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The Honey Bee Puzzle

IPM experts look for ways to keep colonies healthy

In 2006, managed honey bee colonies began to disappear in large numbers without known reason. Scientists suspect this problem may be caused by a complex combination of factors, including disease, parasites, pesticides, and other environmental stresses.

The Northeastern IPM Center has supported projects that boost our understanding of honey bee colony health, investing nearly \$350,000 in related research since 2003. These studies add to the knowledge base that could help us protect honey bees, which directly and indirectly pollinate one-third of the foods we eat.

Since the 1980s, bee colonies have been extensively damaged by a pest called the varroa mite. Dennis vanEngelsdorp (Pa. Dept. of Agriculture) tested the effectiveness of two biopesticides, formic and oxalic acids, which are used to control varroa in Canada and Europe but have not been approved for use in the United

States. In this country, beekeepers use conventional pesticides to control mites, but the pests show increasing resistance to these materials. Moreover, beekeepers are concerned about impacts of pesticides on bees and bee products.

Results of vanEngelsdorp's study showed that certain uses of organic acids can effectively suppress mite populations below the economic threshold. If organic acids were developed into registered products for American beekeepers, they might provide more economical mite management, reduce pesticide residues in bee products, and slow the development of mite resistance to conventional pesticides.

Penn State's Nancy Ostiguy has explored interruption of bee reproduction as a way of reducing levels of varroa mites, which require bee broods to reproduce. Ostiguy temporarily removed or isolated queens from the rest of the colony to prevent reproduction. Early results showed only minor differences in mite populations when brood production was interrupted, but Ostiguy also noticed very high levels of queen replacement by the colonies.

A closer look revealed a significant relationship between viral infection and queen replacement. In fact, colonies with the highest virus

levels requeened themselves most frequently. Varroa, a vector of bee viruses, may be a factor in this equation, too. Ostiguy was able to show, for the first time, the transmission of a virus to honey bee larvae via honey and pollen. Some viruses may contaminate pollen even before honey bee contact.

"These data are extremely important," Ostiguy explains, "because they may provide clues as to why queen quality has declined since the introduction of the varroa mite."

John Burand (Univ. of Mass.) is leading a multistate team to develop diagnostic tools for assessing bee colony health. By examining pathogens at the molecular level, Burand seeks a better understanding of microflora that enhance bee health. He hopes to translate this new knowledge into IPM recommendations that will help to maintain the microbes which are beneficial to bees.



Brooding over solutions...IPM scientists study mites, viruses, pesticides, bee reproduction, and beneficials in search of clues to colony collapse. ARS photo by Stepher Ausmus



IPM Educator Exchange Grants

Have you ever wanted to learn more about IPM but couldn't afford to travel to a meeting? The Northeast Vegetable IPM Working Group offers an Educator Exchange Program that pays up to \$800 to help agricultural professionals attend meetings about IPM practices in vegetables and strawberries, and then share what they've learned.

These modest grants can pay big dividends in IPM knowledge, as Cornell's Julie Kikkert found last November. Kikkert received funds to attend a midwestern food processing convention, where she learned about the snap bean aphid-virus complex.

"This was a hot topic at the New York snap bean advisory because viruses were so devastating here in 2007," Kikkert reports. "In discussing solutions, I was able to provide the most up to date information from the Midwest."

Educator Exchange applications are accepted and reviewed on a rolling basis. For complete information on the simple application process, visit NortheastIPM.org/work_vegetable.cfm.

IPM Resources

...supported with Northeast IPM funds!

Brochures and posters

Land grants partner with the food industry on IPM. Major food distributors have begun urging suppliers to actively support more sustainable environments in the production of food. As suppliers and growers explore ways of moving toward greater sustainability, some are looking to land grant institutions for guidance. Regional IPM Centers, the Sustainable Agriculture Research and Education Program, U.S. EPA, and land grant specialists created a brochure to help land grant personnel respond. Available for download at IPMCenters.org/CurrentIssues.cfm, this publication offers examples and tips on how to help growers, suppliers, and the industry.



Promoting green lawns to the public. Several publications will accompany a sustainable lawn-care display at the U.S. Botanical Gardens this summer. The "Green Lawns" materials include a brochure on IPM lawncare tips, an eco-score card, and a poster. View the full set at GrowingGreenLawns.org, and order single copies from the IPM Center (contact Angela DeFelice at amd88@cornell.edu). We expect to reach more than 750,000 visitors through this display, which will run until Columbus Day.

Raising IPM awareness of customers in greenhouse and garden centers. Margaret Skinner (Univ. of Vermont) and other northeastern Extension personnel are working with growers to increase public awareness of IPM by displaying posters in greenhouses and garden centers. The eye-catching posters describe IPM in simple terms to clientele who are often unfamiliar with the concept (in a recent survey, over 80% of customers had never heard of IPM). More than 6,000 posters have been distributed, and growers display them enthusiastically. The poster is accompanied by brochures that provide more details about IPM. Once the customers surveyed understood the term, more than 65% said they would be willing to spend 10–20% more for IPM-grown plants. Marketing plants as IPM-grown represents an added value to growers, and through this public/private initiative more customers are learning the value of IPM. For more information and copies of these materials, contact Skinner at Margaret.Skinner@uvm.edu, 802-656-5440.



On the Internet

No such thing as a stupid question! Maryland's Home and Garden Information Center website (HGIC.umd.edu) serves the northeastern region with information on plant diagnostics, pest management, invasive species, and more. When HGIC's frequently-asked-questions database grew to more than 20,000 questions with detailed responses (many with digital photographs), specialists on staff knew users would need a convenient way to tap into this wealth of information. They made the database searchable, so that visitors with repeat questions could find IPM solutions quickly. Clients can browse general categories or search by key word and/or date range. All answers have been screened by HGIC specialists for accuracy. The searchable database can be found under the "Send a Question—FAQ" link on the site.

