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UTAH PESTS QUARTERLY
NEWSLETTER

Utah Plant Pest Diagnostic Laboratory

USU Extension

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EXTENSION
UtahStateUniversity

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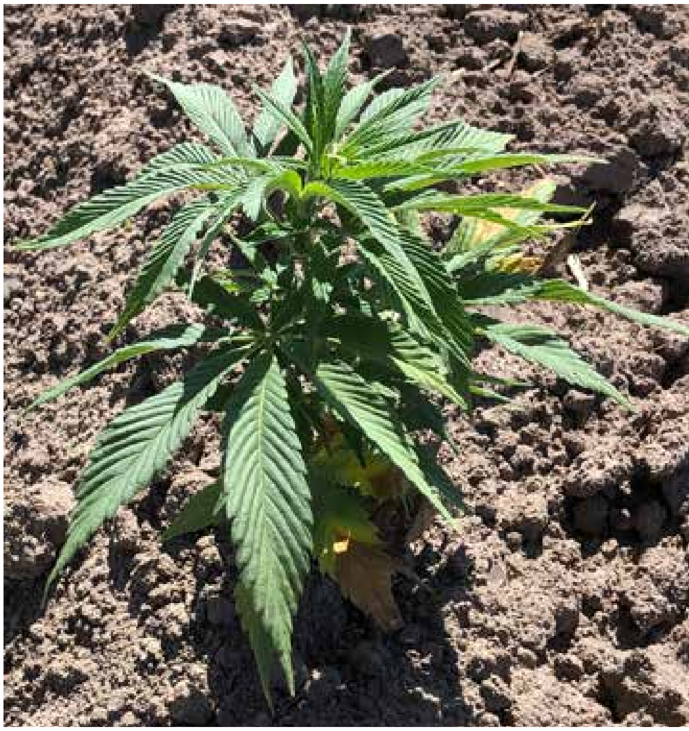

Pythium root rot on industrial hemp causes stunted plants, leaf scorching, chlorosis, and eventual death (***top***).

Pythium crown rot only affects tissue at the soil line, girdling the stem and causing similar symptoms (***bottom***).

Industrial Hemp

Industrial hemp is now planted on several hundred acres in Utah, and some pest problems are beginning to appear. In summer 2019, several hemp growers sent plants in poor health to the Utah Plant Pest Diagnostic Lab. All samples were diagnosed with root rot and/or crown rot caused by the oomycete, *Pythium*. The plants with root rot were most likely infected early in the season. They were stunted, the foliage was chlorotic (yellow), and the roots were spongy and rotted. The epidermis of the fine roots could be easily peeled off, leaving only the core tissue. The plants with crown rot, however, may have been infected later in the season, where the pathogen grew within the crown tissue at the soil line causing a localized rot and girdling the stem. In the case of crown rot, the roots were not affected.

Pythium is a soilborne pathogen that produces motile spores in the presence of water. The spores have flagella, little hair-like appendages, that propel them forward, and cause infection on susceptible plant tissue (roots or crowns) that they encounter.

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Watermelon (*top*) and butternut squash (*bottom*) infected by Pythium fruit rot.

The infections begin as a brown spot on the side touching the ground. These enlarge to a soft rot with a cottony mass of mycelium that eventually surrounds the fruit.

Management of Pythium root or crown rot on hemp is challenging because there are no fungicides registered for management. But as with management of soilborne diseases on other crops, cultural management of soil moisture is of the utmost importance. In fields that had problems in the past with *Pythium*, using plastic mulch and drip irrigation can be very effective. Drip irrigation reduces the moisture levels in the root zone without affecting plant growth, and prevents standing water from occurring around the crown of the plant. In fields with an existing infection, reducing overall moisture levels will help to prevent spread to neighboring plants.

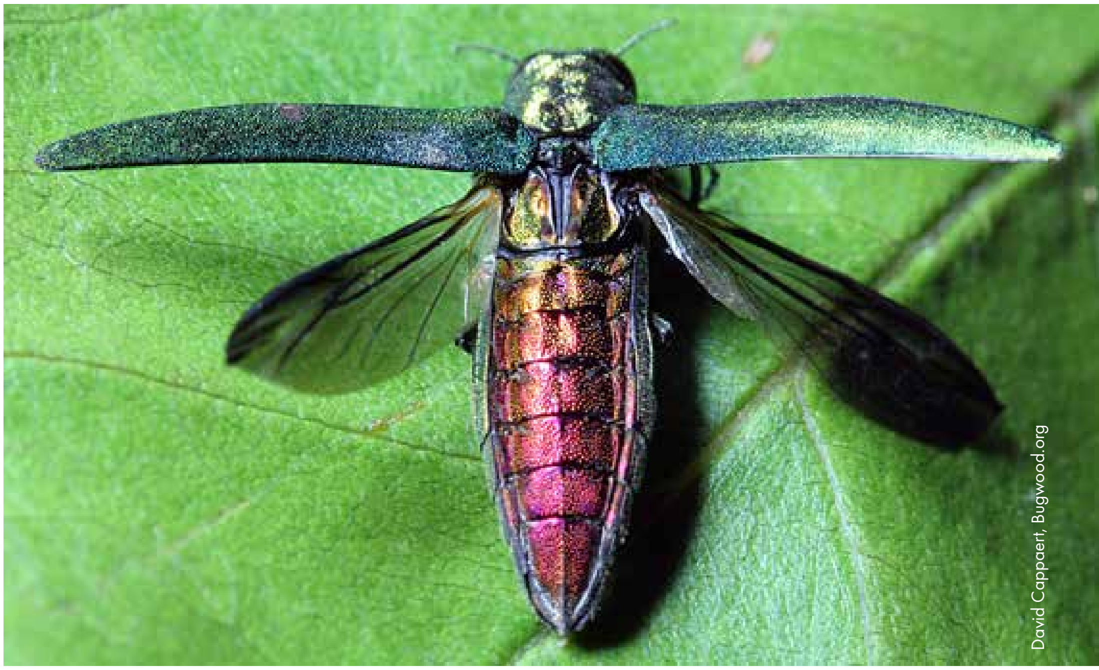
Watermelon and Winter Squash

Also in summer 2019, watermelon and banana squash were affected by *Pythium*, in particular, *Pythium aphanidermatum* (see the Summer 2019 Utah Pests News). This particular species causes both root and fruit rots. In the case of the root rot samples, the plants had symptoms of stunting and wilting, followed by plant death. The plants with fruit rot symptoms had brown lesions on the underside of the fruits where they touched the ground. As the lesions aged, cottony mycelium developed and eventually, the fruit liquefied.

