



Bacterial Wetwood on Cottonwoods

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Over the past two years, we have had reports of cottonwoods of all ages dying suddenly or in decline in parts of Utah (Cache, Iron, and Salt Lake counties). After several unsuccessful attempts by plant pathologists at Oregon State University to isolate plant pathogens from the wood, we came to the conclusion that the problem was simply, bacterial wetwood, which is difficult to pinpoint to one causal organism. If you are familiar with bacterial wetwood, the symptoms we have seen are not as clear-cut as you might think.

Bacterial wetwood is a disease that affects many hardwoods and some conifers. In general, it is an asymptomatic condition in trees, but in the case of cottonwoods (and globe willows and sometimes elms), it is lethal. Naturally occurring soil and water bacteria enter the tree through root wounds or are transmitted from tree to tree through natural root grafting or by wood-boring insects. The bacteria multiply and occupy the xylem, killing and staining the wood and causing a water-soaked condition. In the absence of oxygen, these bacteria degrade pectin, starches, and sugars via fermentation to produce methane and carbon dioxide. High gas pressure and moisture content forces fermentation by-products to outer limbs, and in the case of cottonwoods and globe willow, to the cambium, causing localized death. Fluid that seeps out of wounds or branch stubs is colonized by



Top: Cottonwood trees of all ages can be killed, seemingly overnight, by bacterial wetwood.

Bottom: Symptoms include early fall color, dieback, and quarter-sized areas of tarry-like ooze on the bark. Under the ooze are small cankers of dead cambium, and orange staining of the xylem.

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airborne bacteria and yeasts, resulting in the foul-smelling and toxic “slime flux.”

Affected cottonwoods in Utah do not express the classic slime flux, but have several small (quarter-sized) areas of tar-like ooze on the bark. Removal of the bark over these oozing areas reveals a brown discolored cambium and fermented odor. The xylem beneath the dead cambium is streaked red. In the case of the dying cottonwoods in Utah, the symptoms indicated multiple entry points through roots and by spread of flatheaded borers. Trees contained both basal and upper stem cambial wetwood cankers that, in advanced stages, coalesced into a single massive formation. Some trees developed cracks in the upper limbs due to the intense pressure within the tree. Symptoms of disease expression started with yellowing, wilting, and scorching foliage in parts of the canopy, branch dieback, and failure to leaf out in spring. Death eventually occurred when the cambium was girdled at the base of the tree.

Most of the cottonwoods were growing in environments that favors spread, including monoculture plantings that allow for root to root spread, compacted soil, surface roots exposed to wounding, and in some instances, drought conditions or excessive water. Most trees also had a high incidence of cytospora canker that probably contributed to tree death. Dead trees ranged in age from 20-60 years.

Although isolating bacteria from wood is very difficult, there have been reports of over 13 genera of bacteria associated with wetwood tissue. Species from two genera, *Clostridium* and *Enterobacter*, are most prevalent, but cannot be assumed to be the causal agents of wetwood because they have never been tested for ability to induce wetwood in laboratory conditions.

There are no chemical treatments to prevent or cure trees with bacterial wetwood. Trees may have become affected



In advanced stages of decline, large areas of cambial tissue are killed.

by wetwood at a very young age (less than 10 years), and not show symptoms for many years. Areas that have important cottonwoods should be managed for prevention of disease. The most important factor is to prevent damage and stress to roots. Trees should be given optimal watering and fertilization.

-Marion Murray, IPM Project Leader

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Invasive Pest Highlight: The Brown Marmorated Stink Bug

A new invasive pest to the U.S. is a concern for Utah's agricultural, landscape, and home garden industries. The brown marmorated stink bug (Hemiptera: Pentatomidae) is native to Asia and was first detected in the U.S. in Allentown, Pennsylvania in 1998. It has since spread to areas of the Mid-Atlantic, South-Atlantic, Northeast, Great Lakes, and Northwest regions of the U.S. In 2010, it caused severe crop injury to pome and stone fruits and some small fruits and vegetables in the Mid-Atlantic region. Some characteristics of the brown marmorated (= marbled) stink bug that make it such a concern include:

