Winter 2022
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UTAH PESTS QUARTERLY

NEWSLETTER

Utah Plant Pest Diagnostic Laboratory

USU Extension

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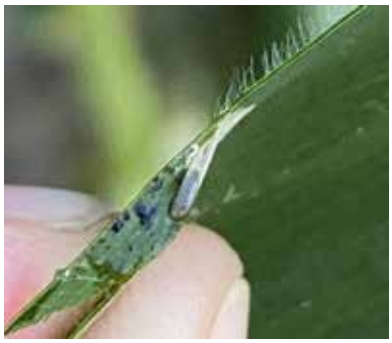
Powdery Mildews of Vegetables fact sheet

Squash Bug Management video

Extension
UtahStateUniversity.

6 Unusual Vegetable Pest Finds of 2021



Leafminer in sweet corn (left), pea weevil (center), and cavity spot (right) were just some of the unusual pests found on vegetable farms in summer 2021.

Every season, the Utah IPM Program connects with vegetable producers and hobby growers by scouting for pests on farms. The summer of 2021 yielded several unusual pests and six of them are highlighted below. Other unusual pests we saw were three-lined potato beetle, Fusarium crown and root rot in cantaloupe, western corn rootworm, and alfalfa mosaic virus in potato.

Leafminer on Corn

Community gardens in Cache and Salt Lake counties

"Leafminer" commonly describes the larval stage (maggots) of various fly species in the family Agromyzidae. Spinach, beets, and Swiss chard are the most common vegetables that get damaged by leafminers in Utah. However, this season, we found slight leafminer damage on sweet corn foliage in community gardens in Cache and Salt Lake counties. In major corn-producing regions around the U.S., common leafminer species include the corn blotch leafminer (*Agromyza parvicornis*) and others in the genus *Agromyza*. We were unable to identify the Utah species due to lack of live larvae or pupae in the mines. We will continue this investigation in 2022 to identify specific leafminers feeding on Utah corn foliage.

Pea Weevil

Community garden in Cache County

Pea weevils are found sporadically in Utah but this season, they were found in large numbers at a community garden in Cache County. The oval-shaped, brown adults were found on foliage while the larvae, which reach about 7mm long, were feeding within the pea seeds, either consuming them entirely or making them inedible. Pea weevils have one generation per season. Adults overwinter in plant debris in the soil or stored dry peas. In spring, females lay eggs on pea pods and hatched larvae bore directly into the pods.

continued on next page

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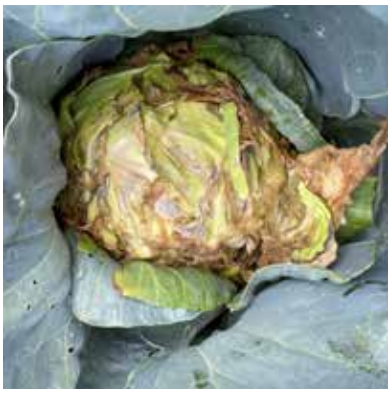


Other unusual pests found in 2021 include bacterial soft rot on cabbage (left), Rhizopus rot on cabbage (center) and Mexican bean beetle (right).

Cavity Spot on Carrot

Vegetable farm in Davis County

Cavity spot is a disease caused by the fungus-relative, *Pythium sulcatum* and/or *P. violae*. It was documented this season in a single carrot at a vegetable farm in Kaysville. Symptoms of cavity spot include irregular, sunken lesions occurring on the surface of the carrot, across the upper third of the carrot root. These lesions may start when plants are very young but increase in size as the root grows. Cavity spot is favored by heavy rainfall and cool, wet growing conditions.

Bacterial Soft Rot on Cabbage

Vegetable Farm in Utah County

Bacterial soft rot is caused by the bacterium *Erwinia carotovora* subsp. *carotovora* (syn. = *Pectobacterium carotovorum* subsp. *carotovorum*). This pathogen has a wide host range and is of major agricultural importance. Due to Utah's dry climate, it is relatively rare. This season, it was found on cabbage in a Utah County field. Symptoms include water-soaked areas that enlarge over time. The tissue becomes soft and mushy and eventually, the head collapses inward. The most defining characteristic of bacterial soft rot is the foul odor it emits. The bacteria initially infect the plant through natural openings or wounds caused by tools, weather, or insects.

Rhizopus Rot on Cabbage

Community garden in Cache County

Rhizopus spp. are common saprophytic fungi that feed on decaying plants and other organic matter, including stored food products. In some cases, it can act as a pathogen, such as when we found it causing disease on cabbage located in a community garden. The original infection occurred on damaged plants, and the fungus subsequently spread and infected adjacent cabbage plants throughout the season. Symptoms included browning of the exterior leaves of the head. Internal rot did not occur so the cabbage heads could be salvaged.

Mexican Bean Beetle

Vegetable farm in Davis County

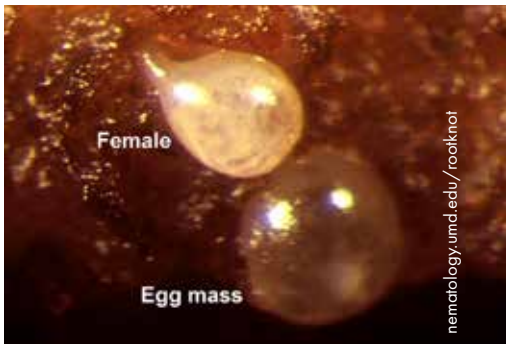
The Mexican bean beetle is not commonly found in Utah but where it occurs, it is a major pest of bean crops. This insect is in the same family as lady beetles and has 1 to 3 generations per year in Utah. Adults overwinter in woody areas near legume production. Both Mexican bean beetle adults and larvae cause lacy defoliation by feeding and stripping away the lower layer of leaf tissue. Eventually, this leads to skeletonization and total defoliation.

