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UTAH PESTS QUARTERLY

NEWSLETTER

Utah Plant Pest
Diagnostic Laboratory

USU Extension

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Caterpillar Pests of Brassica Vegetables

Ergot on Grasses and Small Grains

Dominique Jacquet, Wikimedia Commons

Barley with dark, large, hard survival structures produced by the ergot fungus, *Claviceps purpurea*.

In summer 2016, an extension agent brought a sample of wheat grass to the Utah Plant Pest Diagnostic Lab, and suspected ergot. The story of this identification was featured on KSL news. Many people are not familiar with ergot because generally, it is not a problem in commercial small grain production.

Ergot is a fungal disease caused by *Claviceps purpurea*. The name ergot also refers to the dark, large, hard survival structure the fungus produces. The ergots germinate in early spring and produce fruiting structures that release sexual spores (ascospores). These spores are wind-dispersed onto grass or small grain flowers, and if they come in contact with the ovaries or stigma of the flowers, they cause infection. The fungus then colonizes the ovaries and within five days, the fungus releases sticky, sweet droplets of asexual spores. These spores are dispersed by water or insects to neighboring flowers and cause secondary infections. Within a few weeks, the grain plants' infected ovaries become replaced by the curved ergots, allowing the pathogen to survive the winter. The ergots can also survive in the soil for up to a year.

There is quite a history behind ergot, mainly related to human consumption. The ergots contain alkaloids (precursors to LSD) that cause serious health problems in both animals and humans when ingested. The symptoms range from hallucinations and manic behavior, to a sensation of burning skin due to constriction of blood vessels.

Until the mid-1800s, the fact that fungi can cause plant diseases, and produce structures like ergots, was not recognized. Often, the ergots were mixed with the rye grain and ground into flour, and were readily consumed. Historians attribute the strange behavior of people in Europe and North America before that time to the consumption of the contaminated rye bread. Some believe that ergot played a role in the behavior that spurred the witch trials.

A disease of the middle ages called St. Anthony's fire is also now attributed to ergot ingestions. The name of

continued on next page

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Ergot on Grasses and Small Grains, continued

Symptoms of ergot on rye.

the disease comes from the burning sensation that patients experienced, often followed by gangrene and loss of limbs. During an outbreak in France in the year 1039, a hospital was built to care for the patients, and it was dedicated to St. Anthony.

Ergot infections of rye became very rare with the widespread introduction of fungicides in the 20th century. Today, it rarely causes disease in humans but can still cause disease in animals who feed on infested pastures.

The fungus needs cool, wet weather in spring for infection. Small grains are most susceptible if pollination is delayed due to wet and cool weather. Once the flower is pollinated, it is no longer susceptible.

— Claudia Nischwitz, Extension Plant Pathologist

INVASIVE PEST NEWS AND INFORMATION

European Cherry Fruit Fly: A New Invasive Pest in North America

delta-inkey.com

The European cherry fruit fly (ECFF), *Rhagoletis cerasi*, is a major pest of cherry crops in Europe, and was confirmed for the first time in North America in Mississauga, Ontario in June 2016. ECFF probably arrived to Canada via fresh cherries imported from Europe. It is not known to occur within the U.S., but is regularly intercepted at U.S. ports of entry. Its host range includes cherry (*Prunus* spp.), honeysuckle (*Lonicera* spp.), and snowberry (*Symphoricarpos albus*), and the predicted geographic range includes nine USDA plant hardiness zones (2-10).

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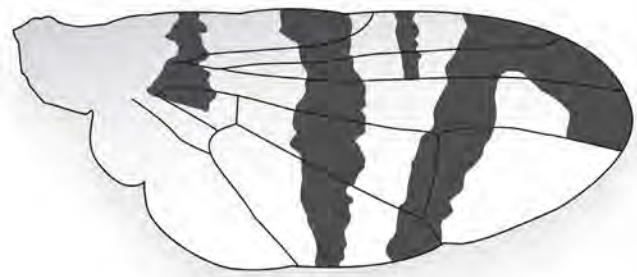
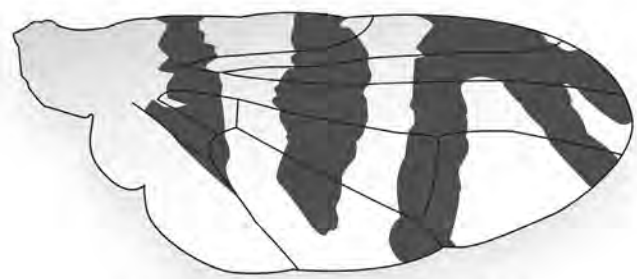
European cherry fruit fly; note the yellow dot and distinguished wing pattern.

