

INTEGRATED PEST MANAGEMENT

Insights

January 2017: Volume 14, Issue 1



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Signature Programs



IPM a Way Forward for Invasive Species Management

If you're someone who wants to promote the conservation of biodiversity—to sustain the diversity of plants, animals, and other organisms on the planet—and enjoy seeking solutions to complex problems, you might enjoy working on the issue of invasive species.

“Although invasive species seem to be an insurmountable problem,” said Carrie Brown-Lima, director of the New York Invasive Species Research Institute (NYISRI), housed in the Department of Natural Resources at Cornell University, “We can't just throw in the towel. We can all play a part by taking personal actions to slow the spread of invasive species and prevent new introductions.”

An example of such a personal action might be educating yourself about the hemlock woolly adelgid, an aggressive insect pest that feeds on the sap of hemlock trees and has decimated their populations from North Carolina to southern New England.

“We can learn a lot from IPM and in fact, many of our invasive species are being addressed by IPM programs,” Brown-Lima commented. She notes that invasive species managers think in much the same way as IPM professionals. For example, according to the Northeastern IPM Center website, “IPM is *integrated* because it brings together, or integrates, a range of biological, organic, cultural, mechanical, and chemical options for pest problems.” That is exactly what her invasive species managers do, she said.

Brown-Lima's organization serves members of the scientific research community, natural resource and land managers, state government officials, and personnel of state-sponsored organizations. They promote information-sharing, develop recommendations, and create sets of instructions for accomplishing policy-related tasks, or implementation protocols, for research, funding, and management. Their primary objective is to improve the scientific basis of invasive species management.

Another primary goal is to provide invasive species managers, policy makers, and researchers with information. To this end, they have made improvements to their website, adding expert and manager contact databases, blogs, and webinars. They also coordinate

an annual conference. In addition, Brown-Lima sees a need for more decision-support tools that would facilitate the use of decision science in invasive species management.



The hemlock woolly adelgid (*Adelges tsugae*) is a tiny insect that feeds on eastern hemlock and produces a wool-like protective covering as seen here. Source: Bruce Watt, University of Maine, Bugwood.org.

“Prevention is always the best policy,” Brown-Lima said. “Some of the most problematic species here in New York are uncommon in their native range. Non-native species, not yet considered invasive, can become invasive under different climatic conditions or with land-use change.”

Brown-Lima says that the National Invasive Species Council recently updated their national invasive species management plan on its website.* This key document can help newcomers get up to speed with knowledge of invasive species issues.

You could also become an ecological scout. For example, you could join a group in your local area that reports sightings and infestations of the pernicious hemlock woolly adelgid.

—Chris Gonzales

Reference

* The National Invasive Species Council Management Plan 2016–2018 can be downloaded from <https://www.doi.gov/sites/doi.gov/files/uploads/2016-2018-nisc-management-plan.pdf>



Invasive Update: Spotted Wing Drosophila

In 2016, the Northeastern IPM Center awarded \$20,000 for a working group led by Julie Carroll of the New York State IPM Program at Cornell University to control the spread of the invasive spotted wing drosophila (SWD). The project is designed to identify and prioritize research and extension needs for the pest. Priorities in the prior year were topped by biological control, knowing what to do, i.e., recommendations for next season, and optimizing the use of insecticides. These were followed by early detection monitoring tools, behavioral controls such as repellents, attract and kill, mass trapping, push and pull, and trap crops.

Since its discovery in the Pacific Northwest in 2008, this tiny vinegar fly (*Drosophila suzukii*) has established outposts in nearly every fruit and berry-growing region of North America. Unlike most vinegar flies, this one attacks undamaged fruit.

For more information about spotted wing drosophila, including fact sheets and updates for the Northeast and from national sources, visit <http://neipmc.org/go/kWby>

The Identity Problem of the Southern Pine Beetle

You would think an organism named after the Southern region would stay there. Not so for the southern pine beetle (SPB), which has been wandering northward into the pine forests of New Jersey and neighboring states, causing major destruction to native pine forests. While the name “southern” might not fit this bug anymore, “beetle” still does—along with “prominent tree-killer.” Scientists call it *Dendroctonus frontalis*. For Matt Ayres, a professor of



The southern pine beetle is now found as far north as Long Island and is deadly to many species of pine. Source: Pest and Diseases Image Library, Bugwood.org.

biological sciences at Dartmouth College, one of his biggest surprises has been how fast recent atmospheric changes have been, and how the SPB invader has taken advantage, turning pines into widows.