— Nick Volesky, Vegetable IPM Associate

Root-knot Nematodes on Vegetables and Ornamentals

Root-knot nematode damage on carrots.

Tomato roots affected by root-knot nematode, showing galls (***top***).



Female nematode and egg mass on the root surface (***right***).

Root-knot nematodes (*Meloidogyne* sp.) are microscopic roundworms that live in the soil and infect plant roots. There have been more than 70 species described around the world. Some species infect hundreds of different crops and weeds which makes them very difficult to manage. Both the northern root-knot nematode (*Meloidogyne hapla*) and the southern root-knot nematode (*M. incognita*) occur in Utah, and feed on vegetables, potatoes, and ornamentals.

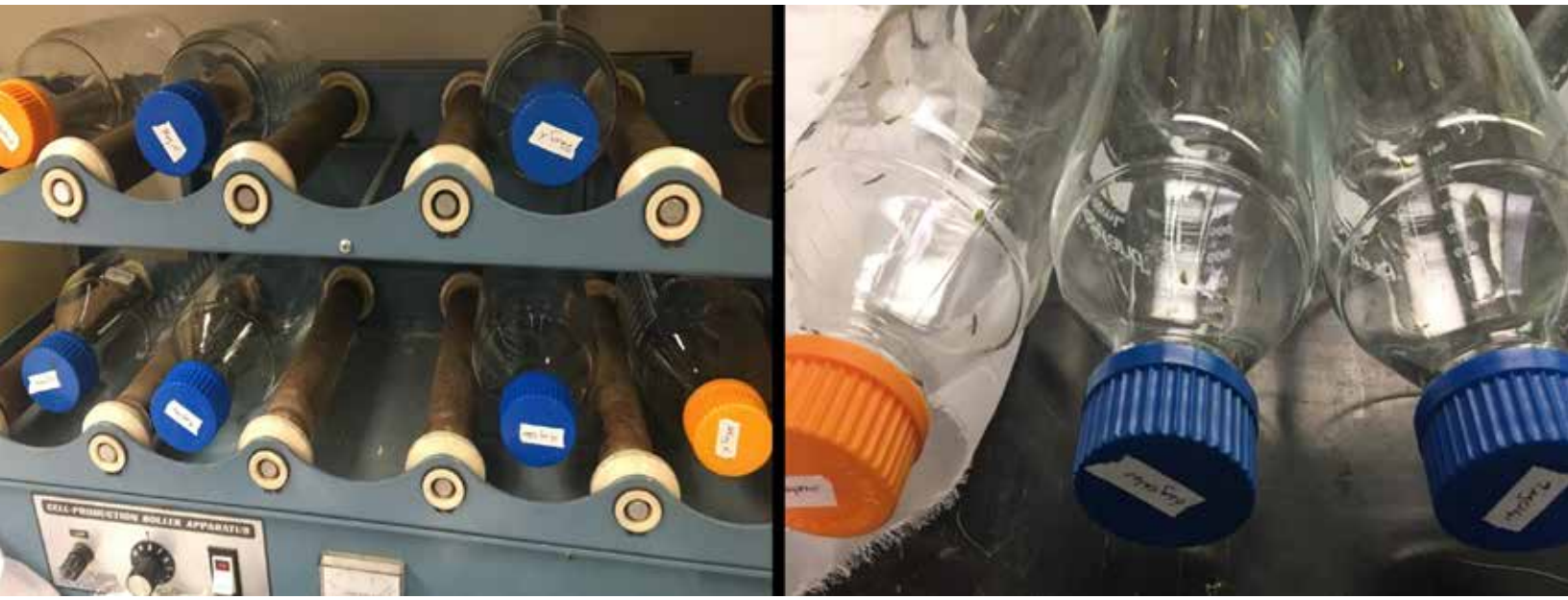
Nematodes go through four juvenile life stages before they become adults. The female second-stage juvenile penetrates plant roots at the tip and moves up in the root until it finds a suitable feeding site. There it establishes itself permanently, grows through the next two juvenile stages and then changes its shape from worm-like to lemon-shaped. When the nematodes become obese they frequently break through the root and deposit egg masses into the soil. One female root-knot nematode can produce hundreds of eggs during her lifetime. Some *Meloidogyne* species have male root-knot nematodes, depending on environmental conditions. The presence of male nematodes in the soil is a sign that the nematodes have been present for a while and are not newly introduced to the field. Male nematodes are not needed for reproduction in most *Meloidogyne* species.

Aboveground symptoms of root-knot nematode infection often resemble symptoms of nutrient deficiency. Plants are yellow, small and stunted, and wilt easily. When plants like these are removed, gall can be seen on the roots. The galls contain the female nematodes that have released growth hormones that cause rapid plant cell division and subsequent swelling. The plants will transport more nutrients to the galls thereby providing more nutrition to the nematode. On root crops like carrots, the nematodes can cause forking and galls on the carrot root.

Management of root-knot nematode is difficult due to its large host range. Some vegetables such as tomato have resistant varieties, but many don't. If nematode pressure is low and there is concern for an increase in the population, one option is to grow a cover crop of Caliente Rojo mustard for one season. The mustard acts as a biofumigant and according to growers, the key to effectiveness is harvest speed. The mustard must be cut and incorporated into the soil in 20 minutes or less. Otherwise the volatile compounds that kill the nematodes are lost. In high nematode populations, the field should be kept fallow and weed-free for a few years. During this time, periodically till or cultivate the soil during the summer to further reduce the nematode population. After this time, plant production can resume for a few years until nematode populations have built up again to a level where they cause significant damage. If root-knot nematode damage is suspected, send a plant sample showing symptoms to the UPPDL for confirmation.