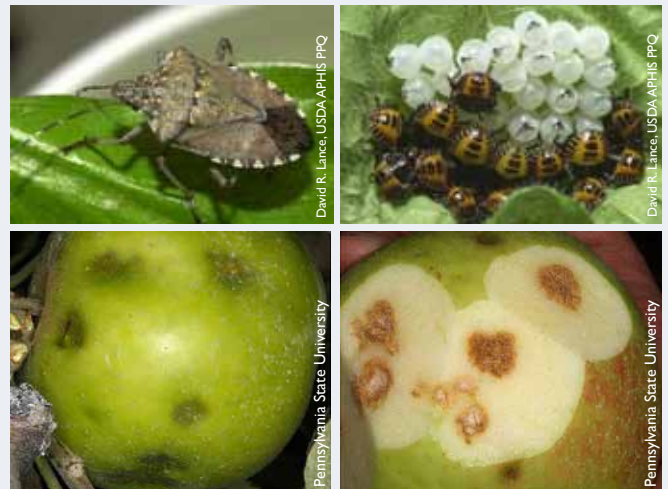
- Adult populations move rapidly from one crop to another (a few hours for nearby fields).
- It appears to be widely adaptable to many regions of the U.S.
- It has a broad plant host range that includes tree fruits, vine and cane fruits, some vegetables (sweet corn, tomato, pepper, bean, asparagus), some field crops (soybean, corn), and some landscape trees and shrubs.
- It feeds on fruits, seeds, and leaves.
- It is already showing resistance to some pyrethroid insecticides.
- Both the adult and nymph (immature) stages cause plant injury.
- It is also a nuisance pest, as it seeks shelter from the winter within buildings (similar to boxelder bug and the Asian multicolored lady beetle).

DAMAGE

The brown marmorated stink bug feeds by sucking on plant juices with its beak composed of tube-like mouthparts. On fruits it causes small necrotic spots. On pome fruits, a pithy area often forms under the fruit skin. For stone fruits that are attacked early in the season, typical stink bug cat-facing (puckering, distortion) is caused. On leaves, feeding causes light-colored stippling or small crows-foot shaped lesions. On seedpods, the bug feeds on the immature seeds developing within the pod.

APPEARANCE AND LIFE HISTORY

The adult is a typical shield-shaped stink bug (5/8 in long, 3/8 in wide). Its upper side is mottled brown and gray and its underside is white with gray and black markings. Its antennae have alternating dark and light bands on the last two segments which is a characteristic that separates it from other similar-looking stink bugs. Adults and nymphs have red eyes. Nymphs are oval-shaped and tick-like in appearance. Early nymphs are yellowish brown and mottled with black and



Adult stink bugs (top left) are identified by white bands on dark antennae, a smooth "shoulder" and black and white pattern around abdomen. Eggs and nymphs (top right) are difficult to tell from other stink bugs. Injury to apple fruit (bottom) resembles other stink bug injury.

red. Late nymphs are darker with light bands on dark legs and antennae. Eggs are light green, barrel-shaped and laid in small clusters (20-30 eggs). The brown marmorated stink bug generally completes one generation per year in most regions of the U.S., but it may be multi-voltine in warmer areas. It overwinters in the adult stage. Adults seek protected sites beginning in September. This habit causes it to be a nuisance pest for people as it congregates in homes, office buildings and other structures.

SPREAD AND HOW TO REPORT OCCURRENCES

Utah crop producers and home gardeners should be on the look-out for this insect to show up in Utah. It is now well established in greater Portland, OR. It could easily be transported on plant products or in vehicles to the fruit and vegetable producing regions of Utah. If a suspected specimen is spotted, collect it and submit it to your local Utah State University Extension office or Utah Department of Agriculture and Food office. Also report any suspect plant injury as this has been a common way its presence has been first detected in other regions of the country.