Pythium aphanidermatum has a wide host range, including alfalfa and small grains that are often used for rotating out of vegetable crops. Management of this disease includes the cultural recommendations listed above. Another benefit of drip irrigation plus mulch is that fruit will not come in direct contact with the soil and will thus avoid infection by the pathogen. For chemical control, a soil drench with a fungicide containing mefenoxam (following labeled recommendations) can be used to control root rot, but it will not help with fruit rot.

—— Claudia Nischwitz,
Extension Plant Pathologist

The Invasive Emerald Ash Borer Not Yet Confirmed in Utah



David Cappaert, Bugwood.org

Emerald ash borer (EAB, *Agrilus planipennis*) is an invasive wood-boring beetle that has caused the decline and mortality of tens of millions of ash trees (*Fraxinus* spp.) in eastern and mid-western U.S. and Canada. This pest will attack all North American ash species, including small, large, stressed, and even healthy trees. Utah's two native ash species are susceptible–the small, shrubby singleleaf ash (*F. anomala*) that occurs sporadically in southern Utah and velvet ash (*F. velutina*) found in southwest canyons–as well as planted ash species, such as green (*F. pennsylvanica*) and white ash (*F. americana*), which comprise up to 30% of the urban canopy in many Utah communities.

Repeated surveys over the past 10 years, led by Utah Department of Agriculture and Food with help from USDA APHIS PPQ and the Utah Plant Pest Diagnostic Lab at USU, have *not detected* EAB in Utah.

Despite this, some Utah tree care companies are offering EAB treatment programs for ash trees. It is important to note that insecticide applications for a pest that is not present is a waste of time and money. In other states where EAB does occur, the protocol for ash protection is to consider insecticide treatment of all ash trees located within 30 miles of EAB detections, and to monitor trees beyond. Although EAB does not yet occur in Utah, an outbreak can be minimized upon its arrival by avoiding new ash plantings. Instead, select site-appropriate trees that have minimal pest concerns. USU's TreeBrowser.org is a search tool that provides a wealth of information on the most appropriate trees to plant for any given situation, including alternatives to ash.

Distribution and Identification

Originally from Asia and parts of Russia, EAB was first discovered in the U.S. in 2002 in southeastern Michigan. Although adults typically fly short distances (up to 2 miles), EAB is primarily introduced to new locations through movement of infested materials, such as firewood and nursery stock. As of October 2018, EAB is now known to occur in 35 states, and the Canadian provinces of Ontario, Quebec, New Brunswick, Nova Scotia, and Manitoba. Colorado marks the western-most occurrence of EAB in the U.S., with infestations initially found in Boulder County (2013) and new detections in Adams, Broomfield, and Larimer counties in 2019. Information on EAB's current distribution can be found at emeraldashborer.info.

Adult EAB are metallic green beetles with bronze heads and iridescent purple-red abdominal segments beneath their wings. They are bullet-shaped, lack a defined waist, and are about 1/2-inch long and 1/8-inch wide. The larvae are cream-colored with 10 body segments and a flattened abdomen. They can reach a length of 1 inch when mature, are tapeworm-like in appearance, and have a pair of brown, pincer-like appendages on the last abdominal segment.

Symptoms of Infestation

Although adults feed on leaves, the real damage is done by larvae that feed on the vascular tissue under the bark, cutting off the flow of water and nutrients. As they feed they create serpentine (S-shaped) larval galleries filled with sawdust-like frass (insect poop) that increase in size

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S-shaped gallery (***bottom***) created by an emerald ash borer larva (***top***). Note the flattened head of the larva.

as larvae feed and grow. Larval feeding occurs more commonly in the upper canopy of newly infested trees, and they will occur lower on the trunk as the infestation progresses. Other symptoms of EAB include splitting bark; premature leaf yellowing; canopy thinning and dieback; epicormic branching (suckers) at the base of large, dead branches or the base of the tree; and woodpecker activity (seeking out larvae). Adults leave tiny, D-shaped exit holes on tree branches and trunks when they start emerging in late spring. Further, Colorado researchers have found that ash trees infested with EAB have leaves that are smaller and lighter in color compared to normal ash leaves. Infested trees can become brittle and are prone to drop branches without warning, thereby posing a liability risk for property owners and municipalities. Eastern states have seen small trees die within one to two years and large trees die within three to four years.

Insecticide Management

Management of specimen ash trees using insecticides has been successful in states where EAB occurs. These treatments have been more effective on infested trees with less than 50% canopy thinning. Commonly used active ingredients include: imidacloprid, dinotefuran, emamectin benzoate, and azadirachtin. Efficacy and application rates and usage vary by the product and tree size. For an in-depth discussion on insecticides, refer to Insecticide Options for Protecting Ash Trees from Emerald Ash Borer.