Claudia Nischwitz, Plant Pathologist

Battling the Resistance (*of Pesticides*) – A Growing Issue in Alfalfa?



Bottle assays are a way to evaluate the toxicity of contact insecticides. Bottles are first coated with insecticide using a bottle roller (left). Insects are then introduced to the bottle and exposed for 1 hour (right). After 24 hours, the number of insects that die and survive are counted.

Pesticides play a critical role in managing insect pests and diseases to minimize crop damage and loss. However, heavy insecticide use, particularly of the same or similar modes of action, can lead to the development of insecticide resistance, meaning a higher rate of the chemical is needed to achieve the desired results. As resistance of pest populations increase, growers may be caught on the "pesticide treadmill," where they need more toxic chemicals and use increasingly higher levels of previously effective insecticides.

The pesticide treadmill is problematic since the need for more treatments is costly, and they harm pollinators and beneficial insects, animals, and pose health risks to humans who may be exposed to pesticides directly and indirectly. Understanding levels of resistance in common agricultural pests and sensitivity in pollinators can help growers and researchers develop effective integrated pest and pollinator management (IPPM) practices.

Rose Sepesy and team (USU Departments of Biology and Chemistry and Biochemistry) are researching insecticide

Alfalfa weevil larvae are increasingly becoming resistant to certain pesticides.

sensitivity of two alfalfa pest insects (alfalfa weevil and lygus bugs) and the pollinator, alfalfa leafcutter bee. The research team tested insect mortality from varying doses of chlorpyrifos and lambda-cyhalothrin and compared the results among each insect.

Chlorpyrifos and lambda-cyhalothrin are common active ingredients in a number of products available for alfalfa

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pest suppression. Alfalfa weevil larvae and lygus bugs were collected from unsprayed research fields at USU's Greenville Research Farm. Since alfalfa leafcutter bees are typically sourced each season for seed production, bees were purchased from producers in Canada.

For **alfalfa weevil,** the research team found that for lower levels of suppression (a lethal dose to kill 50% of the population), chlorpyrifos and lambda-cyhalothrin were equally effective on the larvae. For higher levels of suppression (a lethal dose to kill 90% of the population), chlorpyrifos was much more effective.

In the future, the team will be investigating whether alfalfa weevil populations throughout Utah vary in their susceptibility to insecticides considering that researchers in California and Montana have observed pyrethroid-resistant alfalfa weevil populations. Some growers and ag professionals have speculated that weevil resistance to may be occurring in Utah given the lack of efficacy after some applications, but this has not been confirmed yet.

For **lygus bugs**, Rose and team found that lambda-cyhalothrin was more effective for both lower and higher levels of suppression than chlorpyrifos.

Not surprisingly, the **alfalfa leafcutter bee** was highly sensitive to both chlorpyrifos and lambda-cyhalothrin. The team tested the lower and higher suppression dosages previously found for the pest insects on the bees, and found that both levels caused high bee mortality. For this reason, pesticides that are less-toxic to bees should be selected whenever possible for alfalfa weevil and lygus bug management, and applied following the "Bee Advisory Box" on the label, which provides steps to minimize exposure of pesticides to bees while they are foraging.

The toolbox of management options, particularly of available pesticides, can be quite limiting. For instance, in 2021 the EPA released its final rule and revoked all

Sweep nets are a tool used to monitor alfalfa weevil and other pests and these data can be used to calculate thresholds (# of weevils/sweep) for making management decisions. Dr. Scott Bernhardt demonstrates this by collecting alfalfa weevils and lygus bugs by sweep netting an alfalfa field at Utah State University's Greenville research farm.

tolerances for the pesticide chlorpyrifos, and there is a need to seek alternatives in pest management.

Producers and ag professionals can avoid pesticide resistance and subsequent loss of effective chemicals by practicing IPPM. This includes the following tips:

- Monitor pest populations regularly.
- Use pest thresholds to make management decisions.
- Rotate insecticide modes of action.
- Carefully time applications to avoid pollinator foraging.
- Choose selective insecticides whenever possible.
- Use alternative (such as non-chemical) management strategies.

—— Rose Sepesy, graduate student, Biology (PhD), Scott Bernhardt, Professional Practice Associate Professor, and Ricardo Ramirez, Entomologist

For more information

Rodbell, E.A. & Wanner, K.W. (2021). First report of alfalfa weevil (Coleoptera: Curculionidae) resistance to lambda-cyhalothrin in Montana. *Journal of Economic Entomology 114*: 2088-2095.

Orloff, S., Godfrey, L., Goding, K., Askew, L., & Putnam, D.H. (2016). Alfalfa weevil resistance to pyrethroid insecticides found in Intermountain alfalfa fields. UCANR Alfalfa & Forage News.