-Diane Alston, Entomologist

For further information, visit these online resources:

- ento.psu.edu/extension/factsheets/brown-marmorated-stink-bug
- ohioline.osu.edu/hyg-fact/pdf/FS_3824_08.pdf
- www.oregon.gov/ODA/PLANT/docs/pdf/ippm_halyomorpha.pdf?ga=t

How Winter Weather Affects Insect Activity

For some Utahns, November brought “Blizzard 2010”, followed by bitter cold temperatures and additional snow. What does the winter have in store for insect populations? While many might hope that pest insects would freeze to death, not all insects die during the winter. Many insects have evolved ways to avoid or tolerate the effects of cold weather. Alaskans, for example, see large populations of mosquitoes every spring following winters of below freezing temperatures.

Insects are poikilotherms (or “cold-blooded”), meaning their body temperature fluctuates with ambient temperatures. As temperatures cool, insect metabolic and enzymatic activity slows down. Thus, activity for many insects is restricted to warmer parts of the day and year. Temperature also impacts the rate of insect development. Insects regulate their temperature in a variety of ways. Some insects move to an area of preferred temperature, while others, like butterflies, bask in the sun during cool mornings to raise their body temperature. Other insects are endothermic, meaning that they must rely upon their body to produce heat. Bees, for example, generate heat with movement of their flight muscles. Take note as these mechanisms are mainly for short-term regulation of body temperature (thermoregulation).

Insects must be physiologically prepared in advance to tolerate winter temperatures. Many insects go into diapause, which is a state of arrested development in response to lower temperature, shorter day length, and changing food resources. Insects also have “cold-hardy” life-stages adapted to resist harsh climates. For example, aphids and some mosquitoes and grasshoppers overwinter as eggs (Fig. 1); wood borers overwinter as larvae within wood (Fig. 2); some moths overwinter as pupae in protected sites; and many beetles (e.g., alfalfa weevil) and true bugs overwinter as adults. Insects reduce the effect of freezing temperatures by being freeze-tolerant or freeze-intolerant. Freezing is problematic because ice crystals form and disrupt cell membranes and eventually kill an insect. Freeze-tolerant insects synthesize ice-nucleating proteins that isolate the formation of ice outside of the cells and slow the detrimental ice formation inside of cells. Most insect species, however, are freeze-intolerant and prevent the formation of ice by producing compounds including glycerol, sorbitol, and trehalose that act like antifreeze. Additionally, during diapause, insects stop feeding and purge waste to reduce any chance of ice formation on food in the gut.

To escape the harmful effects of winter, some insects migrate south to places with relatively warm winters. Monarch butterflies, for example, overwinter as adults on trees in southern California and forests in Mexico and make their way



Fig. 1 (top). In fall, aphids busily lay eggs on woody plants for overwintering.

Fig. 2 (middle). Emerald ash borers overwinter as a larva and are protected from freezing by living in trees.

Fig. 3 (bottom). A large population of lady beetle adults prepares to overwinter.

back north every spring. The susceptibility of these butterflies to harsh winter conditions was apparent in 2002 and 2004 when severe winter storms came across Mexico and millions of monarch butterflies froze to death. In central and southern Utah, where winters are warmer, corn earworm overwinters as a pupa. In the spring, some corn earworm moths will migrate back to northern Utah. Insects also combat the

Overwintering Insects, continued from previous page

winter by seeking shelter in soil, debris, under bark, and in and around our homes. Some lady beetle species overwinter as adults in large populations under bark and forest debris in the mountains (Fig. 3). Snow cover and higher soil moisture maintained by frozen surface layers can act as an insulator and can significantly enhance the survival of overwintering insects. However, insect life-stages that overwinter in the soil and do not burrow deep enough may succumb to freezing if ice progresses to lower soil strata. In Utah, many adult boxelder bugs may forego outdoor overwintering and seek shelter in and around buildings and homes and become a nuisance pest.

Insect populations can decline when freezing temperatures occur out of season. Early frosts in the fall can decrease insect populations not yet prepared for cold temperatures.

