Fall 2009
Volume 12, No. 3

Pennsylvania Integrated Pest Management Program

PA IPM News

In This Issue:

Uninvited Guests:
Bed Bugs

Common adult bed bug

Bed bugs are making a comeback in apartment buildings, dorm rooms, hotels, hospitals and homes. Why now? Both people and the things they buy are traveling greater distances more frequently, causing hitchhiking bed bugs to spread more rapidly. Follow the steps below to learn how to identify, prevent, and control them safely and effectively.

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Penn State Making an Impact on Pollinators

(Photo courtesy of Penn State Master Gardeners)

Across the country, pollinators such as honeybees and hummingbirds are declining due to habitat loss, diseases such as Colony Collapse Disorder, pests and excessive pesticide use. Penn State researchers and educators are hoping to help combat these issues by promoting ways home gardeners can help pollinator populations thrive.

New demonstration gardens featuring native plants have been recently established at Shaver's Creek Environmental Center and the new Arboretum at Penn State. Nancy Ostiguy, associate professor of entomology, and other researchers at Penn State helped design the new gardens. "The gardens include plants native to Pennsylvania, because they are four times more attractive to pollinators," she explains. "We also chose plants that have a variety of flower shapes to attract different types of pollinators, and planted them in clusters of the same type to help pollinators find them."

Pollinators are so important because they are responsible for one out of every three bites of food you eat, says Diana Cox-Foster, Penn State professor of entomology and co-chair of a national working group of CCD researchers. "Over 80 percent of all flowering plants depend on our pollinators for survival."

Even before the discovery of Colony Collapse Disorder (CCD), our pollinators were in decline. According to Cox-Foster, four species of bumble bees are going extinct, and over 50 pollinator species are threatened or endangered. In addition, wild honey bee populations have dropped 25 percent since 1990. "Our pollinators need increased pollen diversity to help bolster their resistance to disease, pesticides and other stresses. Establishing native plant gardens will have a big impact on pollinator health."

In addition to the native plant gardens being established on campus, Penn State Master Gardeners are reaching out to gardeners across the state to help them plant native gardens through a project funded by ice cream manufacturer Haagen Dazs. The program focuses on encouraging homeowner to add plants to the landscape that provide food and shelter for pol-

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Uninvited Guests: Bed Bugs (continued from page 1)

Step 1 Pest Identification
What exactly are bed bugs? Bed bugs are blood-feeding parasites that bite people at night and hide during the day. They are tiny, less than 1/8 inch, wingless, chestnut brown in color, with flattened, generally oval-shaped bodies. They become swollen, elongated, and dark red after a blood meal. Bed bug bites may cause itchy welts on their victims, and often leave small dark spots on sheets and other surfaces. Bed bugs do not spread or cause any diseases but **do** cause mental anguish – no one wants to "let the bed bugs bite"! They are difficult to control because their small size enables them to hide almost anywhere in and around their feeding sites on mattresses and bed frames, cracks and crevices in walls, under peeling paint or behind wall sockets. Unlike head lice that remain on human heads, bed bugs only stay long enough to feed before moving away to hide.

Step 2 Prevention
Bed bugs cannot fly so they infest homes by being transported in on clothing, backpacks, suitcases, mattresses or other furniture. They can also walk in from adjacent apartments or rooms through cracks or conduits for electrical wiring or plumbing. They search for a sleeping human by moving up walls, bed linens, bed legs or anything touching the bed.