He gave a talk at the National Forum on Climate and Pests, sponsored by the Northeastern IPM Center, on October 4. The Center’s website offers a free video of his presentation.

According to Ayres, for enhanced security against the growing numbers of pest species that are expanding their ranges and invading new regions, we need to focus on several factors:

- improved pest monitoring and mitigation
- increased knowledge sharing
- improved biosecurity against future invasions
- management plans that anticipate continuing change
- growth of practical theory that is transportable among forests and regions

“There’s nothing more practical than good theory,” Ayres remarked. “There is already a trove of theories that inform practical management strategies.”

As in the case of SPB, temperatures affect insect survival. Warmer temperatures increase metabolic

rates. Temperature affects phenology and species interactions. Ayres gives an example of Arctic mosquitoes, in the presence of warmer temperatures, develop faster than their predators can eat them. It’s a simple example, and population dynamics could go the other way. Unfortunately, in this case, humans lose.

He’s also interested in the idea of phylogenetic conservation of pestilence. This means that pests tend to be members of particular evolutionary groups (clades). Examples are *Dendroctonus* bark beetles, *Agrilus* woodborers, autumnal and winter moths, and adelgid plant-suckers. Due to shared genes, creatures within each of these clades are more likely to be plant-killers than most other species of insects.

See “Southern Pine Beetle” Page 4 (Back Panel)

Resources

IPM Insights on Flipboard

News from the Northeastern IPM Center:
<http://flip.it/OvepB>

Get Flipboard for free to keep up with the news you care about: <http://flpbd.it/now>

“Why IPM?” — A New Video Series



The Northeastern IPM Center’s new video series poses the question, “Why IPM?” Watch the

introductory video and join the conversation at <http://neipmc.org/go/WhyIPM>

Northeastern IPM Center Websites

NortheastIPM.org — Our main website for promoting and funding IPM in the Northeast

StopPests.org — Training materials, pest solutions, and advice for implementing IPM in multifamily housing

StopBMSB.org — Management of brown marmorated stink bug in U.S. specialty crops

A Career in IPM and Invasive Species

Donna Ellis, a senior extension educator at the UConn Department of Plant Science and Landscape Architecture, and co-chair of the Connecticut Invasive Plant Working Group (CIPWG), has led an interesting career in IPM and invasive species.

She said her first experiences in growing plants could be attributed to her late father, who had an extensive backyard garden each summer in Delaware and taught her family how to grow vegetables. During summer dinners, he would begin discussion around the table with a question, “Do you know what it takes to grow _____?”, filling in the blank with beans, beets, corn, tomatoes, or whatever else was harvested that day. Pest management was certainly a part of growing produce each season. She learned about common garden pests (and pulled a lot of weeds) during her childhood.

Today, each day brings its share of emails, phone calls, and other inquiries regarding invasive species and related IPM topics; teaching; conducting IPM training programs or site visits for invasive plants; developing, presenting, or participating in meetings, programs, and other events; writing proposals and administering grants. As a state IPM coordinator, she connects regularly with the Northeastern IPM Center.

IPM can be utilized with any type of pest, she noted. Therefore, IPM can play a central role in managing invasive species. One would begin with identifying the problem species, learning about its life cycle and how it affects the desirable plants and the overall habitat. The species would be monitored to determine the extent of the population and damage that is occurring. Management options, if needed, would be considered, and these could include biological, cultural, physical/mechanical, and chemical. One or more types of management may be needed. Most importantly, long-term monitoring should occur to verify and document results of the management undertaken.

One of Ellis’s first responsibilities with invasive species was to conduct exotic pest surveys for the USDA APHIS Cooperative Agricultural Pest Survey (CAPS) Program.

During the mid-1990s at UConn, she had an opportunity to continue her collaboration with USDA APHIS and received funding for invasive species

biological control. The first project was releasing *Serangium parcesetosum* predatory beetles for control of silverleaf whiteflies (*Bemisia tabaci*) on greenhouse poinsettias.