ECFF occurs throughout central and western Europe, the Middle East, and temperate regions of Asia. It is a close relative of the western cherry fruit fly (*R. indifferens*), which is the most important pest of sweet and tart cherries in Utah. The two species are distinguished by coloration and wing patterns. ECFF has a black body with yellow spots on the thorax (midsection) and head, transparent wings with four dark blue-black stripes, and is about 1/8 - 3/16-inch long. The western cherry fruit fly has a black body with white bands on the abdomen, transparent wings with a banding pattern that appears as a malformed letter "F", and is about 1/5-inch long.



European Cherry Fruit Fly



Western Cherry Fruit Fly

Like western cherry fruit fly, ECFF has one generation per year. It overwinters as a pupa in the soil. Adults are active from late May to early July during hot, dry conditions, and live 16 to 35 days, depending on temperatures. Mated females use their ovipositor to insert eggs into mid- and late-ripening fruit and prefer fruit that are in full sun. Females usually lay only one egg per fruit, but can lay 30-200 eggs in their lifetime. Eggs hatch in one to two weeks, and the larvae feed on the flesh of developing fruit for about four weeks. Damage will appear as soft, brown spots and exit holes will become visible as larvae vacate the fruit. In Europe, feeding damage results in fruit losses of up to 100% if left uncontrolled.

European cherry fruit fly damage to cherries.

During the summer of 2017, the Utah Cooperative Agricultural Pest Survey (CAPS) team will monitor several northern Utah cherry orchards for ECFF, in addition to other invasive pests such as brown marmorated stink bug and spotted wing drosophila. We will present the results during our annual grower conferences and on our Utah Pests CAPS website. If you have any questions or interest in having your farm scouted for invasive fruit pests, please contact Dr. Spears at lori.spears@usu.edu.

— Lori Spears, USU CAPS Coordinator

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Carroll, L.E., I.M. White, A. Freidberg, A.L. Norrbom, M.J. Dallwitz, and F.C. Thompson. 2002. Pest fruit flies of the world. Version: 8th December 2006.

Molet, T. 2011. CPHST Pest Datasheet for Rhagoletis cerasi. USDA-APHIS-PPQ-CPHST. Revised May 2016 and October 2016 by H. Moylett.

USDA-APHIS. 2011. European cherry fruit fly. USDA – Stone Fruit Commodity-Based Pest Survey.

Winter Home-Invading Flies

It can be surprising to see flies in your home or office during the cold winter months. Indoor flies in the winter are usually of two types: those that are overwintering ("resting") or those that are established breeding populations. While both groups are primarily a nuisance, there is always a small risk of flies transmitting human pathogens when they land on food or food preparation areas. In Utah, there are several species of flies that may occur indoors in the winter, some worse than others.

Fungus Gnat

Fungus Gnats (Sciaridae & Fungivoridae)

Fungus gnats are a very common indoor fly. Adults are small (1/16 – 1/8"), with long, clear- to smoky-colored wings and long legs. They are weak fliers and are often found in close proximity to potted plants or near windows. Blowing on the leaves and potting mix of plants may cause adults to fly. Adults lay eggs on moist organic material or soil.

Fungus gnat larvae are whitish-clear with dark black head capsules. They live in the soil of potted plants, feeding on root hairs, fungi, or organic matter. Larvae thrive when soil/potting mix is over-watered or drainage is poor. They pupate within the soil. Fungus gnats can complete one generation in two to three weeks and can develop continuously indoors.

Drain (Moth) Fly

Drain (Moth) Flies (Psychodidae)

Drain flies, also called drain moths, filter, or sewage flies, are also commonly found indoors in winter. They are tiny flies (1/6") that have a hairy, moth-like appearance and long antennae. Adults are typically seen in bathrooms or kitchens or weakly flying a few feet at a time, sometimes emerging from drains. Larvae live within drains and pipes, feeding on the organic scum lining. Larvae may also occur in sump pumps, leaking sewer pipes and crawl spaces, aquarium filters, infrequently used toilets, and anywhere moisture and organic material persist.