Insects that prematurely emerge from their cold-hardy stage or come out of diapause can also be susceptible to freezing during unpredictable spring weather. The spotted wing drosophila, an insect that can harm unripe fruit, was recently detected in Utah. Many wonder if winter will suppress this initial population and decrease the impact of this potential pest. In late November, snow was on the ground and a lone spotted wing drosophila managed to find its way into a monitoring trap. It is not known whether spotted wing drosophila will successfully overwinter in northern Utah, although survival in southern Utah is likely. Predicting an insect's overwintering success is complex and much like forecasting the weather.

-Ricardo Ramirez, Entomologist

Detection of Invasive Pests in Utah Demonstrates Importance of CAPS

The Cooperative Agricultural Pests Survey (CAPS) is a federal program designed to reduce the impact of introduced plant pests through monitoring and early detection. The program is managed jointly by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) and each state. The Utah CAPS program is cooperatively administered by the Utah Department of Agriculture and Food (UDAF) and Utah State University (USU).

The importance of this program cannot be overstated. It has been estimated that invasive plant pests result in a \$41 billion dollar annual loss to American agriculture, and this does not even include the cost of control measures. The pests that CAPS monitors for could potentially devastate local agriculture if not detected and controlled early. For example, the silver Y moth (*Autographa gamma*) feeds on over 200 different plant species, including crops that are economically important to Utah, such as alfalfa, corn, and wheat. If the silver Y moth were to become established in Utah, many industries would be heavily impacted, so monitoring for this and other invasive pest species is obviously important.

Each year, several surveys are conducted by various entities throughout the state, including UDAF and USU. Pests of concern are identified and potential hosts are monitored by trapping or other means. Occasionally a target pest is found; when this occurs, the information is passed on to APHIS, who

collaborates with UDAF to develop an appropriate response plan. Depending on the pest, where it was found, and how many were found, the response could include a combination of further monitoring, eradication or control efforts, or quarantine. The strategy adopted also considers the local residents and economy, and although some citizens may not be as receptive as others to some measures, such as spray programs, these measures are better than the alternative of a severe long term pest infestation.

In 2010, three surveys were conducted by Dr. Cory Vorel, the CAPS Coordinator at USU, in cooperation with UDAF. These included a fruit pest survey, an exotic moth survey, and a survey for wood boring and bark beetles.

The fruit pest survey targeted three species: light brown apple moth (*Epiphyas postvittana*), European grapevine moth (*Lobesia botrana*), and spotted wing drosophila (SWD, *Drosophila suzukii*, Fig. 1). Traps were placed at 10 sites in Box Elder, Weber, Davis, and Utah counties (Fig. 2). Neither of the moth species was found, but unfortunately, SWD was detected in Kaysville. SWD has been found in many states over the past two years; therefore, it was not surprising that it was detected in Utah. However, it is a cause for concern. [A spotted wing drosophila fact sheet](#) containing more information about this pest is available on the Utah Pests website.

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Dealing with Delusional Infestation

During the winter months, the number of samples submitted to the Utah Plant Pest Diagnostic Lab dramatically decline. This time of year, though, there is an increase in one particular type of pest problem—those that don't actually exist. I am referring to a medical condition known as Delusory Parasitosis, or Delusional Infestation (DI). A delusional state is a psychological disorder defined as a false belief based on incorrect inference about external reality that persists despite evidence to the contrary. People with delusional infestation believe that they, their belongings, house, family, etc., are infested with arthropods. Only medical doctors are able to diagnose DI and prescribe medications or therapies that may help control the delusion, but diagnosticians and Extension personnel need to know how to recognize the signs of this condition and how to deal with people suspected to suffer from DI. Straightforward communication with suspected sufferers may encourage them to seek appropriate treatment.



Fig. 1. A typical sample submitted to the UPPDL from a sufferer of delusional infestation.

First, it is critical for diagnosticians to recognize DI symptoms (see Table 1 for a list of common symptoms). People with DI often fail to provide samples containing pests (Fig. 1; Table 2), but can provide vivid and detailed descriptions of their morphology, life cycle, and habits. If the pest description sounds odd, continue to ask questions. Usually, they will describe pests that defy science or that fall outside of what is possible for arthropod life cycles and habits; sometimes they will describe excessive pest control measures applied to their living space or body. The role of a diagnostician is only to examine samples for the presence or absence of arthropods.