Additional opportunities to conduct biological control projects for invasive species occurred with USDA APHIS in 2007 for mile-a-minute weed (*Persicaria perfoliata*) and in 2011 for lily leaf beetle (*Lilioceris lili*). The mile-a-minute project is a collaborative effort between UConn and the Connecticut Agricultural Experiment Station. These two projects are still underway, and the biological control agents are establishing at many release sites.

“I remember fondly our first CIPWG organizational meeting attended by thirty people in Vernon, CT where together with the other attendees we listed and ranked



Donna Ellis leads a guided invasive plant tour in Washington, Connecticut.

our top ten non-native invasive plants. Nineteen years later, CIPWG is still going strong, with 800 e-mail subscribers, an active website, and CIPWG members convening biennial invasive plant symposia attended by an average of 450–500 people.”

The invasive species projects with which she is involved are funded primarily through USDA NIFA, USDA APHIS, and UConn.

She would point newcomers to the IPM website (www.ipm.uconn.edu) and the CIPWG website (cipwg.uconn.edu). Both websites have valuable resources on invasive species and other program areas in IPM.

—Chris Gonzales and Donna Ellis



Identifying an Invasive: The Case of the Stink Bug

Several insects look similar to the invasive brown marmorated stink bug (BMSB), including brown stink bug, spined soldier bug, and dusky stink bug.

In fact, on StopBMSB.org, a website of the Northeastern IPM Center dedicated to the invader, the most popular page (besides the home page) is the one about stink bug look-alikes.

You might confuse BMSB with native, brown stink bugs of the genus *Euschistus*. An easy way to distinguish them is to look at their undersides. BMSB has a brown-gray underside; brown stink bugs, native to North America, have a yellowish-green underside.

You can distinguish the spined soldier bug, *Podisus maculiventris*, from BMSB by looking at the shoulder angles. The spined soldier bug has sharp, acute angles at the shoulders compared to BMSB, which has more rounded, obtuse angles. The spined soldier bug, as a generalist native predator, reports for duty as a good soldier and in fact will eat BMSB.

The dusky stink bug, *Euschistus tristigma*, is generally smaller than BMSB. Dusky stink bugs also have pointed shoulders, similar to the spined soldier bug.

For detailed photos of the brown marmorated stink bug and to tell the good bugs from bad, visit <http://stopbmsb.org/go/HEDQ>

Southern Pine Beetle, Continued



Southern pine beetle damage. Source: Tim Tigner, Virginia Dept. of Forestry, Bugwood.org.

Ayres noted that we should see more cases of range expansions and invasions by forest pests because of the individual and interacting effects of climate warming, international trade, and human land use.

He showed photos of huge expanses of trees killed within weeks following coordinated attacks by thousands of SPB per tree.

See for example, in his talk, slide 25, of New Jersey pines killed in weeks by *D. frontalis*.

“Managers can frequently suppress SPB outbreaks by cutting down a band of trees within local infestations where the beetles are highly concentrated,” Ayres said.

He lauds the effective SPB management program in the southeastern states as “one of the greatest success stories in the history of forest pest management.” This program, led by the U.S. Forest Service, is essentially IPM for forests. It includes systematic monitoring with pheromone-baited traps and active suppression when populations first begin to rise, via cutting and removing the trees in which beetles are concentrated. It reduces risk with silvicultural practices such as thinning and controlled burns that reduce the extent of high density

(overstocked) pine forests. Otherwise, these forests would become excellent SPB habitat and could rapidly produce enormous populations and regional epidemics.

“We can have more success stories like this,” Ayres commented, “and we will need them because the pests will keep coming.”

Ayres would like to see broader public support for forest management. “Funding for pest management is shrinking and this is a serious problem as the challenges are multiplying and the value of healthy forests is growing,” he said, “but this can be solved because the costs are modest and the benefits large and lasting. We just need more advocates who strongly support forest health in the twenty-first century.”