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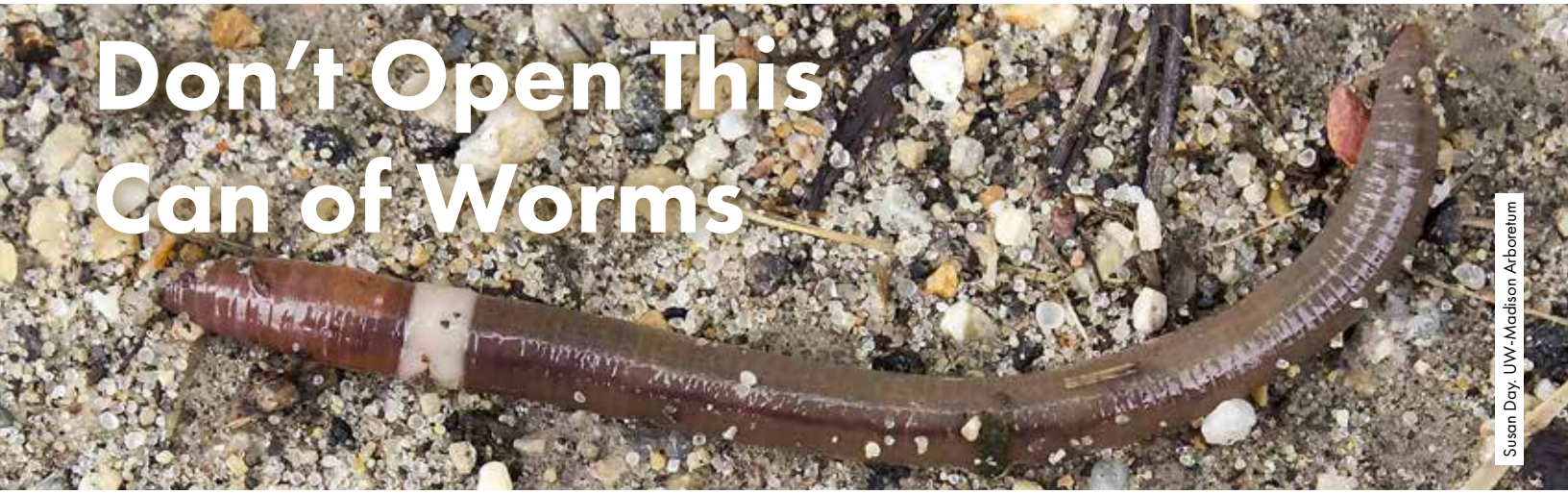
Frequent Questions about the Chlorpyrifos 2021 Final Rule | US EPA

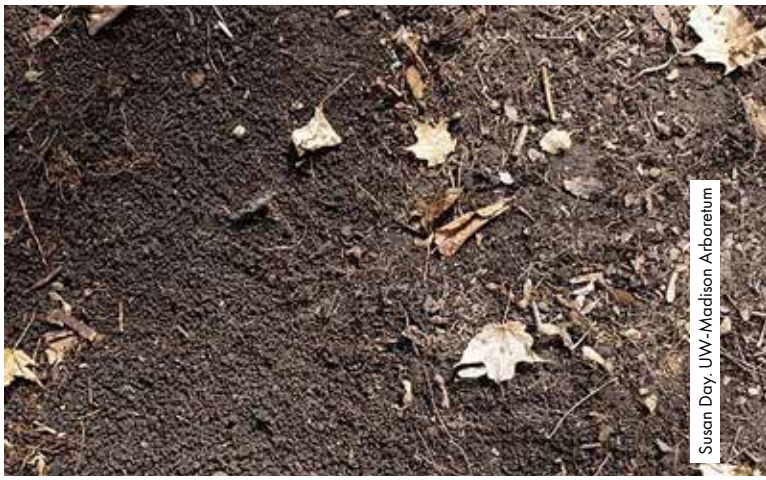
Don't Open This Can of Worms

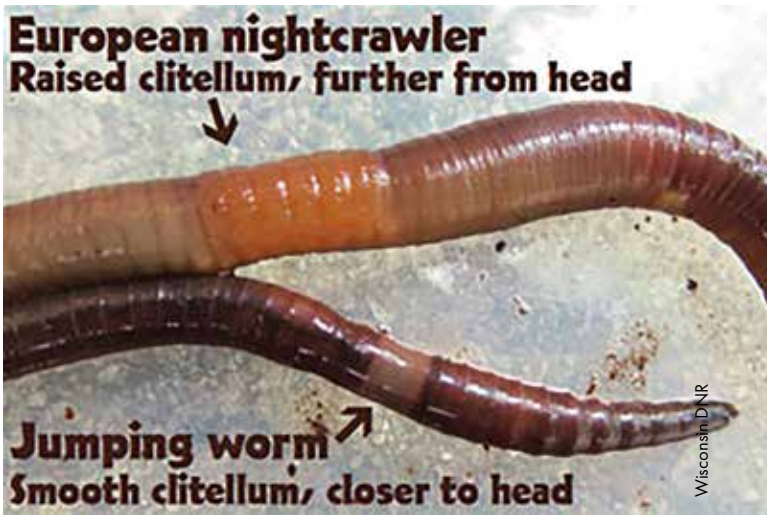


Jumping worms of the genera *Amynthas* and *Metaphire* are native to East Asia and were first officially reported in the U.S. in Maryland (1939) and New York (1940s), likely having arrived in soil from plants imported from Asia decades earlier. Three species (*A. agrestis, A. tokioensis,* and *M. hilgendorfi*) are of primary concern, and these species have begun spreading broadly in the past 15 years. Currently they occur across much of the northeastern, southeastern, and midwestern U.S. To date, only one related species (*A. gracilis*) has been reported west of the Rocky Mountains (in Oregon, 2016). Jumping worms can spread to new areas by their use as fishing bait, and by the unintentional movement of life stages (eggs, worms) in soil, mulch, and compost.

Jumping worms can be found in hardwood forests, urban parks, residential yards, greenhouses, and compost piles. They live in the litter-soil interface and slightly into the soil surface, where they profoundly change soil characteristics and plant communities as they consume enormous quantities of organic matter in a short amount of time. Their feeding results in gravelly and dry soil that is water-repellent and depleted of nutrients. Their excrement (castings) remains on the soil surface, out of reach of plant roots and prone to erosion. They strip the soil layer necessary for seedling establishment and wildflower growth, and in heavily infested areas, native plants and animals can decrease significantly. On top of this, jumping worms displace earthworms and nightcrawlers that are important for both aerating the soil for water infiltration and for moving nutrients into the soil for plant use.