Prevent bed bugs from gaining a foothold in your home!
• Carefully inspect clothing and baggage after you have travelled. Place clothes in sealed plastic bags until you can wash them.
• Avoid acquiring used furniture and mattresses – these may be infested.
• Remove clutter from the home,

Bed bug nymph (bedbugger.com)

especially the bedrooms where bed bugs can find added places to hide.
• Seal cracks and crevices, especially those that lead to other rooms/floors.
• Keep beds cleared off above and below. Do not pile coats or "foreign" clothing on beds.
• Use solid, light-colored sheets – these make early detection of bed bugs easier.
• If you live in an apartment building and are concerned about bed bugs, keep them from climbing up the bed by pulling it away from the walls, making sure no bedding touches the floor. Around each bed leg, spread a thick layer of petroleum jelly (e.g. Vasoline) in a band at least 2 inches wide and about 6 inches off the floor. Bed bugs cannot crawl through this barrier. You can also use little dishes of soapy water under each leg or commercial devices such as the Climb-Up Interceptor.

Step 3 Controlling Bed Bugs Safely
To control bed bugs effectively a **combination of actions** will be needed. Control may be difficult and because of this, it is best to consult with pest management professionals (PMPs) to help rid your home of these pests.
For **safe** and effective control:
• An initial assessment of the severity of infestation is key. The PMPs must conduct a thorough inspection of the home to look for bed bugs and their harborage sites for targeted cleaning and treatments.
• Inspect and vacuum mattresses, box springs, and bed frames, as well as carpets and crack and crevices that bed bugs may hide in during the day
• After vacuuming, enclose the mattress and the box springs in zippered encasements that are rated to prevent piercing by bed bug bites or their escape through zippers (e.g. "Protect a Bed"). Any bed bugs remaining on the mattress and box springs will be trapped inside the covers. Leave the covers in place for a year or more because bed bugs can live that long without a blood meal.
• Launder bedding and clothing in hot water and dry in hot dryer (175 degrees for 5 minutes). Pillows can be put in the dryer for 5 minutes also.
• "Dry-steam treatment" of infested areas including mattresses can be an effective "knock-down" strategy. Bed bugs and their eggs are killed by heat over 113 degrees.

Using Pesticides on Bed Bugs
If bed bugs have been found in your home, resist the urge to use over-the-counter bug sprays! Bed bugs are resistant to most commonly used pesticides. Bug bombs and sprays on mattresses and in bedrooms will only increase YOUR exposures to more toxins and will NOT control bed bugs. Since pesticides are poisons, they should be used sparingly and carefully. If chemicals are to be used, you should seek assistance from a professional, **licensed** pest control company trained to deal with bed bugs.
Why you need help!
• Common household products gen-

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Penn State Entomology Student "Worth Watching"

A student in Penn State's College of Agricultural Sciences was recently featured in a national trade magazine after receiving the National Pest Management Association (NPMA) Minorities in Pest Management scholarship.

Alexis Barbarin, a Ph.D candidate in the college's entomology department, was featured in the June issue of Pest Management Professional as a pest management professional "Worth Watching" in the industry. Pest Management Professional is a trade publication geared toward the pest control specialist designed to educate them in pest detection and identification, treatment, and control methods. The magazine became aware of Barbarin and her research after she won the NPMA scholarship, which benefits minority students studying urban pest management, entomology, or related fields and who plan to enter the pest management industry.

Barbarin's research focuses on bed bugs and their recent resurgence in urban areas. A native of New Orleans, Barbarin knew she wanted to do research on a pest whose control would help urban residents. "I stumbled upon bed bugs after realizing there hadn't been much dedicated research conducted since the 1950's," she explained. Her goals include developing an urban integrated pest management curriculum for urban youth; developing a standard bed bug feeding protocol utilizing alternative blood sources; and identifying environmental cues that alert bed bugs to the presence of a host.

Barbarin chose Penn State due to its diverse faculty and research areas. Her future plans include teaching general biology, ecology, and entomology at a small university or college or becoming an extension educator at a land grant institution.

Students Receive Häagen-Dazs Fellowships

Two students in Penn State's College of Ag Sciences were recently awarded fellowships in pollinator health sponsored by ice cream-maker Häagen-Dazs.