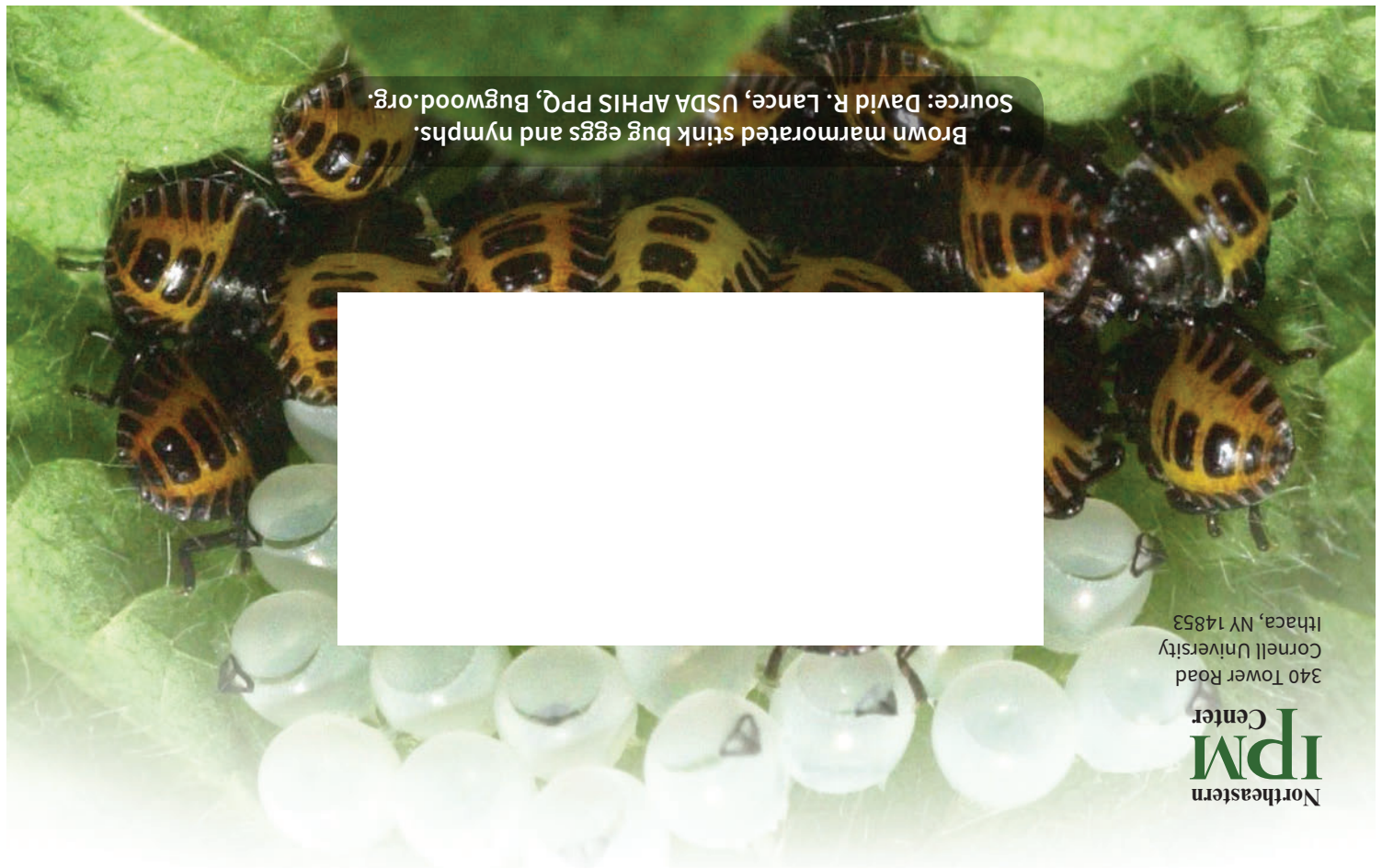
—Chris Gonzales

Credits

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The Northeastern IPM Center is supported by the National Institute of Food and Agriculture, Crop Protection and Pest Management, Regional Coordination Program, Grant #2014-70006-22484. Printed on recycled paper. 4.6M; CP 1/17



Brown marmorated stink bug eggs and nymphs. Source: David R. Lance, USDA APHIS PPQ, Bugwood.org.