Bees, bees and more bees!!

Research and News on the latest pest management techniques

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PestTalks

COMING UP THIS WEEK:

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What the ... ?

First things first, what you've been waiting for: the answer to and winners of last newsletter's "What the … ?" game. And the answer is (drum roll) ... orchid pollinia stuck on a bumble bee! Did you get it? Matyas Bartha, Jim Borland, Jonathan Ebba, Megan Mathey, Gary Matsuok, and Julie Rosenberg did. Kudos! Y'all are better sleuths than I was.

I thought the yellow flakes might be orchid pollen, but I thought, "Nah, that just can't be!" It was Tony Bertauski, the photographer, who solved the mystery by chancing upon videos of bees pollinating orchids. Guess what? Tony has orchids in his greenhouse.

Orchids have very interesting interactions with their pollinators. Some orchid species entice their potential pollinators with the usual reward of nectar. Some rely on deceit. They have flowers that look like females in flight or emit a scent that smells like the pheromone of female wasps or bees. As the bees or wasps try to get to the nectar, or the males try to mate, the pollinia (compact balls or flakes of pollen) stick to them.

In this case, the bumble bee probably was trying to get to nectar at the bottom of the flowers (or labellum) and brushed against the sticky pollen. Does it mean bumble bees are pollinators of orchids? Nah, I don't know about that. It was probably just a chance encounter.

Not exactly a pest management issue, but interesting natural history nonetheless.

The next "What the … ?" critter is considered a pest by some:

I found them by the side of my driveway this morning. I've been waiting for these "little volcanoes" to pop up, signaling the coming spring. We've had a warm spell in the past few days. Believe it or not, the red maples around my house are breaking buds.

What are they? The answer is at the end of this newsletter.

Recent insights and efforts in pollinator research

I'm part of a research team funded by USDA Specialty Crops Research Initiative (SCRI) Grant to develop approaches to protect pollinators in the horticultural industry. We had our meeting of researchers and advisory group members (including representatives from industry groups, pesticide manufacturers, EPA staff and beekeepers) in St Louis, Missouri, a couple of weeks ago.

The researchers reported on their previous and ongoing research projects. It's quite fascinating how quickly we've gained insights into ways we might reduce negative impacts of systemic insecticides on pollinators. I'll interject some of the findings in the rest of the newsletter.

One of the most exciting outcomes is the project's website, Protecting Bees. Y'all can find information on the researchers and advisors of the project, our research and outreach efforts, papers and information sheets on pollinators and links to other useful resources.

The website includes a searchable database of pollinators and pollinator-attractive plant species. This feature is still under development, but attendees of the meeting were given a glimpse of what it can do. Once it's completed, users of the database will be able to produce a list of pollinator-attractive plant species either by searching for the plants or the pollinators.

I know what my wife would do with the database. She'd print out a list of plant species that are not bee-attractive and hand it to me. Poor girl, she is deathly afraid of bees but ironically married a bee-keeping entomologist. Love trumps all fears; at least that's what I want to think.

Pollinator attractive plants

Part of the SCRI project looks at attractiveness of our most popular herbaceous and woody plants to

pollinators. I'm sure y'all have seen lists with titles such as, "Most bee-friendly plants." Do you ever wonder how the author generated the list? I do, always. Our goal is to put some science behind the lists we generate.

After the researchers compared notes, not surprisingly, some plant species are winners (e.g., lavender and portulaca), and some are losers (e.g., vinca), in terms of their pollinator attractiveness. One thing also becomes immediately apparent; Some cultivars are more attractive to pollinators than others of the same species. So, to put a general label saying "Plant species A is attractive to pollinators," is a bit misleading. The researchers will continue to tease out what makes one cultivar more attractive than the other.

If you can't wait to get some information on pollinator-attractive plants, check out Horticultural Research Institute's *Plants Bees Like Best.* The document is based on recent research conducted by Bernie Mach and Dan Potter of the University of Kentucky. Not only does the document give you a list of bee-attractive plants, it also tells you whether the plant species is native or non-native, and their bloom times. Great resource for planning your next garden, identifying which plant species (and when) you don't want to spray, and determining which species to grow to meet increasing demands.

We can expand or generate such a list with research data from our SCRI project, making it more useful for our operations and our customers. Indeed, generating such a list is one of the major outreach goals of the project.

What happened to neonicotinoids in plants?

Another objective of the SCRI project is to find out how quickly systemic insecticides (not just neonicotinoids) degrade in plant tissues and how much ends up in nectar and pollen. To be comprehensive, we've conducted studies on both herbaceous plants and woodies, as well as both annuals and perennials.

Most of the research is still ongoing and not ready to make any conclusions. But, based on previous and ongoing research, it has become quite clear to us that systemic insecticides behave differently in plant tissues, and because of that, the amount of residues differs among insecticides, application methods, times of application and plant species.

The picture is quite complicated. Two recent studies illustrate that perfectly.

Bernie and Dan treated three groups of in-ground *Clethra* and *Illex* x *attenuata* with a soil drench of dinotefuran (Safari) and imidacloprid (Merit) with three treatments (spring, summer and fall). They extracted nectar from the flowers in early summer (during bloom) over 2 years and analyzed for insecticide residue in the nectar.