Abby Kalkstein received her bachelor's in science from Penn State University in 2004. After graduation she worked as a lab technician in the university's entomology department where she contributed to the original research on colony collapse disorder (CCD). Kalkstein started her PhD studies in Genetics last year under Diana Cox-Foster, professor of entomology. She is working on the ecology and molecular evolution of picorna viruses that infect honey bees. "Working on bees at Penn State has been great, especially because of all the collaboration that place within the entomology department, university, and internationally," Kalkstein explains.

Originally from the Boston area, Holly Holt received her bachelor's in science from Cornell University in 2007, after which she worked for a clinical research team at Brigham and Women's Hospital in Boston, MA. She became interested in studying honey bee health after reading reports of colony collapse disorder, and was struck by the parallels with human disease epidemiology. "One of the things that drew me to Penn State is the fact that there are several faculty members and students studying bees from different perspectives, which makes for a really exciting research environment," Holt says.

Holt also received the Crouch Distinguished Graduate Fellowship in Agricultural Sciences from Penn State. She started her PhD studies this fall under the mentorship of Christina Grozinger, an associate professor of insect genomics in entomology. She will use behavioral, physiological and genomics approaches to study bee-parasite interactions, focusing on Varroa mites and Nosema microspordia.

The fellowship is part of the Häagen-Dazs loves Honey Bees™ campaign, which provides funding for research, education and outreach, student training, and synergizing the collective activities in sustainable pollination at Penn State. It provides students with greater hands-on experiences in pollinator health research, as bee pollination is essential for ingredients in nearly 50 percent of their all-natural super premium flavors. For more information about Häagen-Dazs pollinator campaign, visit http://www.helpthehoneybees.com/.

Penn State is a center for research and education concerning pollinator health, especially the factors causing colony collapse disorder. More than 14 faculty and other researchers are working on pollinator biology and health, including honey bee functional genomics, honey bee immunity, pathogens of bees and native pollinators, role of pesticides in bee health, parasites and diseases of bees, and ecology and manipulation of native bees. Honey bee and pollinator research at Penn State is supported by government grants, corporate gifts, the beekeeping industry and the College of Agricultural Sciences. For more information on honey bee research at Penn State, visit http://www.ento.psu.edu/HoneyBeeResearch.html.

Prevent Tomato Late Blight Next Growing Season

Across the northeast, home gardeners expecting the usual bumper crop of tomatoes this season were dismayed to find their plants affected by late blight, the same fungus that caused Ireland's potato famine in the 19th century.

According to Beth Gugino, assistant professor of plant pathology at Penn State, late blight is a fungus that primarily affects tomatoes, potatoes and certain solanaceous weeds such as bittersweet nightshade. "An unseasonably cool spring followed by an equally unseasonably cool and wet summer facilitated late blight growth for both home gardeners and commercial farmers throughout the growing season, which is very rare," said Gugino.

Symptoms first appear on the foliage of plants as pale green to brown lesions. These areas expand rapidly during moist conditions and a white downy mold appears on the margin of the affected area on the lower surface of the leaves. Eventually, the greasy greenish-brown lesions begin to appear on the fruit and can enlarge until the entire fruit is covered. According to Gugino, the most important sources of the pathogen early in the season are infected potato tubers and infected tomato transplants. "During the season, late blight can be spread long distances from diseased tomatoes and potatoes to healthy ones via windblown spores. Within short distances, like in a garden, spores can also move between plants in splashing rain."

To help prevent late blight next growing season, Gugino recommends making sure that all late blight infected tomato and/or potato plant tissue from this past season is dead and home gardeners refrain from composting diseased plant material. "Late blight cannot withstand the freezing winter temperatures of the northeast, but may be able to live in the center of a warm compost pile. As long as the plant tissue is alive, the pathogen can survive."

There is no need to remove the dead tomato plant tissue this late in the season or treat the soil over the winter, since the freezing temperatures will kill both the plant tissue and late blight. However, late blight can survive in infected potato tubers overwinter and can be a potential source of the disease the following year. If they are infected, Gugino recommends they be dug up and disposed of in the regular trash. "If volunteer potato plants grow next season make sure to quickly destroy them."