If human or animal parasites (e.g., fleas, lice, etc.) are detected, recommend that they consult a physician or veterinarian (if the source is a pet) for treatment.

continued top of next page

Table 1. Characteristics of sufferers of delusional infestation.

strong conviction of arthropod infestation, but none are present
suffer from emotional trauma
constantly submit samples of fiber, cloth, hairs, scabs, etc. as possible pests
have multiple home inspections to examine arthropod-damaged wood, but damage is normal wear-and-tear
often call or visit medical and other professionals to get desired diagnosis; may escalate into hostility if a desired diagnosis is not reached
usually older individuals, especially females
may be isolated (living alone, recently deceased spouse, limited mobility due to medical conditions, etc.)
suddenly breaks off communication
report “bugs” coming out of skin, cuts, body openings, etc.
marks on body claimed to be bites, but are actually irritated areas created in an effort to remove the pest
history of drug use, especially amphetamines or cocaine
administer elaborate control efforts including overuse of pesticides or home remedies
may convince other friends or family members that they are also infested

Table 2. Descriptions of “pests” given by sufferers of DI.

black and white, but changes colors
small and black, often just small enough that they can't tell if it is an arthropod or not, and have difficulty collecting one
black “bug” with a long hair coming out the back
small, “sharp and painful bugs” invading the skin
bugs that jump or fly
bugs have eight little legs and a small sucker
half moon shape, like the end of a fingernail
moth-like creatures
waxy looking fuzz balls
granules about the size of a grain of salt
long hairs that move independently
tiny white worm with a brown bob on its head
worm-like coating around the hair root, with a black bulb attached

Delusional Infestation, continued from previous page

In the case of DI, actual arthropods are rarely found. When a client with suspected DI has submitted a sample I give a simple diagnosis: “there were no arthropods present in the submitted sample.” Usually, more samples will be submitted in which the client insists contain the pest. Again, I inspect the sample and give a simple response. After the 3rd or 4th submission, I provide the client with the USU fact sheet on human parasites, which discusses DI in detail. Most of the time, the client does not agree with the diagnosis.

Most importantly, never agree with the client that an arthropod is present if it is not; this will only perpetuate their delusion. Try and persuade the client to accept non-arthro-

pod possibilities for their problems, such as environmental irritants, medical diseases/conditions, medication side effects or interactions, depression, emotional stress, etc. (see our fact sheet “[Human Parasites](#)” for a complete list). Ultimately, these clients should be diagnosed and treated by a psychiatrist.

For a more detailed discussion of DI, visit the link to our fact sheet provided above. If you have access to online journals, a 2009 publication in [Clinical Microbiology Reviews](#) by [Freudennann and Lepping](#) summarizes over 500 articles on DI.