Detection

Not only is USU involved in the continued state-wide EAB trapping program, but the faculty of the invasive pest program are training Master Gardeners to be First Detectors. Students learn not only about EAB, but also about insects or pest activity that can be confused with it, such as the related honeylocust (*A. difficilis*) and bronze birch (*A. anxius*) borers that attack honeylocust and birch, respectively, and other borers that attack ash, such as the lilac-ash borer (*Podosesia syringae*) and the banded-ash borer (*Neoclytus caprea*).

If you think an insect looks suspicious or you see signs of EAB damage on ash trees, please contact the Utah Plant Pest Diagnostic Lab (UPPDL). If possible, send digital images to utahpestlab@gmail.com or caps@usu.edu for screening prior to submitting physical samples to the UPPDL.

——— Lori Spears, USU CAPS Coordinator

For more information

USU Extension Fact Sheet: Emerald Ash Borer

USU Extension Fact Sheet: Invasive Insect Look-alikes

Hahn J, DA Herms, and DG McCullough. 2011. Frequently asked questions regarding potential side effects of systemic insecticides used to control emerald ash borer.

Herms DA, DG McCullough, CS Clifford, DR Smitley, FD Miller, and W Cranshaw. 2019. Insecticide options for protecting ash trees from emerald ash borer. North Central IPM Center Bulletin. 3rd Edition. 16 pp.

Resources for Identifying Pesticide Risks

The Utah IPM Program participates in the Western Pesticide Risk Management signature program in the Western IPM Center, with a goal of helping professionals, applicators, and citizens to understand and reduce risks from pesticides.

Pesticides can be considered an economic, labor-saving, and efficient tool of pest management. But pesticides can have a level of risk, whether directly, through application, or indirectly, through non-target exposure to humans or the environment.

The Environmental Protection Agency (EPA) conducts risk assessments from toxicological studies of human health and the environment by looking at relationships between possible exposures (direct or indirect) to a pesticide and the resulting harmful effects. A pesticide can be toxic at one exposure level, and have little or no effect at another. Therefore, it is important to be informed on the risks of the pesticide you select, or your indirect exposure to pesticides in general.

In registering or reviewing a pesticide active ingredient, the EPA uses the information from their risk assessment to make the approval decision and to then determine what precautions must appear on the pesticide label, including:

- the use of protective clothing
- the "signal word" (caution, warning, danger)
- the first aid statements
- whether the pesticide may be used only by specially trained and certified applicators (restricted use pesticides)

In addition to the above, the risk assessment is also used to categorize the final pesticide product based on the active ingredient's relative acute toxicity for accidental consumption, inhalation, or skin contact (see table below).

Pesticide Product Toxicity Categories and Characteristics

Acute toxicity is expressed as the single lethal dose or concentration that can kill 50% of organisms in a test population (known as the LD_{50} or LC_{50}). The lower the LD_{50} or LC_{50}, the greater its toxicity to humans and animals.

Category I	Category II	Categories III and IV
These products are high toxic on the basis of either oral, dermal, or inhalation toxicity have the signal words DANGER and POISON (plus in Spanish, PELIGRO) displayed on the front of the label. The acute (single dosage) oral LD_{50} for pesticide products in this group ranges from a trace amount to 50 mg/kg. For example, exposure of a few drops of a material taken orally could be fatal to a 150-pound person. Maximum protective equipment (respiratory device and eyewear) and clothing is required.	These products are moderately toxic and must have the signal word WARNING (plus in Spanish, AVISO) displayed on the product label. In this category, the acute oral LD_{50} ranges from 50 to 500 mg/kg. Swallowing a teaspoon to an ounce of this material could be fatal to a 150-pound person. For the most part, maximum protective equipment (respiratory device and eyewear) and clothing is required.	These pesticides are classified as slightly toxic (III) or relatively non-toxic (IV) have the signal word CAUTION on the pesticide label. Acute oral LD_{50} values in this group are greater than 500 mg/kg. An ounce or more of this material could be fatal to a 150-pound person. Protective clothing for both categories includes long-sleeved shirt, long pants, socks, and chemical-resistant footwear.

Where to Find Pesticide Information

The level of risk in applying a pesticide depends on your exposure level, and its toxicity level (see above). And despite the fact that some pesticide products are considered only slightly toxic or relatively nontoxic, all pesticides can be hazardous to humans, animals, other organisms, and the environment, if the instructions on the product label are not followed.

Use the pesticide only as permitted by the label. The National Pesticide Information Center provides common-sense information for minimizing the risk of pesticide exposure. And remember that, as the applicator, you are legally responsible for any misuse of a pesticide.

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Look up a pesticide's **toxicity signal word and product label** at the National Pesticide Information Center's Product Research Online (NPRO).

The National Pesticide Information Center also provides fact sheets about certain **pesticide ingredients**.

ECOTOX (ECOTOXicology knowledge-base) is an advanced and comprehensive knowledge-base providing single **chemical environmental toxicity data on aquatic life, terrestrial plants and wildlife**.

The Toxicological Profiles (Tox Profiles) website is a compilation of peer-reviewed **toxicological information for certain hazardous substance**.

The Pesticides Properties Database (PPDB) was developed by the Agriculture & Environment Research Unit at the University of Hertfordshire. Although it is an international database, much of the information applies to U.S. products. The results provide a **wealth of information on all risk and safety aspects of the active ingredient**.

ECOTOXICOLOGY

for spinosad

Property		Value	Source/Quality Score/Other Information	Interpretation
Bio-concentration factor	BCF (l kg^{-1})	0.1	F4 Whole fish	Low potential
	CT_{50} (days)	Not available		-
Mammals - Acute oral LD_{50} (mg kg^{-1})		> 2000	A5 Rat	Low
Mammals - Short term dietary NOEL	(mg kg^{-1})	9	L3 Rat	High
	(ppm diet)	-		-
Birds - Acute LD_{50} (mg kg^{-1})		> 2000	A4 *Anas platyrhynchos*	Low

Example of a portion of the results provided from a search of the chemical, *spinosad,* in the University of Hertfordshire's Pesticide Properties Database.