Adult jumping worms are smooth, glossy, and metallic gray or brown, 1.5 to 8 inches long, and up to 1/3 inch wide. They have a large and distinct mouth part and a smooth, flush, and light-colored collar (clitellum) near the head that





Top of page: Mature jumping worm (*Amynthas* sp.).

Middle: Jumping worms' signature gravelly and dry soil full of castings (left side of image), and unaffected soil (right side of image).

Bottom: Comparison of jumping worm and nightcrawler.

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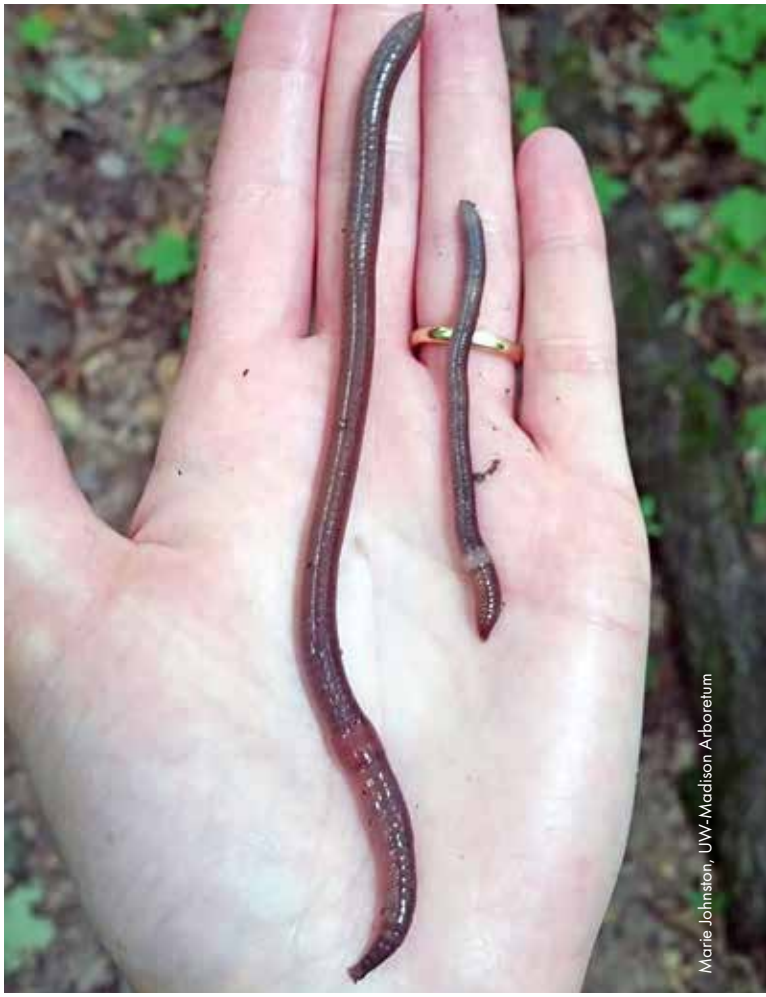
completely encircles the body. Their movements are snake-like, and when disturbed, they can shed their tail and writhe and "jump" for up to 30 minutes. Most earthworms and nightcrawlers, by comparison, are less reactive when disturbed, are commonly found deeper into the soil, and have an incomplete collar that is darker, raised, and more centrally located on the body.

Jumping worms overwinter as eggs in a cocoon that resembles a tiny bead of soil on the soil surface. The eggs hatch in spring, and adults are present beginning in late June. Mature adults are most easily found beginning in late August and can reproduce without mating. There is one generation per year, and adults die with a hard frost.

Jumping worms cannot move very far without assistance, and prevention is the best method for limiting their spread. When purchasing plants, notice the soil surface, and avoid those with dry, granular pellets that resemble coffee grounds or ground beef. Plant seeds or bare-root stock when possible, and do not use jumping worms (sold also under the common names Asian jumping worms, crazy worms, snake worms, Alabama or Georgia jumpers, or Jersey wigglers) for vermi-composting, gardening, or fishing bait.

Although this pest has not been detected in Utah, familiarize yourself with their appearance and unusual soil castings. Contact the Utah Plant Pest Diagnostic Lab or the Utah Department of Agriculture and Food with suspicious sightings. Early detection helps state and federal authorities in Utah manage pests, and citizen involvement is key to program success.



Two species of jumping worms depicting size variation. The worm on the left is likely immature as its clitellum (close to the head) is not pale.

Ann Mull, Research Technician, and Lori Spears, USU Invasive Species Specialist

For more information

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Carignan, C. (2021). Invasive jumping worms. University of Maryland Extension, updated November 16, 2021.

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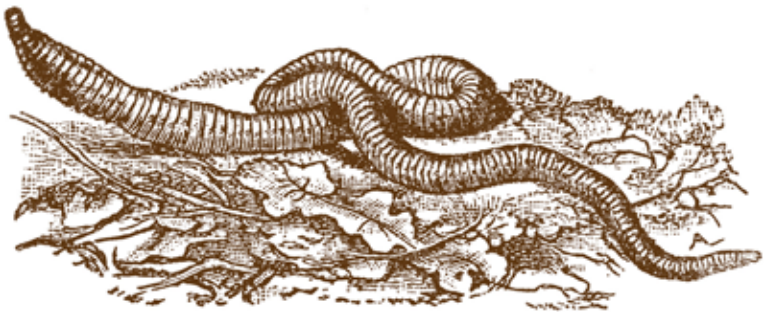


Use Caution When Transporting Wood – The Conifer Auger Beetle

The transport of plant material, including lumber, firewood, and finished wood products is one of the many pathways for non-native species to make it to new locations. Sometimes, even if practices are in place to prevent the spread of potential invasive species, accidents can happen.

