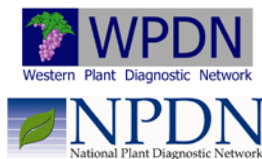
[Beescape.org](#) hosts an evolving set of GIS-based tools for beekeepers, growers, and land managers to evaluate the habitat quality of their landscapes for bees and predict colony stress over seasons.

The Western IPM Center has hosted 13 episodes of "[The IPM Hour](#)", and all are available to view for free. Each episode features two 20-minute presentations and topics cover a variety of IPM-related issues and research. Episodes are slated to begin again in the fall.

A partnership that includes the Western Connecticut State University Tickborne Disease Prevention Laboratory developed the website, [spraysafeplaysafe.org](#). The site includes five short films that answer frequently-asked questions about backyard tick management, with special emphasis on safe and effective use of pesticides for tick control.

Clipart courtesy of [FCIT](#)

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