Drain flies complete a generation in one to three weeks, and adults can live for two weeks. Never pour pesticides, chemicals, or boiling water down drains in an attempt to manage drain flies – the larvae are protected by the scum layer. Clean and maintain drains using a stiff pipe brush and enzymatic drain cleaner. To monitor, spread vasaline on the inside of a plastic cup and place over suspect drains.

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Humpbacked flies

Humpbacked Flies (Phoridae)

Humpbacked flies, also called phorid, coffin, or scuttle flies, are tiny flies (up to ¼"). They are tan to brown or black and have an arched back (thorax) when viewed from the side. Humpbacked flies have a characteristic movement pattern where they run along surfaces, stop, and then run again.

Humpbacked flies feed and breed on moist, decaying material, including in potted plants, drains, garbage or garbage cans, cracks in kitchen floors, crawl spaces, under slab foundations, garbage disposals, cut flowers, and anywhere where moist conditions and organic materials exist. Their life cycle can take a month or longer to complete.

Cluster Fly

Face fly

Cluster Flies (Calliphoridae and Face Flies (Muscidae)

Of the larger flies encountered indoors, cluster flies and face flies are most common. These flies do not breed indoors, but enter the home in the fall as temperatures decrease. They seek shelter by squeezing through cracks and crevices on the sunny sides of structures. They remain as adults throughout the winter in a semi-dormant state, hiding in groups in wall voids, attics, false ceilings, and other hidden places. On warm winter or early spring days, some flies will emerge and accumulate on window sills, attracted by light.

Cluster flies are about 5/16" and are distinguished by the golden yellow hairs located on the top and side of the thorax and a checkerboard-patterned abdomen. During the summer, cluster flies live outdoors and lay their eggs in cracks in the soil of lawns and fields. Larvae move through the soil searching for earthworms to parasitize. There can be up to four generations per summer.

Face flies are very similar in appearance to house flies, with 4 black stripes on the thorax. They are distinguished from house flies by the presence of a row of bristles on the base of the wings. (Identification is best done by a trained entomologist.) Face flies can be a particular issue in areas around dairies. Larvae feed in fresh cow manure and adults feed on bovine eye, nostril, and mouth discharge. One generation is completed in about two to three weeks.

Management of Indoor Flies

Fungus Gnats	Drain & Humpbacked Flies	Cluster Flies & Face Flies
• Allow the surface of potting media/soil to dry between waterings. • Keep plant saucers clean. • Do not use infested media or soil. • Do not bring infested pots or planters inside. • Apply *Bacillus thuringiensis* subsp. *israelensis* (Gnatrol) to soil.	• Scrub drains with a stiff pipe brush and maintain with an enzymatic drain cleaner. • Wash and scrub floors where organic material may build up. • Inspect for and repair broken sewer lines, pipes, etc.	• Exclude flies by sealing exterior entry points. • Assure that screens are tight-fitting and weather stripping is in place. • Vacuum large clusters of flies or random flies that enter the living space. • Manage cow manure for fly larvae (face flies).

Ryan Davis, Arthropod Diagnostician

Preventing Bird Damage in Fruit Crops

Losses due to birds is becoming more and more of an issue in Utah's fruit and nut trees. A study in Michigan found that the average per-acre damage ranges from $91 in tart cherries to $763 in Honeycrisp apples. In addition, their research showed that damage is worse in low-yield years.

Birds in Utah that cause damage include starling, robin, crow, red-wing blackbird, house finch, and cedar waxwing. Starlings can cause extensive damage because they travel in huge flocks, pecking at fruits, or eating them whole. House finches peck at fruit, leaving small irregular nicks. Robins feed heavily on small fruits and cherries, often causing substantial damage. Most of these birds also feed on insects, but cedar waxwings can survive several months on fruit alone.

There are three key points to remember for the most effective bird control for the 2017 season:

- Introduce scaring devices up to a month before fruit ripens. This helps to prevent birds from establishing a habit of visiting the site.
- Combine multiple practices.
- Rotate practices regularly to prevent habituation.