-Ryan Davis, Arthropod Diagnostician

CAPS Update, continued from page 5

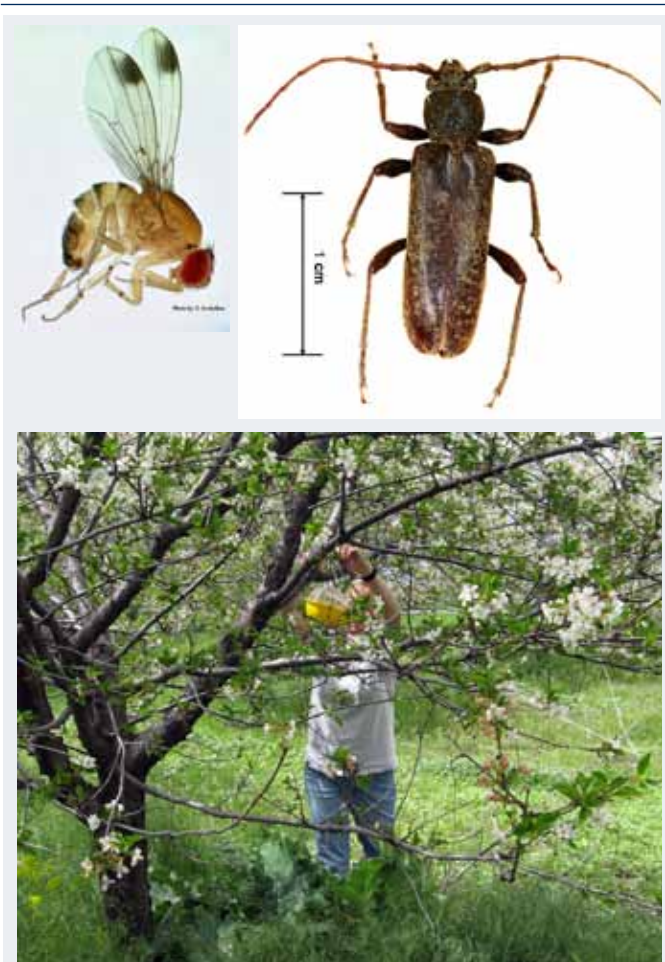


Fig. 1 (top, left). Male spotted wing drosophila (*Drosophila suzukii*).

Fig. 2 (bottom). McPhail trap being placed in a cherry tree to monitor for spotted wing drosophila.

Fig. 3 (top, right). Chinese longhorned beetle (*Trichoferus campestris*).

Seventy-nine sites were monitored this year for the presence of three exotic moth species: silver Y moth, Egyptian cottonworm (*Spodoptera littoralis*), and old world bollworm (*Helicoverpa armigera*). Alfalfa fields, corn fields, and facilities processing alfalfa or corn were monitored in 28 counties. Fortunately, none of these species was detected.

The third survey targeted 17 species of wood boring and bark beetles. Traps were placed at 14 sites statewide, representing a wide range of habitats, including industrial areas, wood importers, tree farms, and wild lands. Although identification of all of the trapped beetles is yet to be completed, one beetle of regulatory concern was identified. The Chinese longhorned beetle (*Trichoferus campestris*) (Fig. 3) was found in trap samples collected from an industrial area in Salt Lake County. This beetle, originating in Asia, is a wood-boring pest of apple, mulberry, and other trees. Future surveys are planned to determine the extent of the infestation and if any action is warranted.

Next year, in addition to expanded monitoring for the Chinese longhorned beetle, an extensive fruit pest survey is planned, targeting SWD, light brown apple moth, European grapevine moth, and five other insect species at 50 sites where cane berries, cherries, and peaches are grown, as well as sites where fruit is imported, processed, or distributed. Please contact Dr.Vorel (cory.vorel@usu.edu) if you would be willing to have traps placed on your land or at your facility.

-Cory Vorel, USU CAPS Coordinator

Powdery Mildews in Your Backyard – Part I

Powdery mildew is caused by a group of fungi that consists of several genera and hundreds of species. There are only a few plant groups and species that are not hosts for powdery mildew, for example conifers and ginkgo. A sign of powdery mildew is a white layer of fungal mycelium and spores on the surface of leaves, green shoots, and fruit (Figs. 1a-b). The fungus grows on the surface of the tissue and absorbs nutrients by extending haustoria (specialized cells) into plant cells without destroying them.



Fig. 1a (top). Powdery mildew on Siberian pea shrub.

Fig. 1b (bottom). Powdery mildew on Norway maple. The black dots are the fruiting bodies produced on the mycelium.

Powdery mildews produce two types of spores – during the spring, summer, and fall most of them produce conidia (asexual spores) that allow for fast and wide spread (if picked up by wind currents spores can travel many miles) to neighboring plants, and ascospores that survive adverse environmental conditions (winter, dying plant tissue) in a round fruiting body. As conditions improve, the ascospores germinate and new fungal growth starts. The new growth will then produce conidia for widespread dispersal, completing the life cycle.