EPA's Pesticide Chemical Search provides information about **pesticide regulatory actions, science reviews, evaluation schedules, public comment opportunities, and access to public dockets**.

The New York State IPM Program provides active **ingredient profiles and risks and benefits of Minimum Risk Pesticides** (MRP). A product is an MRP when the risk to the public and the environment is sufficiently low as to not require all the data and review necessary for registration. However, these products may involve risks in other ways.

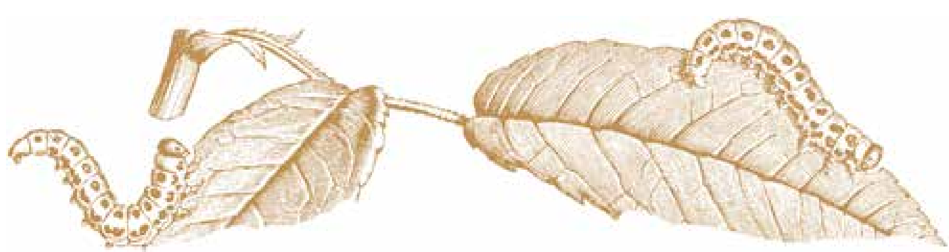
The Pesticide Action Network (PAN) is a coalition of international NGO's, citizens' groups, and individuals that promotes non-chemical farming. They do offer pesticideinfo.org, an easily **searchable pesticide database that includes toxicity and regulatory information from scientific data**. They have developed their own toxin rating scale, but also include information from EPA, the World Health Organization, and others.

The USDA's Pesticide Data Program contributes to their food safety initiative. USDA provides a **simple search feature that provides results of food and crop pesticide residue testing** of over 120 food types in the U.S. for over 500 pesticide residues, including fresh and processed fruit and vegetables, baby food, grains and grain products, almonds, peanut butter, milk and dairy products, fish, beef, pork, poultry, eggs, honey, infant formula, bottled water, potable groundwater, and treated and ambient drinking water. The search results provide both positive detections and non-detects, as well as presumptive positive violations.

"Assessing Exposure to Pesticides in Food--A User's Guide" is a document that explains the process that the EPA uses to determine pesticide risks based on food consumption.

"Pesticide Toxicology – Evaluating Pesticide Safety and Risk" by Purdue University, is an easy-to-read document that addresses the public debate about pesticides and human health by providing comprehensive information on the science of toxicology, animal testing crucial to safety evaluation, and legal requirements and experimental designs for pesticide testing.

—— Marion Murray, IPM Project Leader



Trap Cropping in Utah Vegetable Production

USU is investigating whether sorghum as a trap crop for stink bugs will protect tomato fruits from damage.

Trap cropping involves growing plants alongside a target crop that are more appealing to certain pests, thereby protecting the crop. It is an important cultural control method within Integrated Pest Management (IPM) that is not widely used in Utah. But when successfully implemented, trap cropping provides a sustainable, long-term management option.

Methods of Trap Cropping

There are several types of trap cropping which are characterized by the type of plant, where the plants are grown within the farm, and when they are planted.

- **Conventional Trap Cropping** – A traditional and proven-effective plant is planted around or within the cash crops that is more attractive to a target pest as either a food source or for reproduction.
- **Dead-End Trap Cropping** – Plants that are attractive to a target pest, but on which, offspring will not survive. Dead-end trap crops serve as a "sink" and prevent movement of the target pest to a cash crop later in the season. Dead-end trap crops are planted in field borders or edges where they intercept insect pests.
- **Genetically-Engineered Trap Cropping** – Plants may be genetically engineered to act as a trap crop. Prevention of insect-vectored diseases is one example, where the trap crop is capable of harboring a certain virus but its insect vector cannot acquire it from that plant. In this example, the trap crop helps reduce the insect-vectored pathogen as opposed to the insect itself.
- **Perimeter Trap Cropping** – Trap crops that are planted around the border of the main crop.
- **Sequential Trap Cropping** – Traps crops that are planted either later or earlier than the main crop to increase the attractiveness to insect pests during certain times of the season.
- **Multiple Trap Cropping** – Planting several trap crop species to manage several pests or controlling a target pest by combining plants whose growth stages enhance attractiveness season-long.
- **Push-Pull Trap Cropping** – A combination system where a trap crop is planted around the perimeter of a crop to attract the target insect pest (pull) and a different plant is inter-cropped to repel (push) the insect away from the cash crop.
- **Biological Control-Assisted Trap Cropping** – Trap crops that are planted within and around the crop that enhance populations of natural enemies that then help suppress multiple pests.
- **Semiochemical-Assisted Trap Cropping** – The use of either manually hanging insect semiochemicals (such as pheromone lures) on a perimeter planting, or using genetically modified plants that emit semiochemical lures to attract the target pest.

Making Trap Cropping a Success

There are several factors that can determine whether a pest is manageable by a trap crop. The first is whether the life stage of the insect being targeted allows the insect to access the trap crop. In addition, it is important not only

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to have the right number of trap crops, but that they are planted at the right time and in the correct locations as they relate to the cash crop. Finally, the trap crop should match the growing cycle of the cash crop to allow its effectiveness until harvest.

As the pest population increases on the trap crop, a decision should be made in managing the pest for most trap cropping systems. Natural biocontrol is one option where the tolerance for crop injury level is higher, since natural enemy populations don't increase until after the pest population increases. The two other options that provide more effective pest control on the trap crop include removal or destruction of the trap crop once the pest reaches the threshold, or applying an insecticide (conventional or organic).