Netting

Netting provides the best protection, but it is cumbersome and expensive. With proper care, the netting may last three to ten years. There are a variety of netting materials available, and the mesh size should be selected based on the pest bird species in the area.

Netting works best when installed over the crop on top of sturdy posts. When the tops of posts have a smooth covering (inverted milk jug or solo cup, rubber inner tubes, etc.), netting application is easier and the net is protected as it moves in the wind.

Air Dancers

Research in Michigan has showed that air dancers—those unsightly used-car lot gimmicks—actually provided decent bird control in commercial cherry orchards. The scientists found the best results when the dancers moved every 15 minutes, and when their position in the orchard was relocated every few days. The downside to air dancers is that they require electricity to operate, costing up to $325 for the season.

Top: Bird damage to apple fruit. Common birds that cause damage to Utah fruit crops are starlings, robins, crows, red-wing blackbirds, house finches, and cedar waxwings.

Bottom: Netting on orchard trees provides the best protection from bird damage, but can be cumbersome and expensive. However, with proper care, netting materials may last three to ten years.

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Bird damage to peach (top), pear (middle), and cherries (bottom).

Birds of Prey

Once a raptor starts circling a field, problem birds leave the area very quickly. Some commercial growers hire a falconer to keep birds away, but this option is quite expensive. In addition, the effect only lasts as long as the raptor is airborne. In some Washington cherry orchards, the use of kestrel nesting boxes has shown success in managing problem birds.

Visual Deterrents

Visual deterrents should be used with other mechanisms, as birds do not react to them as much as they react to noises, and birds quickly learn to ignore them. There are two general groups of deterrents: those that simulate predators and those that are shiny and reflect light.

Predator simulators include fake birds with moving parts (such as SOL-R Action Owl), hawk-shaped kites, and predator bird drones (such as those from BirdX). Shiny deterrents include scare-eye balloons, scare tape, flashing lights, and mirrors. Most of these should be suspended both above and within the crop and allowed to move freely with the wind to look more realistic.

Noises

Most bird-control noises (bangers, crackers, poppers, bombers, sirens, etc.) rely on perceived danger for their effect. Some growers have permits to shoot propane cannons or guns. Newer noise devices mimic bird alarm calls (BirdX, Bird Gard). Species-specific alarm calls alert nearby birds to the presence of danger, and the response is immediate flight of the pest birds. The calls have a longer-term impact than loud noise-makers and habituation can be prevented by moving the device every one to two weeks.

All noise devices should be set to go off at random intervals of less than three minutes, and should be supplemented by visual deterrents. The downside of noise-makers, of course, is "neighbor relations."

——— Marion Murray, IPM Project Leader

For more information click the links below or search the internet for:

Managing Bird Damage in Crops, Ontario Crop IPM

Ontario Fruit and Vegetable Growers' Association

Bird Damage Prevention for Northern New England Fruit Growers, University of New Hampshire Extension

Severe Curly Top Virus in 2016 Vegetable Crops

The summer of 2016 brought heavy infections of beet curly top virus (BCTV) in tomato and other vegetable crops. BCTV is a chronic disease in southern Utah, but its intensity is more variable in the north. Why was it worse this year? It may be that the insect vector, beet leafhopper (BLH), was more abundant. Although we have not tracked year-to-year BLH populations, we did detect BLH later in the season than they typically occur. Another reason may be that susceptible vegetable varieties without resistance to BCTV, were heavily planted. And finally, hot temperatures starting in early June may have dried out weed hosts, and prompted BLH to move into vegetable fields and gardens earlier, and in greater numbers than usual. In northern Utah, we saw the virus on tomato, bean, squash, and gourds.

Plant Hosts

Beet leafhopper has adapted to a wide range of host plants in Utah, including many weeds: mustards, kochia, Russian thistle, lambsquarters, filaree, plantain, pigweed, pepperweed, borage, saltbush, verbena, shepherd's purse, sagebrush, and rabbitbrush. Crop hosts include sugar and table beet, tomato, pepper, potato, bean, Swiss chard, spinach, flax, and cucurbits (melons, squash, pumpkin, gourds, and cucumber).

Most of the crop and weed hosts listed above for BLH are also hosts for BCTV.