Without a microscope, powdery mildews all look the same and even with a microscope it is sometimes not easy to identify the genus or species. Conidia of powdery mildews look barrel-shaped. To identify the species, diagnosticians view stained spores under a microscope, or use molecular tools such as PCR (polymerase chain reaction). The best stage for identification is the fruiting bodies, which will contain ascospores. The fruiting bodies have appendages of various shapes (Fig. 3) that are specific to each genera, and the number of asci (sac-like structures containing the ascospores within the fruiting body, see “Picture of the Quarter”, last page) vary by species as does the number of ascospores in an ascus.

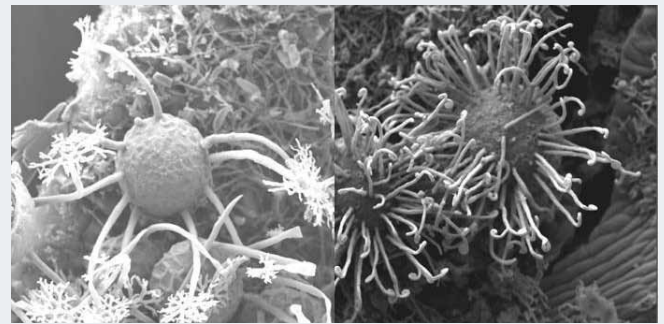


Fig. 3 (top). Powdery mildew fruiting bodies showing appendages. On the left is *Microsphaera palczewskii*, powdery mildew of the Siberian pea shrub and on the right is *Sawadea bicornis*, powdery mildew of Norway maple.

Fig. 4 (bottom). Image of symptoms of *Leveillula taurica* on tomato leaves

To every rule there is an exception. There is one powdery mildew, *Leveillula taurica* that can infect tomato, pepper or onion leaves but does not grow on the plant surface and is therefore not easily visible. It grows spore-bearing structures out of the stomata (openings in the leaves for gas exchange by the plant). The spores are cylindrical or spear shaped and fruiting bodies are rarely produced. If you see yellow spots (Fig. 4) developing on these plants, please submit a sample to the UPPDL.

Host specificity of powdery mildew fungi varies. Some species require a specific host whereas others have a wide host range. For example, maple powdery mildew (*Sawadea* sp.) will not attack any vegetables or flowers. It is specialized to maple species. In contrast, *Erysiphe cichoracearum* infects many weeds, ornamentals (such as phlox, penstemons, black-eyed susan and many others), and some vegetables. It is one of two powdery mildews infecting cucurbits such as melons, cucumber and squash. I will cover powdery mildew species frequently found on vegetables, ornamentals, and fruit trees in Utah in the next newsletter.

-Claudia Nischwitz, Plant Pathologist

In the National News

“RE-DISCOVERED” SWITCHGRASS PEST

As interest in using switchgrass for bio-fuel grows, so does concern about managing switchgrass pests. The switchgrass moth (*Blastobasis repartella*) was first described in 1910, and is only now getting some interest. Its larvae bore into switchgrass stems, and seem to be host specific. As production of switchgrass for cellulosic ethanol increases, populations of the moth are also expected to increase. Losses of up to 10% have already been seen in some research fields. An October 2010 journal article in *Zootaxa* describes the life stages and biology of the moth.

CORNWORMS’ BLOOD REPELS SOME PREDATORS

Corn rootworm is one of the most severe pests of corn. USDA Agriculture Research Service entomologists and colleagues have discovered that many predatory insects avoid feeding on corn rootworm larvae because of its sticky, distasteful blood. Predators such as ground beetles and ants that do attempt to feed on the rootworm immediately stop because the foul-tasting blood coagulates in the predators’ mouths, sealing them shut. Wolf spiders, however, have a voracious appetite for corn rootworm. They bypass the effects of the blood by sucking the rootworm’s fluids rather than chewing. These results reveal the importance of encouraging a diverse predator population to allow for better corn rootworm control.

SECURITY MEASURES ACROSS STATE LINES?

“Invasive pests” in the U.S. may originate in foreign countries or in neighboring states. A recent report from researchers in the U.S., Australia, and New Zealand looked at the top 100 known exotic pest species and says that most already exist in the U.S. and that pests crossing state borders is the most immediate threat to spread. U.S. border quarantines and screening of imports receives much attention, but transport of materials across state lines should perhaps get more attention. The author believes that the findings have significant implications for biosecurity policy and the need to consider security measures beyond established national borders.