Got IPM news to share? We release the *Northeastern IPM Monitor* (NortheastIPM.org/Monitor.cfm) to nearly 1,000 IPM professionals and practitioners. This e-newsletter links readers to news briefs on IPM research, extension, workshops, funding opportunities, and job openings. Northeastern IPM Center staff prepare the *Monitor*, posting IPM-related news items from partners throughout the Northeast. If you have news to share or would like to receive monthly *Monitor* postings via email, contact Amy Galford (aeg1@cornell.edu).

Reading, Writing, and IPM

Connecticut's new classroom environment

Today, IPM outreach is extending beyond the agricultural community to all citizens. Teaching IPM concepts to school children has emerged as a strategy that prepares all citizens to make decisions that safeguard the environment and human health.

In 2006, Connecticut Extension Educator Donna Ellis received Northeast IPM funding to expand an IPM Environmental Education Curriculum that engages students and their families in learning about insects, invasive plants, and other pests that occur in and around homes, buildings, farmland, and natural areas.

The University of Connecticut curriculum teaches students what pests are (insects, weeds, pathogens), how to control them (mechanical, biological, chemical, cultural controls), and how to protect the environment by keeping our food and water safe and preserving biological diversity. The curriculum is especially relevant to science programs but also links to social studies, language arts, math, and art.

The IPM curriculum is developed as modules, presented to educators through workshops and



Donna Ellis displayed several of the IPM curriculum modules at a community IPM conference in 2005. Since then, UConn's team has expanded the set for use in grades K–8. Photo by Kathy Murray.



With IPM fundamentals under their belts, children will understand how growers help to protect the environment, and they will be more likely to apply IPM principles in their own homes and daily lives.

training sessions. “Our trainees have been very enthusiastic,” Ellis reports, “because the modules promote critical thinking and scientific inquiry.”

For more information or to order modules, visit www.hort.uconn.edu/ipm or contact Donna Ellis at 860-486-6448.

Moving toward IPM in all northeastern schools

A new School IPM Implementation Working Group is forming in the Northeast, building on the groundwork that has been laid by state IPM programs in the region. This group, led by Lynn Braband (NYS IPM Program at Cornell Univ.) and Kathy Murray (Maine Dept. of Agriculture), will connect with key school IPM stakeholders in the region and will link these groups with broader efforts nationwide to share successful strategies in school IPM.

The working group's members will represent school professional organizations, land grant universities, state regulatory agencies, pest control professionals, and environmental advocates from at least six states in the region. These representatives will work with stakeholders to identify needs and opportunities for research, extension, education, and implementation for school IPM so that funding organizations will have a grounded sense of priorities and projects needed to promote school IPM in the region.

The new working group will multiply K–12 IPM teaching and learning tools, like the modules that Donna Ellis has created in Connecticut. The group aims to network and coordinate across state lines and among different organizations to infuse IPM into science, math, social studies, language arts, and other core curricula.

An overall aim of the group is to help northeastern states meet the national goal of implementing IPM in all U.S. schools by 2015. Regional school IPM leaders laid good groundwork at the New England School IPM meeting, held May 19 in Concord, NH, where they identified issues, needs, and priorities for regional action.

Center Says Farewell to Liz Thomas

This spring we bid farewell to our friend and colleague Liz Graeper Thomas. A former IPM fruit consultant, Liz joined the Center in 2001 when it was still in its infancy. Since then she has been a leader in website and database development, IPM priority setting, and conference planning.

Above all, Liz has strengthened our connections with partners. Her knowledge of IPM, her inquisitive nature, and her personal warmth have helped so many of us to connect, whether networking at meetings or sharing a good meal at a large table.

We are grateful for Liz's time with the Center, and we wish her all the best serving as a Town of Ulysses board member and forming other new partnerships.



IPM Partnership program supports 24 new projects

In 2008, we awarded nearly \$475,000 to support the following research and outreach projects in northeastern states.

IPM Working Groups

Northeast School IPM Implementation Working Group
Multiregional Working Group on Sooty Blotch and Flyspeck of Apple
Northeast Community IPM Working Group
Northeast Vegetable IPM Working Group

Regional IPM Publications

IPM for Homeowners and Gardeners: Outreach via Brochures, Presentations, and the Web
Web-based Vegetable IPM Resource Database: Publicity and Upkeep
Developing a Fungicide Resistance Management Guide for Vegetable Growers in the Mid-Atlantic Region

IPM Issues

Master Gardener-Facilitated IPM Education for Homeowners
Adopting New Methods for Cucurbit Virus Diseases
Guardian Plant Systems for Greenhouse IPM

Second Regional Workshop with NRCS to Foster IPM as a Conservation Practice

IPM Planning Documents

New England Maple Syrup Pest Management Concerns Survey; PMSP for Brambles in New England
Planning a PMSP Workshop in Ornamentals
PMSP for Commercial Greenhouses in the Northeast

IPM Minigrants

Behaviorally Based Management Strategies for the Plum Curculio and Apple Maggot Fly in Northeastern Apple Orchards
Production of Disease-Free Onion Bare Root Transplant Seedlings
Quantifying the Exposure and Effect of Farmer-Applied Pesticides on Northeast Migratory Operations Pollinating Crops in PA, NJ, ME, and MA

State Network Projects were funded in each state to respond to federal requests regarding pest management methods.

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