Infection and Disease Cycle

BLH feeds on weeds as it migrates northward from overwintering sites in the south each summer. Although sugar beet is the preferred host, BLH does not distinguish host type until 45 minutes after a trial feeding period. BLH finds a preferred host by random movement and sample feeding, causing infection of several non-preferred hosts along the way.

BLH transmits the virus in a persistent manner (the virus resides within the insect's body), in some cases for as long as a 3-month period. After the leafhopper acquires the virus, it needs a latent period of at least four hours before it can transmit the pathogen (the most efficient transmission occurs after 48 hours). Infection of host plants can occur within as little as one minute of feeding.

There are three or more generations of BLH per season.

Beet leafhoppers are about 0.12 inch long with a pale green to tan colored body and dark markings. Nymphs and adults may cause damage to plants by feeding, but they are a serious pest because they vector beet curly top virus.

Virus Symptoms

BCTV-infected plants typically occur randomly due to the sporadic movement of the leafhopper as it feeds. Some plants may exhibit severe symptoms, while others are asymptomatic (many species of weeds). Plants affected early in their growth may quickly die.

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Typical symptoms of BCTV include:

- small, copious leaves that twist and curl, often with purple veins
- thickened, stiff, and crisp leaves
- blister-like swellings (resembling small galls) on the veins on the underside of leaves
- yellowing and death of mature leaves
- downward curling petioles
- small fruits that ripen prematurely
- reduced fruit quality and yield
- stunted growth
- phloem necrosis of the taproot which appears as dark concentric rings in cross section, or linear streaks in longitudinal section





TOMATO: Common BCTV symptoms in tomato include patchy plant infection, stunted plants, yellow and twisted leaves, purple leaf veins, and small, prematurely ripening fruits.



PEPPER: Although BCTV-infected pepper plants were few in 2016, infections have been observed in past years.



BEAN: Beans infected by BCTV show yellow and necrotic lesions on leaves, and stunted growth.

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SQUASH: Common BCTV symptoms in squash include yellow and crispy leaves that turn brown and shrivel.

Management

BCTV is a challenging disease to manage. In vegetables, insecticide applications directed at leafhoppers are ineffective. The primary strategies are prevention and rapid response by rouging out infected plants. However, even these strategies may be inadequate in years with high pest pressure.

- *Rouge out infected plants immediately upon detection.*
- *Exclude leafhoppers with floating row cover.* Row covers (e.g. Reemay) for the first 6-8 weeks of planting or throughout the season is one of the most effective management practices.
- *Destroy and remove plant debris.* In southern Utah, weeds and volunteer plants from previous crops can act as overwintering hosts for the leafhoppers and virus. In northern Utah, weeds from field borders and interiors provide food sources for incoming infected leafhoppers.
- *For tomatoes, plant resistant varieties.* Trials in St. George, Utah showed that 'Rowpac', 'Roza', 'Salad Master', and 'Colombian' performed well.
- *Use dense plant spacing.* In general, dense plantings make it more difficult for leafhoppers to find feeding sites, as they seem to prefer widely spaced plants where there is a sharp contrast with the surrounding soil.
- *Shade plants.* Tomatoes and peppers protected by shade cloth tend to attract fewer leafhoppers.
- *Intercrop or 'hide' susceptible hosts among non-susceptible plants.* Intercropping has been reported to reduce levels of curly top.

Diane Alston, Entomologist
Cami Cannon, Vegetable IPM Associate

For further reading on BLH and BCTV, click the links below or search the internet for:

Curly Top of Tomato, USU
Beet Curly Top Virus in Commercial Tomatoes, Colorado State
Beet Curly Top Virus, Robert L. Gilbertson, UC Davis
Beet Leafhopper on Tomato, UC Davis
Beet Leafhopper, Circulifer tenellus, Oklahoma State

References:

Cook, C. 1967. Life history, host plants, and migrations of the beet leafhopper in the western United States. Agricultural Research Service, USDA. Technical Bulletin No. 1365.

Harveson, R. M. 2015. Beet curly top: America's first serious disease of sugar beets. APS Features. doi:10.1094/APSFeature-2015-02.

Munyaneza, J. E. and J. E. Upton. 2005. Beet leafhopper (Hemiptera: Cicadellidae) settling behavior, survival, and reproduction on selected host plants.