SPOILED MILK LEADS TO PEST MANAGEMENT DISCOVERY

Syngenta researchers have developed a novel insect management tool for corn: a protein trait called Agrisure Viptera that is now available in several hybrids including Garst and Golden Harvest. The discovery came from years of deliberate testing of a wide variety of materials that might harbor bacteria with novel toxins. They isolated a particular bacteria from spoiled milk that produces the Vip3A protein, which has activity against not only black cutworm, corn earworm, and western bean cutworm, but a wide range of insect pests. Syngenta received the “Best Novel Agricultural Biotechnology” award at the 2010 Agrow Awards ceremony for developing this trait.

INVASIVE PEST NUMBERS STAGGERINGLY HIGH

A recent report in *BioScience* reveals that more than 455 invasive insects and 16 invasive pathogens are causing severe losses in U.S. forests. Examples are laurel wilt disease that is killing redbay, sudden oak death, and the emerald ash borer. Based on the pattern, the researchers predict one especially destructive pest will sneak into the nation every two years. The authors ask for improved enforcement efforts to prevent further importation.

MORE INFORMATION ON COLONY COLLAPSE OF BEES

Colony collapse was first identified in late 2006 and the exact cause is still unknown. A large team of biologists from Texas Tech, Montana, the U.S. Army and Mexico have published a report that the bees may be affected by a lethal combination of both an insect virus and a fungus. Though an association between exposure and death was found, scientists don’t yet know if the two pathogens cause CCD or whether CCD-affected colonies are more likely to succumb to the two pathogens. The virus, found in ground bees, is called insect iridescent virus (IIV) 6 and the fungal parasite is *Nosema*. The insect virus is closely related to another virus that wiped out bee populations 20 years ago in India. Unlike previous research that found the deaths may be caused by a virus with RNA, the IIV 6 contains DNA.

Useful Publications and Websites

- EPA has launched a new website with a search tool that can help you choose an EPA-registered **bed bug product**. Users can search for a product by its name, company, site of application, and pesticide type. Access the site [here](#).
- The EPA has published a report on “**Protecting Children’s Health**” by preventing pesticide exposure.
- General Concepts in Integrated Pest and Disease Management (Integrated Management of Plant Pests and Diseases) is a newly published first volume of a book series, with information on pest models, epidemiology and effects of climate change. A. Ciancio and, K.G. Mukerji, editors.



Featured Picture of the Quarter

The ascus ("skin bag") shown at left is a cell produced by a group of fungi called ascomycetes that contains spores called ascospores usually eight spores (in this case, you can see six of the eight spores). In powdery mildew fungi, the number of asci range from one to a few dozen within a chasmothecium depending on the powdery mildew species. Chasmothecia typically form in the fall to survive the winter, and look like ground pepper flakes scattered on infected plant tissue.

-Image by Claudia Nischwitz

Calendar of IPM-Related Events

January 10-14, 75th Annual Purdue Pest Management Conference, Lafayette, ID, extension.entm.purdue.edu/urban/Urban_Info

January 24-26, Utah Green Industry Conference & Trade Show, South Towne Expo Center, Sandy, Utah, www.utahgreen.org

January 19-22, Practical Tools and Solutions for Sustaining Family Farms, Chattanooga, TN, www.ssawg.org/conference

January 26-29, Ecological Farming Conference, Pacific Grove, CA, www.eco-farm.org/programs/efc

February 2-3, Utah Pest Control and Lawn Care Association Convention, Salt Lake City, UT, upcla.com/convention.html

February 7-10, Weed Science Society of America 51st Annual Meeting, Portland, OR, www.wssa.net

February 10-12, Organicology, Portland, OR, www.organicology.org

February 21-23, Annual Diversified Agriculture Conference, Richfield, UT, diverseag.org

February 28-March 4, National Invasive Species Awareness Week 2011, Washington, D.C., www.nisaw.org

March 3, Ecological Landscaping Association, Springfield, MA, www.ecolandscaping.org/conference

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