In 2021, packages were sent to the state of Utah on wood pallets that came from Asia. Upon arrival, the recipient noticed a few living beetles within the pallet wrapping and packaged goods. This observant individual sent the beetles to the Utah Plant Pest Diagnostic Lab for identification, concerned that they may be non-native.

The UPPDL identified them as conifer auger beetle (*Sinoxylon unidentatum*). This insect, native to parts of Asia, has been intercepted in wood packaging products in several areas around the world. Solid wood packing materials appear to be the most common way in which this insect is transported by humans (Price et al. 2011). In certain cases, these wood-boring insects can become important pests of agriculture, forestry products, finished wood products, and lumber.

The conifer auger beetle has an interesting appearance. They are solid black, round overall, and have two characteristic "spikes" on the back end of their wings. The rest of their body is covered in small bumps, especially on the top of the thorax. Their thorax is also visually "humped," giving them a humpback appearance when viewed from the side. They measure about 1/2 centimeter in length.

While these insects were intercepted and there is little concern over any further spread into Utah, this is a great example of how easily organisms can move into new areas and the importance of carefully inspecting shipments that contain plants or originate from them (such as wood pallets).

Firewood is one of the easiest pathways for wood pests to spread, and the best practice is to "buy it where you burn it." All other transported wood products (especially wood that is untreated) should be inspected for signs of pests prior to traveling long distances. If you notice anything out of the ordinary on recently-shipped wood products or plant material, contact your local department of agriculture or plant/insect diagnostic lab for appropriate documentation and identification.

— Zach Schumm, Arthropod Diagnostician

For more information

Price, T., Brownell, K.A., Raines, M., Smith, C.L., & Gandhi, K.J.K. (2011). Multiple detections of two exotic auger beetles of the genus *Sinoxylon* (Coleoptera: Bostrichidae) in Georgia, USA. *Florida Entomologist, 94*(2), 354-355.

HINTS FOR HEALTHY HOUSEPLANTS

My hidden secret is that I sometimes neglect my houseplants only to discover that one or two of them is suffering from an insect or disease problem. I either tackle the problem head-on or decide to never grow that plant again! Unfortunately, we must accept that pests on indoor plants will happen and they can become a chronic issue if not prevented. Most houseplant pests are introduced from the original plant purchase or on houseplants kept outside for the summer and relocated indoors. Common offenders include fungus gnats, mealybugs, scales, aphids, and whiteflies.

Fungus gnats are one of the more common houseplant insects, and are more of a nuisance than a plant pest. Adults are tiny flies that are drawn to moist soil and decaying leaves, where they lay eggs. Fungus gnat larvae feed on fungi in the soil and on plant roots, but rarely cause noticeable damage. Targeting the larvae is the best option for reducing fungus gnats. Only water when necessary and let the soil surface dry between waterings, as the eggs and larvae will die in dry soil. Purchase inexpensive yellow sticky traps (for example, search for "yellow sticky trap fungus gnats" at your favorite online store). For a more severe infestation, use an organic soil drench of Bti (*Bacillus thuringiensis israelensis*) such as Thuricide, Monterey Bt, or Dipel Pro, to kill larvae.

Mealybugs, scales, and aphids are soft-bodied, fluid-feeding insects that can feed on any part of the plant. They often go unnoticed until the leaves and the area under the plant is sticky with honeydew (from scales or aphids) or when leaves turn yellow and fall. Mealybugs and scales cover themselves in a protective, waxy or cottony covering which makes them more difficult to remove than aphids. For treatment, wash the plant leaves under running water or if this does not work, spray with insecticidal soap or horticultural oil (at 1% concentration) every 5 days until the problem diminishes (make sure the spray contacts the pest).

Whiteflies are more of a problem in greenhouses than on houseplants, but could be found on poinsettia, begonia, lantana, hibiscus, and angel trumpet. They are sap-feeders as well, and will cause the plant to slowly loose vigor. If a plant is badly infested, it should be removed from the home as whiteflies are difficult to control once present. Otherwise, apply neem oil targeting the immature stages, and repeat every 5 to 7 days for several applications.

Yellow sticky traps aren't the most appealing to look at, but can capture flying insects. For fungus gnats, place the trap sticky side down to catch adults as they emerge from soil.

Other tips to manage houseplant pests:

- Inspect foliage for insects (tops and bottoms of leaves) before bringing plants inside or after a plant purchase.
- Use fresh potting mix when planting or repotting.
- Regularly examine plants thoroughly to detect early infestations. Look for sticky honeydew on foliage and gently shake the plant over a piece of paper to look for moving "dust."
- Periodically wash foliage to dislodge small insects and mites.
- Discard badly infested plants.
- Horticultural oils and soaps are generally effective against most houseplant insect pests.
- Botanical insecticides, like neem oil, azadirachtin, and pyrethrin, are relatively fast-acting but have a short residual.
- A conventional option against aphids and scales (Bonide Houseplant Insect Control) is a systemic (granules) that is effective, but should be used as a last resort.

