The **Research** Buzz

by Hannah Whitehead, Honey Bee Extension Educator, UMass Amherst, **December 2019**

Welcome back to The Research Buzz, a recurring column where I summarize some of the newest and coolest in bee research. This week, you'll hear about a new study on "mite bombs" (cliff notes: maybe they should be called "robber lures" instead) and learn about the role that flowers may play in virus transmission between bee species. I also summarize new research on miticide residues in wax foundation and discuss an important new study on neonicotinoids and *Varroa* (in which researchers ask: is neonic exposure more harmful when bees are also parasitized by mites?) Finally, I include a link to a new pollinator-friendly pesticide decision-making guide out of Cornell that's worth checking out. You can also read this column on the UMass Extension website.

1

"Mite Bomb" or "Robber Lure"?

backyardbeekeeping101.com

When *Varroa* mites kill a colony, mite levels in neighboring colonies often skyrocket. **But how exactly do mites spread from these "mite bombs"?** Do disoriented bees from dying colonies drift into healthy hives, transporting mites? Or are collapsing colonies irresistible targets for robbing by healthy bees, who inadvertently ferry mites home? Are healthy colonies safer if they are 50m or even 300m from dying ones? These are the questions that Tom Seeley and his research team sought to answer in a paper published this summer. The researchers observed what happened to low-mite colonies placed at varying distances from a cluster of collapsing high-mite colonies. **They found that mites spread via both drifting and robbing, but that robbing was the more significant mode of transmission.** They also observed that colonies closer to collapsing hives (0m away) were more likely to receive mites via drift, but that distance had no effect on mite transfer via robbing (hives 300m away still saw a mite spike). They conclude that collapsing colonies should really be called "robber lures" rather than "mite bombs".

Why is this research important?

This research is important because it shows us that: 1) robbing drives the "mite bomb" phenomenon more than drifting, and 2) hives are not safe, even at a distance of 300m. The authors suggest that it is important to repeat this study on a larger scale, and to test these questions in other locations where there might be different pressures for drifting and robbing.

Read the full study here.

2 Health impacts of miticides in wax foundation

The miticides coumaphos and tau-fluvalinate are ubiquitous in beeswax. In a 2018 Massachusetts study, for example, **we found coumaphos in 94% of all wax samples**. Coumaphos and tau-fluvalinate were once popular for controlling Varroa but are rarely used today because they impact bee health (especially queens) and accumulate in wax (they don't degrade when melted, so likely persist in wax products and foundation). Two recently published studies explored potential impacts of coumaphos and tau-fluvalinate residues in wax foundation. A group out of Texas A&M assembled hives with miticide-free or miticide-laden foundation and observed bee health outcomes. **Surprisingly, they found no effect of foundation type on hive health.** However, hives with high mite levels were less likely to survive winter, underscoring the importance of mite management. Another research group out of Argentina focused on larval development. **They found that brood raised on miticide-laden foundation had a lower survival rate than brood raised on miticide-free foundation.**

Photo credit: Max Westby

Why is this research important?

These studies highlight that *Varroa* mites are the number one most important threat to honey bee health – much more important than miticide residues in foundation. However, they also suggest that coumaphos and tau-fluvalinate residues may have some negative effects, such as increased brood mortality. Given the ubiquity of these miticides in wax, future research should explicitly test their prevalence in commercial foundation and explore other effects on hive health.

Read the Texas A&M study here. Read the Argentina study here.

3 Flowers as "viral hotspots"

Pathogens threaten the health of both honey bees and native bees. In fact, **there is evidence that honey bee colonies (and commercial bumble bees) could be viral hotspots, transmitting viruses to nearby native bees.** Researchers at the University of Vermont recently tested whether virus transmission can occur on flowers, when honey bees leave behind contaminated feces or glandular secretions. In experimental tents, they let virus-laden honey bees (DWV + BQCV) forage on a patch of flowers, and then allowed virus-free bumblebees to forage on those same flowers. They later tested the flowers and the bumble bees for viruses. **They found that honey bees indeed deposited viruses on flowers. However, the viruses were not transmitted from the flowers to the bumblebees.** They caution that the viruses may have been transmitted in levels too low to be detected, and that transmission may still be happening in the wild.

Photo by Jane Ogilvie/Chicago Botanic Garden

Why is this research important?

This is the first paper to show that honey bees can deposit viruses on flowers. It is an important step in understanding disease transmission between bee species.

Read the full study here.

4 Neonicotinoids + *Varroa* mites impact winter bee health

This past spring, an international team of researchers published a paper testing whether neonicotinoid exposure and *Varroa* parasitism interact to affect the health of winter bees (long-lived bees born in autumn, who are crucial for overwintering survival). They found that winter bees exposed to the neonicotinoid thiamethoxam and parasitized by *Varroa* as pupae weighed less at emergence and died sooner than un-exposed and un-parasitized bees. Neonicotinoid exposure alone did not affect emergence weight or lifespan. *Varroa* parasitism alone did reduce emergence weight and shorten lifespan, but not as much as the two stressors combined. **In short, the researchers found that Varroa parasitism alone was much more damaging to winter bee health than neonicotinoid exposure alone – but that the worst outcomes occurred when the two stressors were combined.**

Why is this research important?

This is one of the first papers to demonstrate an interaction between Varroa mites and neonicotinoids on winter bee health. Mites reduce bees' ability to detoxify pesticides, which might explain why the neonicotinoid affected winter bee health in combination with Varroa, but not alone. **The fact that the researchers saw reduced lifespan in winter bees is especially significant, since these long-lived autumn-born bees are critical for winter survival.** It could help to explain why hives exposed to multiple stressors go into winter strong and die before spring. Overall this study shows us that 1) *Varroa* control is critical for winter bee health (more important than pesticide exposure) and 2) researchers exploring health impacts of neonicotinoids should pay attention to interactions with other ubiquitous stressors like *Varroa* mites.

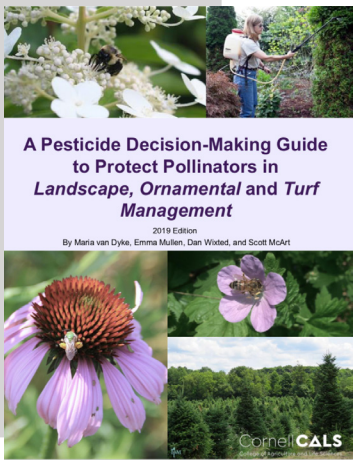
Photo by Jason Graham, University of Florida

Read the full study here.

5 A new pesticide decision-making guide

A research group out of Cornell recently published a pollinator-friendly pesticide decision-making guide for landscape, ornamental and turf management. This is the second publication in a series that also includes a pesticide guide for tree fruit orchards. **What is unique about these publications is that they discuss known synergies between chemicals, i.e. instances where the toxicity of one chemical is magnified when it occurs alongside another chemical.** For examples, the new guide points out that the fungicide thiophanate-methyl is practically non-toxic alone but becomes highly toxic to bees when used in combination with imidacloprid. These guides are useful for growers, landscape professionals, and home owners who want to make informed pest-management choices.

Read the guide here.



Contact: Hannah Whitehead, UMass Extension, hwhitehead@umass.edu