Fortunately, the late blight pathogen can't survive in or on tomato seeds, or on tomato cages and stakes between the seasons and therefore cannot be a source of the disease next season. However, Gugino says many bacterial diseases can survive in the seeds and on the cages so it is still important to purchase high quality seed and to disinfect cages and stakes to help control these bacterial diseases.

Currently there are no tomato varieties resistant to late blight, however growers and home gardeners have observed that some may be less susceptible than others. "Fortunately, there are some potato varieties including Elba, Kennebec, Allegany, Sebago, Rosa, Defender, Jacqueline Lee and Ozette, that are described as having some late blight resistance," Gugino says. Breeding work is underway and some resistant varieties are in the final stages of development and are expected to be available as soon as 2010.

Gugino recommends gardeners plant healthy disease-free transplants next year, and examine the plants regularly for symptoms of late blight, especially if the weather is cool and wet. Plants or plant parts that have late blight symptoms should be removed quickly to prevent the spread of the disease to other plants. Avoid wet leaves by watering at the base of the plant or watering in the morning so the leaves dry quickly. She also recommends spacing the plants further apart to improve air circulation and eliminate weeds, which can be carriers of the pathogen. Preventative applications of a fungicide containing chlorothalonil may also help before late blight symptoms appear.

For more information on late blight, visit web site http://www.ppath.cas.psu.edu/EXTENSION/VEGDIS/Vegetable_Pathology_Home.htm and/or contact your local Penn State Cooperative Extension Office.

PA IPM News

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The Pennsylvania IPM Program is a collaboration between Penn State and the Pennsylvania Department of Agriculture aimed at promoting integrated pest management in both agricultural and urban situations.

Penn State Making an Impact on Pollinators

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linators. According to Ginger Pryor, extension associate in horticulture and state Master Gardener coordinator, 48 demonstration gardens have been established across the state to educate homeowners so they can have their property certified as pollinator friendly. "To be certified, homeowners will need to implement pollinator friendly practices such as planting native flowering plants, provide nesting sites for pollinators, eliminate pesticides when possible, and provide water," Pryor explains.

In addition, Dennis vanEngelsdorp, senior extension associate and State Apiarist for the Pennsylvania Department of Agriculture, is also working with master gardeners at 20 of the demonstration gardens as part of a foraging bee survey. The goal of the project is to estimate the native bee density and diversity by selective trapping. "The PDA bee inspection program has been doing solitary bee survey intensely for four years and have now identified over 400 species in PA," says vanEngelsdorp. "The current effort funded by Haagen Dazs is meant to look at which pollinator plants attract the most and/or greatest variety of bees." vanEngelsdorp is also testing different bee monitoring methods and looking to expand the program next year and develop an online bee identification guide.

Also hoping to have an impact on our pollinator populations is the Xerces Society for Invertebrate Conservation, who recently received a Natural Resource Conservation Service award to partner with Penn State researchers to develop on-farm pollinator habitats. "Providing additional forage and refuge through on-farm natural habitat is widely recognized as important for enhancing pollinator health, diversity and abundance," says Cox-Foster.

The Xerces Society will work with Penn state to standardize pollinator seed mixes to ensure that pollinator plantings don't compete with the primary crop. Similarly, these pollinator plantings need to be composed of species that will not become weeds in the primary crop, and they should not serve as alternate hosts of crop pests and diseases.

For more information on pollinator-friendly gardening, e-mail Ginger Pryor at gmp4@psu.edu or contact your county Penn State Cooperative Extension office (http://extension.psu.edu/extmap.html). Also visit Haagen Dazs' interactive Web site, http://helpthehoneybees.com, to learn more about the honey bee and it's decline.

For more information on honey bee research at Penn State, visit http://www.ento.psu.edu/HoneyBeeResearch.html.