Limitations of Trap Cropping

There are some limitations to trap cropping that make this practice undesirable to some growers. Trap crops usually target one pest or pest group, which makes them less effective compared to other IPM strategies. Another concern is that the cost of applying a pesticide to the cash crop may be less than the cost of growing trap crops (loss of space, irrigation, etc.). Finally, trap crops could put the cash crop at risk if they were to harbor non-target insects or pathogens that could be detrimental to the cash crop.

Utah Trap Cropping Trial

This year, the Utah IPM team established trials in three locations across northern Utah to evaluate the effectiveness of sorghum as a trap crop to prevent stink bug damage in commercial tomato production. Each location included two plots separated by 25 yards, each planted with four rows of Sunbrite tomatoes. One plot included a border planting of dwarf sorghum while the other did not. Every week, we scouted for stink bugs in the tomato and sorghum plantings, and at harvest, we evaluated tomato fruit damage and overall yield. This is the first of two seasons for this trial, and the data is currently being analyzed.

—— Nick Volesky, Vegetable IPM Associate

For more information

Shelton and Badenes-Perez. 2006. Concepts and Applications of Trap Cropping in Pest Management. Annual Review of Entomology 51:1, 285-308.

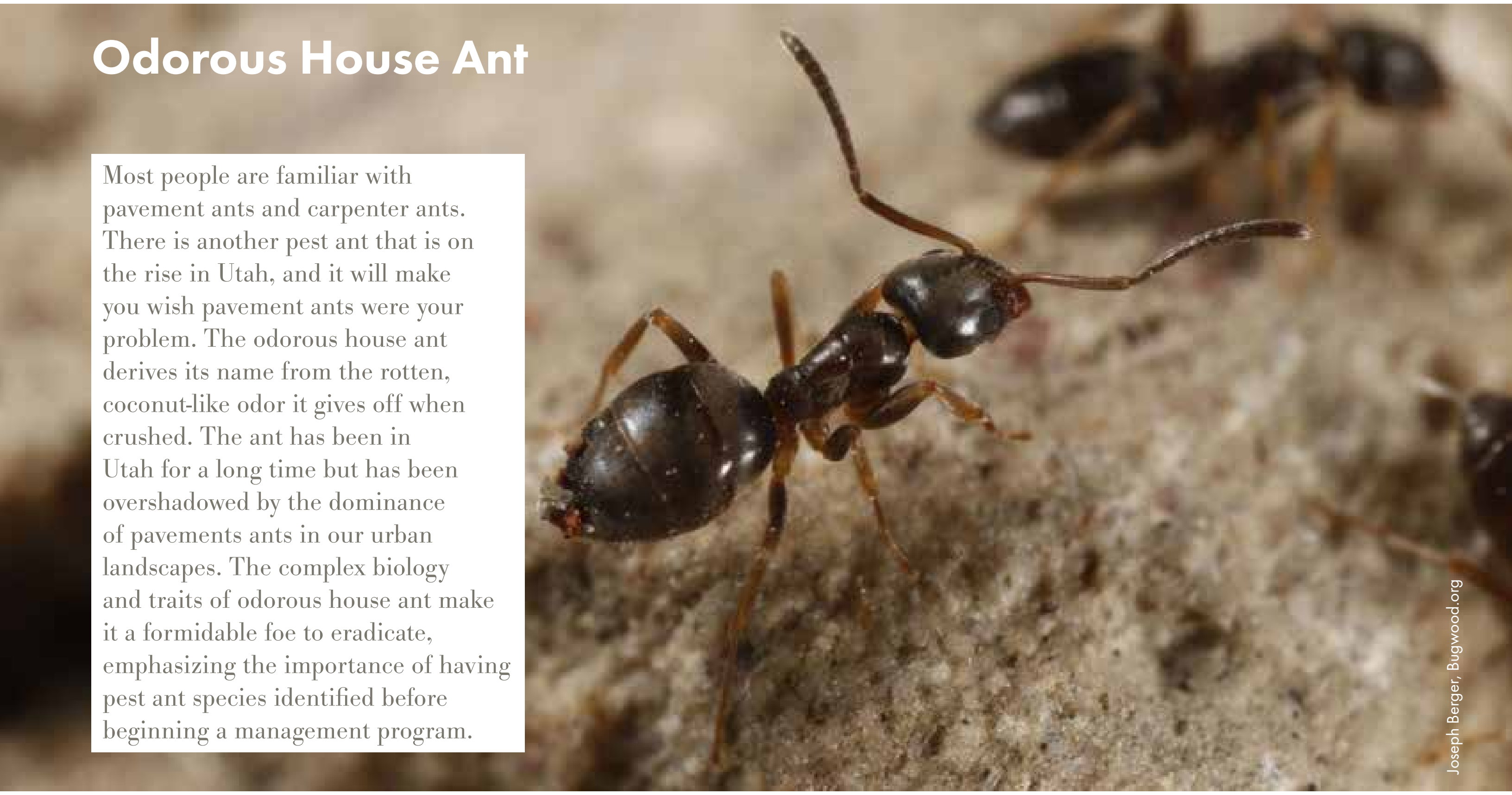
Westerfield, Robert and Kris Braman. Trap Cropping for Small-Market Vegetable Growers. University of Georgia Cooperative Extension Circular 1118.

Wszelaki, Annette and Sarah Broughton. Trap Crops, Intercropping, and Companion Planting. University of Tennessee Extension W235-F.