Thomas, P.E., and R.K. Boll. 1977. Effect of host preference on transmission of curly top virus to tomato by the beet leafhopper. Phytopathology 67: 903-905. Journal of Economic Entomology 98(6): 1824-1830.

In the National News

IPM for Pollinator Protection

Large-scale declines in wild pollinators have been documented in northern Europe and North America. To address this issue, an international team of researchers recently proposed in the journal, *Science*, ten policies that governments should enforce. Promotion of IPM was top on the list, with other suggestions including: increasing pesticide regulatory standards, including indirect and sublethal effects in GMO crop-risk assessments, regulated movement of managed pollinators, and conservation of pollinator habitat greenways. In addition, they recommend that government leaders support diversified farming systems, develop long-term monitoring of pollinators and pollination, and fund pollinator research.

Stricter Regulations for RUPs

In December 2016, the EPA announced it is finalizing standards for application of restricted-use pesticides (RUPs) that require special handling, and that are not available for purchase by the general public. The stricter standards would require all people who are certified to apply RUPs to be at least 18 years of age, with renewal every five years. Special licenses will be required for certain methods such as fumigation and aerial application methods. In addition, those working under the supervision of certified applicators will receive training to use pesticides safely and prevent "take-home" exposure.

Potential New Varroa Mite Pest

Purdue University entomologists report in the journal, *BMC Genomics*, that populations of *Varroa jacobsoni* mites in Papua New Guinea are shifting from feeding and reproducing on Asian honeybees—their preferred host—to European honeybees, the primary species for crop pollination. Sixty years ago, *V. destructor* made this same host leap. Varroa mites are relatively large compared to bees. They feed on bees' hemolymph (the rough equivalent to blood), leaving behind open wounds that are susceptible to infection. They can also transmit diseases such as deformed wing virus and have been linked to colony collapse disorder. The authors stress that vigilance is needed to protect European honeybees worldwide from further risk.

Two Biocontrols Reduce Grass Weed in Texas

Giant reed (*Arundo donax*), which is thought to be native to eastern Asia, is an invasive weed occurring along the Rio Grande in Texas. The 30-ft tall grass clogs streams and irrigation channels, weakens river banks, reduces native vegetation and wildlife habitat, and impedes law enforcement activities. These negative impacts spurred quick action for a solution. In 2009, researchers from USDA Agricultural Research Service released both arundo gall wasps (*Tetramesa romana*) and arundo scale insects (*Rhizaspidiotus donacis*) as a biocontrol program. Since then, monitoring of the weed population over more than 550 river miles has shown success. Surveys taken in 2014 documented a 22-percent decrease in plant biomass and surveys in 2016 show a further decrease of 28 percent, along with a significant recovery of native riparian vegetation.

New Host for EAB

Emerald ash borer (EAB) is an invasive pest that primarily attacks ash. In 2014, entomologists at Wright State University discovered that EAB was also attacking white fringetree. Those same scientists have recently reported that in laboratory experiments, EAB can successfully complete its life cycle and cause damage in Manzanilla olives, a Spanish variety that yields green table olives. Olive, ash, and fringetree are all in the same plant family (Oleaceae). The next steps for the researchers are to determine if adult EAB are attracted to olive trees in the wild, if they will lay eggs on the trees, and if they can survive by feeding on the leaves.

New Bee Identified in Utah

Utah State University graduate student Michael Orr, along with the help of retired entomologist Frank Parker, recently named a new solitary bee species. About 40 years ago, Parker collected bee specimens from Goblin Valley, Utah, that were nesting in the sandstone, but never identified the species. Parker curated the bees and nests in the USDA's National Pollinating Insects Collection, and there they sat until Orr made a similar discovery. Orr observed the sandstone nests at the Grand Staircase-Escalante National Park, and then after searching through the USDA collection, came across Parker's specimens. After further investigation of sandstone bee habitat in the southwest, Orr and his colleagues named the fuzzy, gray bee *Anthophora pueblo* in recognition of ancestral Puebloans. This bee is among just six species (out of more than 20,000 bees) that nest in sandstone.