Uninvited Guests

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erally will not kill bed bugs and can cause them to spread out to infest other parts of the home

- "Bug bombs" do not reach into tiny cracks and crevasses or into clutter where bed bugs can hide
- Insect repellents such as "OFF" sprayed on persons or mattresses will not stop or kill bed bugs. Repeated use of these products in this way can pose health threats to you and your family.
- The insecticides that are most effective are those used by trained professionals and may require specialized equipment to apply. These are not readily available as 'over-the-counter' products and require state certification to purchase and use.
- Experienced companies know where to look for bed bugs, are schooled in proper techniques, and have an assortment of management tools at their disposal

When choosing a pest control company, make sure the company meets all the legal requirements that qualifies them to service your home, including a Pennsylvania Pesticide Applicator Certification or Registered Technician card, a business license and general liability insurance coverage. Also ask for a list of local references so you can learn about their past performance in treating bed bugs.

For more information on bed bug control see http://www.stop-pests.org under "Resources".

Useful Web Sites and Information

Images and ID tools for moths in North America
http://www.silkmoths.bizland.com/usatable.htm

Presentations and Recommendations from EPA National Bed Bug Summit
http://www.epa.gov/pesticides/ppdc/bedbug-summit/index.html

USDA's "Help Yourself to a Healthy Home" Booklet
http://www.healthyhomespartnership.net/resources.html

Conserving Wild Bees Publication

Conserving Wild Bees for Pennsylvania is the first brochure of the new Agroecology in Practice series from Penn State's College of Agricultural Sciences. The 5 1/2 x 8 1/2 four-color publication includes practical guidelines for land managers on how to conserve wild bees for improved crop production through habitat enhancements, conservation of nesting sites, and judicious use of pesticides.

The brochure folds out to an 11" x 17" poster with colorful, high resolution pictures of wild bees found in Pennsylvania along with a table of Pennsylvania native plants Penn State research has shown to be attractive to bees. This publication is available from the Publications Distribution Center, The Pennsylvania State University, 112 Agricultural Administration Building, University Park, PA 16802, or from http://pubs.cas.psu.edu/PubSubject.asp?varSubject=Bees%20and%20Beekeeping. This publication can also be downloaded from http://pubs.cas.psu.edu/FreePubs/pdfs/uf023.pdf. For information call (814) 865-6713.

Upcoming Events:

November 1-4, 2009 - **National Housing Education Research Association Conference**, Santa Fe, NM
http://www.housingeducators.org/CollStudElements/Conference2009infoST.shtml

November 7-11, 2009 - **American Public Health Association, 'Water & Public Health'**, Philadelphia, Pa. http://www.apha.org

November 7-11, 2009 - **Pennsylvania Asthma Partnership Meeting**, Harrisburg, Pa. Contact Sara Lewis at slewis@lunginfo.org

November 17, 2009 - **Western Pennsylvania Vegetable and Berry Seminar**, Butler, Pa. Contact Eric Oesterling at (724) 837-1402 or reo1@psu.edu or Lee Young at (724) 228-6881 or ljs32@psu.edu.

February 2-4, 2010 - **Mid-Atlantic Fruit and Vegetable Conference**, Hershey Lodge, Hershey, Pa. For more information go to http://www.mafvc.org/html/.

February 4-6, 2010 - **Farming for the Future Conference**, Penn Stater Conference Center, State College, Pa. For more information, go to http://www.pasafarming.org/

March 21-25, 2010 - **Pesticides in Urban Settings and Aggregate Human Exposures Symposium at the 239th ACS National Meeting & Exposition**, San Francisco, California. Contact Dan Stout (919) 541.5767, Bob Krieger (951) 827-3724, or Chris Peterson (662) 338-3104.

Have Something to Contribute?

If you have information to contribute, or would like to be added to our newsletter e-mail listserv, please contact Kristie Auman-Bauer, Editor, at (814) 865-2839, or e-mail at kma147@psu.edu.