Examples of Trap Cropping in Vegetable Production

Cash Crop	Insect Pest	Trap Crop
Broccoli	Potato leafhopper (*Empoasca fabae*)	Various mustards[S]
Cabbage	Cutworm (*Spodoptera litura*)	Chinese cabbage, radish[C, S]
Cabbage	Diamondback moth (*Plutella xylostella*)	Various mustards[C]
Cauliflower	Colorado potato beetle (*Melighetes aeneus*)	Chinese cabbage, marigolds, sunflowers[M]
Cruciferous Crops	Flea beetles (*Phyllotreta* spp.)	Various mustards[C]
Cruciferous Crops	Cabbage maggot (*Delia radicum*)	Chinese cabbage[C], turnip[C]
Cucumber	Cucumber beetle (*Acalymma vittatum*)	Squash[C]
Cucurbit Crops	Cucumber beetle (*Acalymma vittatum*)	Specific varieties of cucurbit crops[C, S]
Cucurbit Crops	Cucumber beetle (*Acalymma vittatum*)	Squash[C, S, SA]
Sweet Potato	Wireworms (*Conoderus* spp.)	Corn and wheat[M, S]
Cucurbit Crops	Squash bug (*Anasa tristis*)	Hubbard squash[C, S]
Lettuce	Aster leafhopper (*Macrosteles quadrilineatus*)	Lettuce[S]
Lettuce	Thrips (Order Thysanoptera)	Various wildflowers[C]
Sweet Corn	Stink bugs	Various mustards[C, P]
Tomato	Colorado potato beetle (*Melighetes aeneus*)	Potato[S]
Tomato	Whitefly (*Bemisia argentifolli*)	Squash[C]

C – Conventional, **M** – Multiple, **P** – Perimeter, **S** – Sequential, Early, and/or Late Planting, **SA** – Semiochemical Assisted



Joseph Berger, Bugwood.org

Odorous House Ant

Most people are familiar with pavement ants and carpenter ants. There is another pest ant that is on the rise in Utah, and it will make you wish pavement ants were your problem. The odorous house ant derives its name from the rotten, coconut-like odor it gives off when crushed. The ant has been in Utah for a long time but has been overshadowed by the dominance of pavements ants in our urban landscapes. The complex biology and traits of odorous house ant make it a formidable foe to eradicate, emphasizing the importance of having pest ant species identified before beginning a management program.

Odorous house ants (Formicidae, *Tapinoma sessile*) are brown-to-black in color and the worker ants are equal in size (monomorphic), about 3 mm in length. When viewed from the top, the petiole (union of the thorax and abdomen; see image on next page) is obstructed by the rear of the ant's body (gaster). When viewed from the side, the petiole is difficult to see, flattened and laying under the gaster. In Utah, this ant is most likely to be confused with the pavement ant in and around structures. Pavement ants are similar in color and size but in contrast they have two readily visible nodes on the petiole. Aside from the appearance, they have a distinguishing characteristic that pavement ants do not have—when crushed, the odorous house ant gives off a rotten, coconut-like odor.

Odorous house ants are considered "tramp ants." They have multiple queens, can split colonies to form many subcolonies (budding), and are not hostile toward workers from related subcolonies, allowing them to take over large areas (supercolonies). These traits can make management more difficult than the single-queen pavement ants.

Odorous house ant colonies can vary in size and number of queens. Ant colonies located in natural habitats may be small, from 15 to 30 workers, whereas a colony with many queens, which often occurs in urban sites, can contain tens-of-thousands of workers. Supercolonies, which are friendly subcolonies connected by foraging ant trails, can take over large areas and can have hundreds-of-thousands of workers.

Odorous house ants are considered "tramp ants." Tramp ants include a number of species that have similar habits that make them difficult pests to control, including:

- multiple queens that all produce eggs
- multiple subcolony sites
- ability to form supercolonies
- hostility toward non-related ant species
- reproduction by budding
- living in close association with humans
- dispersal primarily by human activities
- varied diet
- wide range of nesting habitats

Colony reproduction occurs through mating flights and budding. Mating flights are infrequent but can occur in

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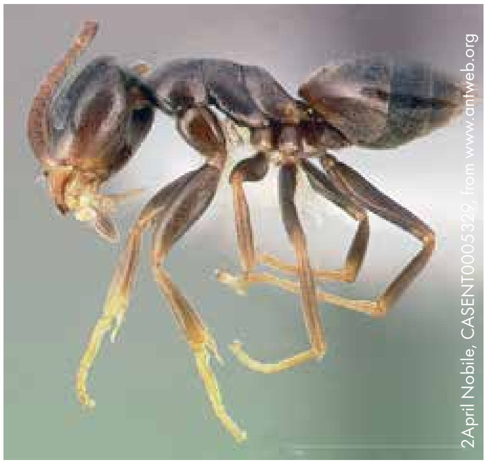
early- to-mid summer when winged males and females fly and mate. Males die after mating and mated females seek suitable habitat to start a new colony. Mating most commonly occurs within the nest between related ants. Odorous house ants also reproduce by budding or fission, where a queen and workers will carry brood from an existing nest across the landscape and start their own subcolony. This can happen naturally when populations become too large within the main colony, or it can be encouraged by human disturbance, such as inadequate insecticide applications.



Note that on the odorous house ant (***left***), the petiole (union of the thorax and abdomen) is difficult to see from the side, as opposed to the side view of a pavement ant (***right***), showing two nodes on the petiole.

As a tramp ant, odorous house ants are opportunistic, and can nest in many sites; however, moist, shady areas near food are preferred. Outside, they frequently make shallow nests in the soil under objects. Indoors, moisture and heat are key components to nesting habitat. Nesting sites can vary in location and may move frequently in response to human activity or changes in environmental conditions. Areas once occupied by odorous house ants that were disturbed are likely to be reoccupied once the disturbance ends. Nests are often connected by vast foraging trails where ants share food, brood, and workers. Ants found indoors may originate from outside, and in one instance, were found traveling over 150 feet along a foraging trail in search of food indoors.

Their diet consists of dead insects (protein) and sweet foods, particularly honeydew produced by insects such as aphids and soft scales. They also feed on food inside structures, but do not like fat-based foods.

Managing odorous house ant in and around structures is challenging. The presence of multiple queens means that any surviving queen can continue laying eggs, and in addition, any surviving ants can re-colonize previously-treated areas. And finally, foraging ants may originate from off property, or supercolonies may extend beyond the management property boundaries.