Results suggested that Merit and Safari, when applied at the labeled landscape rates in the fall of year one and spring of year two, can result in an amount of residue detrimental to bees in year two but not in year three. An obvious recommendation is to reduce the application rate so the residue can dissipate quicker, but it is not clear if doing so will reduce the insecticide's effectiveness. Another surprise is that application of Merit just after bloom in the summer resulted in low residue concentrations in nectar after one year, but application of Safari at the same time did not. The results highlight the point that neonicotinoids are not created equal. (The study was published in *Environmental Toxicology and Chemistry,* DOI: 10.1002/etc.4021.)

The second study comes from Rich Cowles and Brian Eitzer of Connecticut Agricultural Experiment Station (*Journal of Environmental Horticulture*, Volume 35, page 24-34). Rich and Brian treated sunflowers and swamp milkweed with a spray or drench (at labeled nursery rates) of Safari (dinotefuran),

Flagship (thiamethoxam) and Xytect (imidacloprid) at 2, 4, 6, 8 and 10 weeks before bloom (only 2, 4 and 6 for milkweed).

Results suggested that spray application did not result in residue concentrations that were considered dangerous to bees being detected in the pollen of sunflowers. Drench applications of all insecticides at high rates, of medium rates of Xytect and Flagship up to 6 weeks before bloom, of medium rates of Safari up to 8 weeks before bloom, and of low rates of Safari up to 6 weeks before bloom could result in residue concentrations that are above the thresholds. Treating swamp milkweed with neonicotinoids, regardless of active ingredients, application timing and method, resulted in high concentrations of residue in nectar.

These studies demonstrate that the residue concentrations in nectar and pollen depend on different combinations of active ingredients, plant species, application method and application timing. Well, that just blew my mind. I'll admit, it will take us many more studies to figure things out.

JC's soapbox

Since the pollinator and neonicotinoid issues blew up in our industry, I've observed several trends emerging as this process unfolds. Last September, I addressed five of these emerging trends in a keynote speech I gave to the Horticultural Industry IPM Symposium at the North Carolina Arboretum.

First trend: Some pests have become more problematic in situations where their control relies on neonicotinoids. One example is medium drench against aphids and whiteflies in hanging baskets, a situation in which neonicotinoid drench can provide long-term control in a hard-to-reach area. New tools will be needed here.

Second trend: Many growers have moved on and eliminated neonicotinoids from their toolbox. Those who can and choose to continue using neonicotinoids will have to use them more carefully and smarter. One potential improvement is to apply systemic insecticides at appropriate times to minimize insecticide residue on plant surfaces, nectar and pollen. When a situation doesn't allow the use of neonicotinoids (e.g., plants are flowering or too close to shipment), a grower will need to integrate alternatives into their program. You don't have my sympathy if you come crying, all the while wanting to use neonicotinoids and neonicotinoids only.

Third trend: Systemic alternatives (such as flupyradifurone and diamides) are available for growers who decide to phase out neonicotinoids. I'm working with some of these chemistries, and I'm quite optimistic of their efficacy and utility in our industry.

Fourth trend: An increased adoption of biocontrol is a welcoming trend. The evidence of its increasing popularity is in the numbers of biocontrol articles published in magazines over the past two years. Heck, it was almost difficult to get in the room when a talk was given on biocontrol at the Far West Show! I am a strong supporter of biocontrol. Perhaps I am biased, since my graduate study was on mealybug biocontrol. But I am also a realist. Biocontrol is not for everyone, and it's not something you can just jump into, like spraying a pesticide. It'll require knowledge, training and patience.

Fifth trend: An increased use of organophosphates, carbamates and pyrethroids is a troubling trend. This trend bore out in my conversations with many growers. This trend troubles me because we may be exposing our growers to greater toxicity, not to mention its incompatibility with biocontrol. We need to use these older chemistries more carefully and perhaps change our perception of what an "acceptable" plant is.

I asked the attendees how they define "bee friendly" and "neonicotinoid-free." Man, oh man, the variety of answers I got! If these terms are confusing to professionals, imagine how confusing they must be to consumers. But, with the premium price a grower can get by labeling their products as such, we'll likely see more "bee friendly" marketing strategies in the marketplace. As a truth-seeking consumer, I'm totally p.o.'ed! Putting myself in a grower's shoes, however, I understand why the practice has become more popular.

Regardless of which side you stand on the neonicotinoid-pollinator controversy, this is something we can all agree on: We in the horticultural industry can help our pollinators, even by just a little. We produce thousands of species and cultivars of flowering plants, and many of them can be an integral part of a pollinator habitat.

As the little hillside garden in front of my friend Rob's New Hampshire home demonstrated, a few lingering salvia, zinnia and wreath nasturtium were welcoming sustenance for dozens of bumble bees and honey bees in a brisk mid-October afternoon. Perhaps, it takes just one garden at a time.

My friend Rob's garden in New Hampshire on a cold mid-October day.

One of the most appreciative creatures is our mystery critter. The "little volcanoes" are nest entrances of digger bees or miner bees. This is a group of solitary bees (meaning that each nest has only one bee) that likes to congregate in large numbers on exposed, sunny ground. Some may object to the large numbers of dirt mounds on their lawns. These digger bees are not pests; they don't sting and usually avoid people. I love them. So I appeal to you to leave them alone. The best way to reduce their numbers is to cover the exposed ground with grass or mulch. Losing their nesting site, the bees will move on. Save your insecticide for something else.

Stepping off the soapbox,

JC Chong
Associate Professor of Entomology at Clemson University

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