—— Mair Murray, IPM Specialist

IPM In The News

Strength of the "Humongous Fungus" Pathogen

Armillaria ostoyae is a root-rot pathogen with a wide host range that kills acres of timber each year. It is known for forming gigantic specimens, including the largest specimen known in the Malheur National Forest in Oregon that is 3.5 square miles in size and weighs 35,000 tons. Mechanical engineers from the University of Utah pulled samples from the Oregon specimen and studied the defense mechanisms of Armillaria rhizomorphs (large tendrils of mycelium) and published their results in the *Journal of the Mechanical Behavior of Biomedical Materials*. The researchers learned that the rhizomorphs have an extremely strong outer layer that contains calcium which protects from the acidic attacks of insects and chemical compounds. The authors hope that this knowledge will help scientists find ways to degrade the calcium outer surface for managing Armillaria root rot.

Practical IPM for Cucurbits

Researchers, Extension specialists, and vegetable growers in southern U.S. states teamed up to evaluate the practicality of pest control practices for cucurbits. Keeping in mind both economics and efficacy, the team tested common IPM practices including row covers, companion planting, predatory mites, and soil microbes. They found that row covers can be economic and effective in preventing crop damage, companion planting can be effectively used to reduce aphid issues, release of predatory mites can suppress whitefly populations, and soil microbes had no effect. These findings help thousands of growers in the region adopt scientific findings to real world application.

IPM Approach In Watermelon Proves Effective

A multi-year study of commercial fields in the Midwest outlined the benefits of using an as-needed approach when using pesticides in corn and watermelon fields. The authors compared fields of both crops managed with or without IPM practices. They report in *PNAS* that in the IPM fields, wild bees returned within the first year and watermelon yield increased an average of 26 percent. Overall, the IPM fields had a 130% increase in the number of flower visits over the non-IPM fields. This study indicates that although the watermelon fields (which are insect-pollinated) were surrounded by corn (which are wind-pollinated), wild pollinators were able to find their way to the watermelon fields more effectively when IPM methods were used.

Biocontrol Challenges for Emerald Ash Borer

Emerald ash borer has become widespread in the eastern U.S., to the point that the USDA is no longer regulating the movement of ash trees and products in infested areas. The USDA's work has shifted instead to biological control. To date, four parasitoid wasp species from China and Russia have been approved for release to combat the borer, and in 2020, over 550,000 wasps were released in over 240 sites. The challenge, however, is that rearing the emerald ash borers to generate the wasps requires fresh ash logs and foliage, a time- and cost-intensive process. To improve biocontrol management efforts, research is underway to develop an artificial diet for emerald ash borer in the lab to one day ramp up wasp releases.

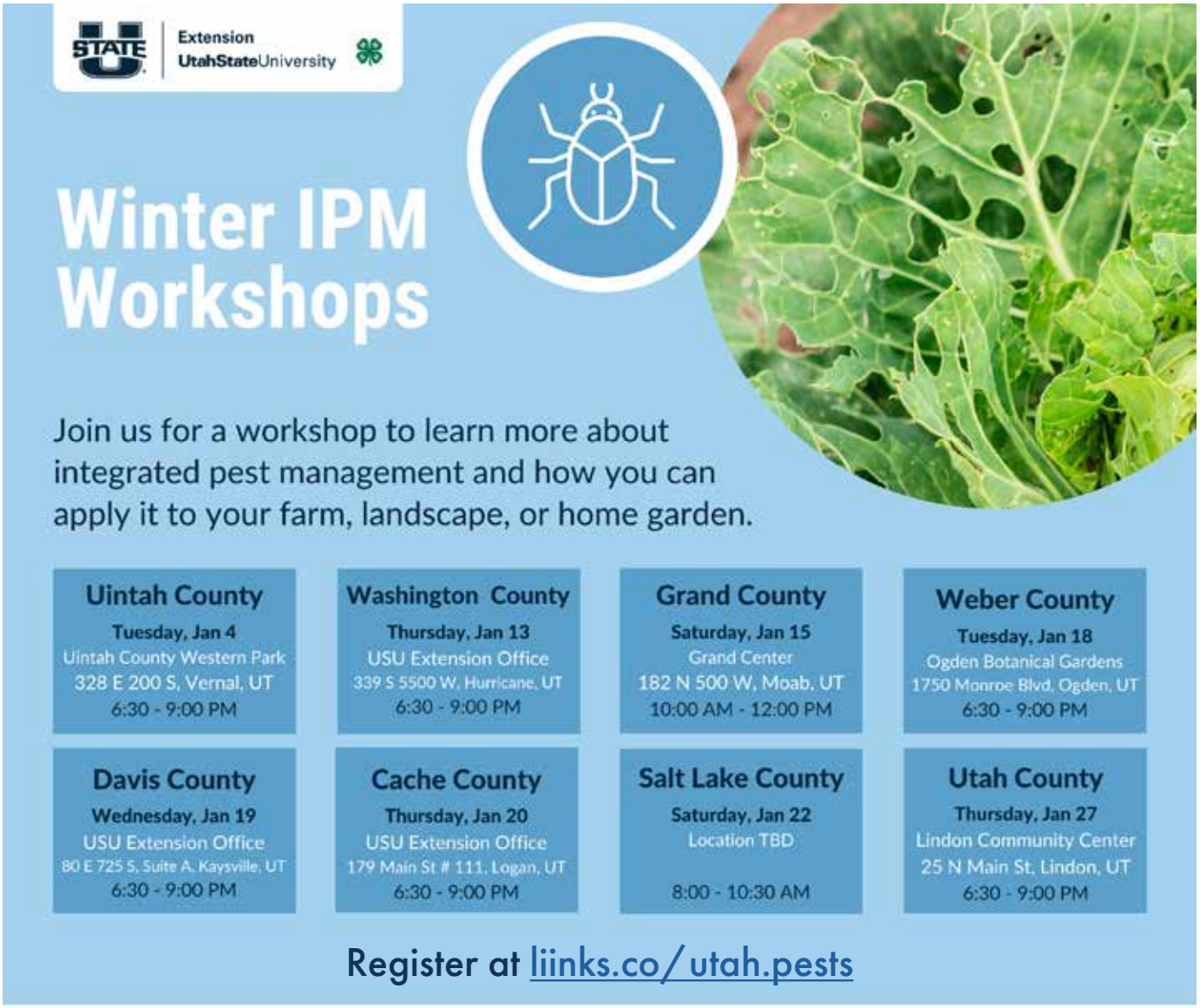
Discovery of Spotted Wing Drosophila Biocontrol