The key to successful management is to use an integrated approach that combines the following. The USU fact sheet, Odorous House Ant, provides in-depth details of each step below.

- Inspect to locate foraging ants and nests
- Identify ants to species
- Eliminate preferred nesting habitat (moist sites)
- Eliminate food sources (honeydew-producing insects and household food)
- Exclude by sealing cracks and holes in structures
- Apply insecticides
    - o Drench nests with a water-based insecticide
    - o Perimeter application with a non-repellent insecticide that ants will distribute into nests. Some examples of commercial non-repellent insecticides (for odorous house ants) include Termidor, Fuse, Taurus, Premise, and Optigard Flex.
    - o Use sweet liquid ant baits (preferred) along with granular and gel formulations along ant trails, near nests, or where ants are active. Some active ingredients found in ant baits include fipronil, indoxacarb, imidacloprid, boric acid, borax, abamectin, and hydramethylnon.
    - o The USU fact sheet, Odorous House Ant, provides a list of chemical options for the management of odorous house ant.

Keep in mind that follow-up inspections and repeated management activities may be necessary to effectively manage odorous house ant.

——— Ryan Davis, Arthropod Diagnostician

For more information

Hedges, S. A. 2010. Field Guide for the Management of Structure Infesting Ants. 3rd Edition. Richfield, Ohio: G.I.E. Inc.

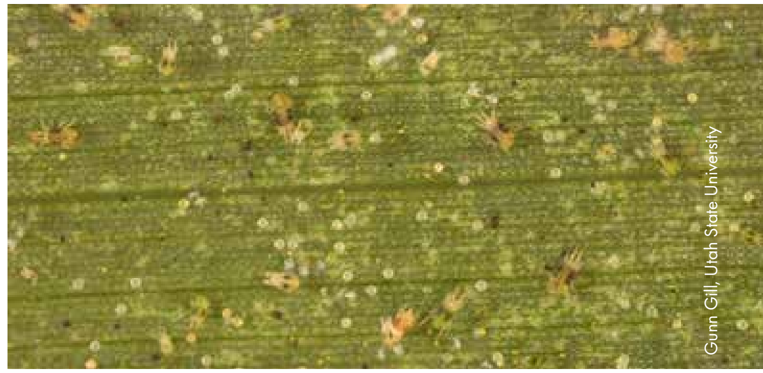
Scharf M. E., Ratliff C.R., Bennett G. W. 2004. Impacts of Residual Insecticide Barriers on Perimeter-Invading Ants, with Particular Reference to the Odorous House Ant, *Tapinoma sessile*. Journal of Economic Entomology, 97(2), 601-605.

The Season of Pest Busts and Booms

Dramatic swings in weather conditions are predicted to increase as a result of climate change. For the last several years in Utah, mild winters, reduced snow pack, unseasonably warm springs and dry summers have dominated. 2019 deviated from this pattern with long-lasting snow pack, a cooler and wetter spring, and unseasonably warm temperatures later in the summer. The spring weather pattern not only delayed planting dates for crops like corn, and slowed green-up of alfalfa, but also slowed activity of the usual suspects in those crops such as alfalfa weevils and spider mites. Insect and mite body temperature fluctuate with ambient temperatures. During cool temperatures, insect activity–including reproduction–slows down, and it is only during the warmer parts of the day and year that they become noticeable.

For alfalfa weevil, the cooler spring delayed adult emergence from overwintering locations. This resulted in eggs being laid later, later hatch, and slower larval development. As a result, growers were able to harvest the first alfalfa crop before weevil populations reached a threshold. A map-based web tool provides alfalfa weevil sweep-net sampling (video) numbers in Utah, through a collaboration with Montana State University to investigate alfalfa weevil activity and thresholds. In cases where weevils were approaching threshold (>16 larvae/sweep), larvae were small, and still in the early growth stages. Even in cases where alfalfa cutting was delayed due to excessive rains, there did not appear to be major yield losses from weevil feeding. (Although in some cases, weevil larvae concentrated in windrows.) Alfalfa weevil has just one generation per year, and after harvesting the first crop, many fields escaped weevil damage this season.

Many areas were also spared spider mite problems. We typically see high populations because during hot, dry conditions, mites have short generation times and feed more because low humidity evaporates the excess water that they excrete. In addition, dust build-up on foliage hinders mite predators, and water-stressed plants have a higher availability of amino acids that provide nutrition to spider mites. But in 2019, the cool spring temperatures slowed the progression of spider mites in corn. Rains that continued through early summer removed dust and physically washed spider mites from plants. Further, the added moisture in the environment increased humidity, and reduced population growth of spider mites that prefer dry conditions. With harvest that has come and gone, it is important to note that the economic benefit of miticides diminishes after the plant reproductive phase (R2). There are several considerations before applying mite treatments in corn, but this season it appears many did not fit the criteria that would require spider mite treatments.



Although spider mites and their eggs were seen in 2019, populations remained low most of the season (***top***).

The Say's stinkbug was found covering plants and buildings (***bottom***). Treatment threshold on small grains is 3-4 adults per 100 sweep samples.

While some pests found the 2019 weather conditions less suitable, there were other insects that thrived. For instance, various green stink bug species were found in large aggregations in public areas, such as outside walls of businesses in St. George to a gas station in Smithfield, Utah, and in small grains. False chinch bug and Mormon crickets were other insects found in large numbers around corn and alfalfa fields in the region. Generally, these insects were more of a nuisance in field and forage crops and were not associated with major yield losses.