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In the National News, continued

Explanation of Increasing Mosquito Populations

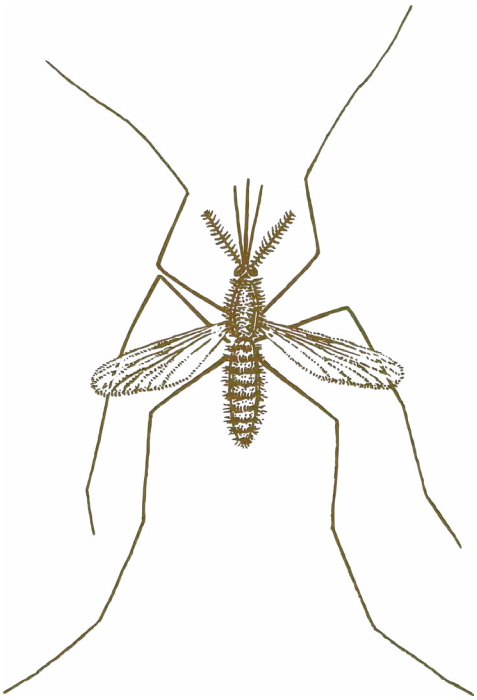
Since the 1950s, mosquito populations in New York, New Jersey, and California have increased ten-fold. Some have suggested that increasing temperatures is a driving force, but a new study published in *Nature Communications* found other reasons. A team of research entomologists found that changes in land use (urbanization) and a gradual waning of DDT concentrations in the environment have helped mosquitoes to survive in larger numbers. Urbanization is an important factor because it changes the species composition, favoring the types of mosquitoes that live near people. The authors found that the DDT applications, which were banned in 1972, reduced mosquitos significantly, and that in some areas, it has taken 30 to 40 years for mosquito populations to recover.

Breakthrough Mosquito Control Being Studied

Vanderbilt University scientists report in the journal *Scientific Reports*, that they have discovered a molecule named VU041 that targets only blood-feeding insects. Specifically, they are looking at the mosquito *Anopheles gambiae*, the leading vector of malaria, and *Aedes aegypti*, a vector of Zika virus and other pathogens. The molecule targets blood-feeding females, and induces kidney failure, where the female is unable to produce urine after feeding. Blood meals carry toxic salts that, if not released immediately after feeding, will kill the mosquito. The authors show that this mode of action will not result in resistance. Arrangements are underway to test VU041 in a spray formulation.

LED Lights Attract Fewer Insects

The energy-saving advantages of LED lighting are well known, yet there are other benefits with these lights. Scientists in the UK installed insect traps at 18 field sites across southwest England, illuminated by a series of LED, filament, and fluorescent light sources. Over 4,000 insects were identified, and the results showed that the LEDs attracted four times fewer insects compared with the traditional incandescent lamps, and half as many as were attracted to the compact fluorescent lamps.



New Publications and Videos

- The Honey Bee Health Coalition has released a series of videos to help beekeepers promote colony health and provides step-by-step directions to manage varroa mite infestations.
- Materials for Training on Worker Protection Standards, including videos and a training manual, are now available from the EPA and Pesticide Educational Resources Collaborative. The materials help users of agricultural pesticides comply with the requirements of the revised standards.
- Conference Proceedings from the Northeast IPM Center are now available. The videos feature 5-minute updates from IPM-related research, education, and extension currently taking place in and around the Northeast.

Psyllobora sp. adult (top) and larva (bottom).

Featured Picture of the Quarter

Psyllobora is a genus of fungus-eating lady beetles that belong to the Coccinellidae family. These beetles feed on powdery mildew (PM) and are found worldwide, with six species occurring north of Mexico. The adult and larva pictured are likely Western psyllobora lady beetles (*P. borealis*) and were found in a Kaysville community garden on potatoes where PM was present.

Mycophagous (fungus-eating) cocinellids are an understudied group, but research done at UC Davis on a specific species of *Psyllobora* (*P. vigintimaculata*) demonstrates that this species serves as an indicator of PM and a support for making decisions in PM management. During three years of successive monitoring for this research, the positive correlative relationship between insect density and disease severity was confirmed and in some cases, yellow sticky card catches of *P. vigintimaculata* were more sensitive to annual deviations in disease development than established predictive models based on weather data.

— Images by Cami Cannon, Vegetable IPM Associate

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