Beneficial parasitoid wasps in the genus *Ganaspis* were recently approved by the U.S. Department of Agriculture Animal and Plant Health Inspection Service for rearing and distribution in the U.S. as a biocontrol option against the pest, spotted wing drosophila (SWD). However, in the meantime, entomologists at Washington State University recently confirmed the natural presence of *Ganaspis brasilensis*. This host-specific wasp was found in a wild blackberry patch in Washington state, and the wasp targets SWD larvae. This discovery will make it easier for entomologists to distribute this biocontrol in the state(s) they are found.

New Monitoring Tool for Predators in Turfgrass

Researchers at the University of Georgia implemented a technique using insect models made of clay to detect the presence of insect predators turfgrass. Clay models resembling the shape of beetles and caterpillars were placed within turf fields for a period of time. After removal, the researchers examined bite marks found on the models. Each beneficial insect predator leaves a unique impression on the clay and these impressions can indicate what predators are present. The researchers also found that the color of clay did not matter; however, blue and green were attacked more often during the day and caterpillar-shaped models had more marks than beetle-shaped ones. These findings, published in the *Journal of Insect Science* provide a new IPM method for monitoring the presence of beneficial predators in turfgrass.

Workshop Announcements



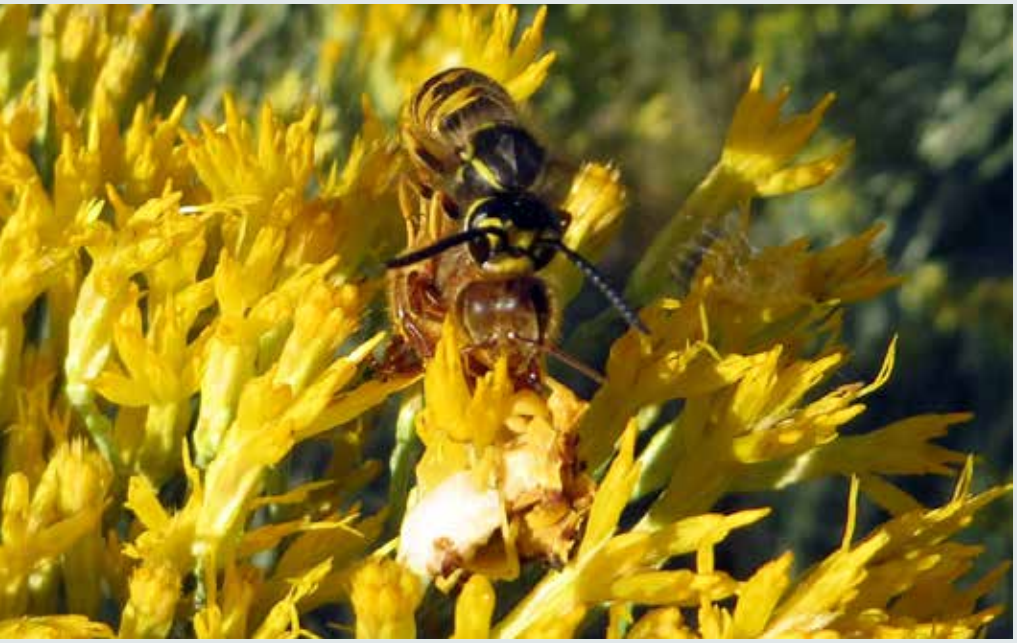
Thriving Hive Beginning Beekeeping Series

Classes will be held the first and third Tuesday of each month from 6:30pm - 8:30pm either online or at Wheeler Historic Farm.

Course instructors include USU faculty, UDAF employees, and local beekeeping experts.
Cost: $150 per person. $225 per couple. Materials and text included with registration fee.

Click Here to register or contact Salt Lake County Extension

Featured Picture of the Quarter



Fall is a time when insects become slightly desperate for food. Honey bees are looking for their last natural sources of nectar (such as from the late-blooming rubber rabbitbrush) and predators are hiding out or seeking out prey.

Can you spot the two predators above and below this poor honey bee? The yellow-camouflaged ambush bug was laying in wait at the flowers, and grabbed the bee from below. The struggling honey bee caught the attention of a paper wasp, who swooped in from above and got a twofer meal!

— Image by Mair Murray, IPM Specialist

New Publications, Websites, Apps and More

The Northwest Center for Alternatives to Pesticides released two short videos of Oregon hemp farmers discussing pest management.

Pesticides and the Climate Crisis is an infographic produced by the Northwest Center for Alternatives to Pesticides to show the relationship between pesticide use and climate change, and its effects on environmental decline and human health problems.

The Western IPM Center's IPM Hour webinars feature research and exciting IPM work in the West.

The American Floral Endowment recently produced a webinar series for thrips and botrytis pest management.

A new publication provides a guide for biology, identification, and management strategies for eriophyid mites in turfgrass.

View dozens of on-demand pest management webinars hosted on The Webinar Portal, and produced by NRCS, USFS, and other agencies and universities.

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