—— Ricardo Ramirez, Extension Entomologist

IPM In The News

Incentive to Plant Flower Strips

Researchers at Montana State University investigated an incentive plan for planting flower strips to promote pollinators, where farmers recoup costs by collecting and selling the wildflower seeds. The three-year study was conducted on four vegetable farms in Montana. The team planted nine native perennial wildflower species in strips next to crop fields. Each wildflower strip was replicated 27 times, and three replicates of each of the nine flower species were planted. They not only observed bee populations on the flowers, but also determined all costs for establishing the flower strips, including all materials and all the labor for planting, weeding, harvesting, and processing, and compared them to the seed sales. They observed 202 species of native bees in the study, most of which used the wildflower strips to collect nectar or pollen. The cost-benefit analysis revealed that all of the tested farms would make a profit by selling seeds retail, but none would profit if they sold seeds wholesale.

Unique Study Using Essential Oils

Swede midge is a recent invader attacking brassica plants in northeastern U.S. and in Canada. Larval feeding causes distorted growth, headless broccoli and cauliflower, and brown scarring, in some cases causing total crop loss. Unfortunately, the damage is not seen until long after the midge has left the plant. Some farmers have stopped growing brassica crops. This led entomologists at the University of Vermont to seek alternative control options. They identified essential oils from 18 plants that vary in their degree of relatedness to brassica host crops and found that midges were less likely to lay eggs on broccoli plants treated with the essential oils, compared to untreated plants. In fact, the adults avoided flying towards plants with certain oils more than others. In general, the oils from plants that were more distantly related to brassicas were more likely to repel the midge. For swede midge, garlic appears to be one of the most promising repellents, particularly because certified organic products using garlic are already available for growers. The study, published in *Scientific Reports*, is the first to show how the similarity of plant odors and species relatedness can predict insect repellency.

Pesticide Delivery by Bees

Over the past several decades, research has shown that the mycoparasite (an organism that feeds on other fungi), *Clonostachys rosea*, can control several fungal plant diseases including early blight of potato and black rot of citrus. The use of *C. rosea* as a fungicide was recently approved by the EPA in a product called Vectorite with CR-7, manufactured by the Canadian company Bee Vectoring Technologies (BVT). The fungicide will be combined with pollination services and "delivered" to plants by honey bees or bumble bees. Crops to be included on the label include strawberry, blueberry, apple, tomato, canola, and sunflower.

Vaccinating Plants

Scientists at Martin Luther University Halle-Wittenberg, the Leibniz Institute of Plant Biochemistry and the National Research Council in Italy report in *Nucleic Acids Research* that they have developed a method for vaccinating plants against viruses. In nature, a virus multiplies within plant cells, creating viral ribonucleic acid molecules (RNAs). As a response, plants initiate a process to protect itself from the virus both at the site of the infection and throughout its structure by producing "small interfering RNAs" (siRNAs) that, with a special protein complex, dismantle and break down the viral RNAs into harmless compounds. The research team has discovered a novel way to identify the few effective antiviral siRNA molecules for different viruses and harness them as plant vaccines. The process was effectively tested using a virus on tobacco, where 90% of the vaccinated plants were disease-free and 100% of untreated plants died. A patent application has been filed for the method. Further studies will clarify how vaccines can be produced in larger quantities and how they can be applied to or absorbed by plants.

Nematodes for Plant Resistance

Researchers at Boyce Thompson Institute (BTI) at Cornell University, published in *Journal of Phytopathology*, that a metabolite from certain plant-pathogenic nematodes helped protect major crops from various pathogens. The compound, named ascr#18, is an ascaroside, which is a group of compounds used by many soil-dwelling species of nematodes for chemical communication. The researchers found that when ascr#18 was applied to soybean, rice, wheat, and corn plants, it induced a resistance response to the specific virus, bacteria, fungus, or oomycete that they were inoculated with, as compared to the untreated plants. The team's previous studies showed the same results in tomato, potato, and barley. This discovery is being commercialized by a BTI and Cornell-based company, Ascribe Bioscience, as a family of crop protection products.

Featured Picture of the Quarter

The geometric lesions on these garlic leaves is the disease, Stemphylium leaf blight, caused by the fungus *Stemphylium versicarium*. Symptoms begin as small, yellow-to-brown spots that coalesce into diamond-shaped lesions.

The disease is rare in Utah, especially on garlic; however, the cool, wet spring of 2019 led to infections in a few commercial garlic and onion fields. Thankfully, farmers reported minimal crop loss, as this disease only affects the foliage and not the bulbs. Growers were advised to rotate to other crops because the pathogen overwinters on the slightest residue in the soil.

——— Image by Nick Volesky, Vegetable IPM Associate

New Publications, Websites, Apps

Urban Landscape Entomology is a new book that serves as a practical guide and resource for turfgrass and ornamental pest management.

The Organic Farming Research Foundation (OFRF) released Understanding and Optimizing the Community of Soil Life, the ninth topic in its Soil Health and Organic Farming Series of free guidebooks and webinars

OFRF has also introduced a free, self-paced, online course on Organic Soil Health Management. Although the content focuses on specialty crops in California, much of the information is practical for Utah.

Developing Insect Pest Management Systems for Hemp in the United States is a comprehensive paper that describes the key pest species currently identified on hemp. The lead author, Whitney Cranshaw of Colorado State University, has also launched the Hemp Insect Website which includes fact sheets, images, image submission, and pesticide and regulatory information.

Integrated Pest Management Strategic Planning: A Practical Guide is a publication from Oregon State University. It outlines the method of IPM strategic planning, which produces a living document that describes the major pests, challenges, and critical needs, and can be used for agricultural industries or other pest management setting.

Biology and Management of Clover Root Curculio, written by USU entomologists and published in *Journal of Integrated Pest Management*, is the first review of this important pest since the mid-1900s.

Insect Repellent Essentials: A Brief Guide is an infographic-driven pamphlet that provides information on how repellents work, when to use them, common misconceptions, and currently available repellent ingredients.

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