The **Research** Buzz

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

Welcome back to The Research Buzz, a recurring column where I summarize some of the newest and coolest in bee research. This week, we start by talking about the temporary suspension of the USDA-NASS Honey Bee Colonies Survey, and clarifying which bee health survey was affected (and which weren't). Then, we discuss an important paper in which researchers analyzed 12 years of data on neonicotinoid seed treatments in soybean production (hint: turns out they don't have much of an effect on yield). You will also learn about *Varroa* transmission via flowers, and the impact of nutritional deficiency on colony growth (the latter study was conducted in Massachusetts!). Finally, I'll describe new research on the unusual "sexual arms race" between queens and drones. You can also read this column on the UMass Extension website.

1

USDA-NASS Survey Temporarily Suspended

This summer, the USDA National Agricultural Statistical Service (NASS), suspended data collection for their Honey Bee Colonies Survey due to resource contraints (you can read their statement here.) They recently announced that they will resume collecting data this fall.

How important is this?

The USDA-NASS Honey Bee Colonies Survey is the only government-run survey collecting data on colony numbers and colony loss in the US. If it were discontinued, it would impact our ability to track losses at a national level. Fortunately, it was only briefly suspended this summer.

Since there are a number of bee health surveys in the US, I think it is important to clarify which project was affected by this suspension. There are three primary organizations collecting national honey bee data: **(1)** The **Bee Informed Parternship (BIP),** a non-profit, which has been surveying beekeepers about colony loss and management practices since 2006 in their Management Survey. **(2)** The **USDA Animal and Plant Health Inspection Service (APHIS)**, which has been monitoring disease levels in large-scale apiaries since 2009 through their Survey of Honey Bee Pests and Diseases. For this survey, apiary inspectors from participating states send in bee and wax samples for analysis – you can check out the data here. **(3)** The **USDA National Agricultural Statistical Service (NASS)**, which has surveyed beekeepers about honey production since 1986 in their Honey Survey. In 2015, in response to concerns over bee health, they added the Honey Bee Colonies Survey, which collects information about colony numbers and loss in the US. It is this NASS Honey Bee Colony Survey that was temporarily suspended.

2

Neonic seed treatments have negligible effects on soybean yield

In September, researchers from 14 universities across the US released a paper in *Nature* that summarized research on neonicotinoid seed treatments (NST) and soybean yields. They analyzed 194 studies spanning 12 years, and 14 key soybean producing states. The researchers found that **using NST had negligible effects on yield**. In fact, management decisions like planting date had more impact on yield than seed treatment. They also found that IPM practices (scouting for pests and treating once pests are present) led to higher yields than prophylactic seed treatments. They point out that pest pressure in US soybean production is generally low, and few pests are active early in the season, when NST provides protection. **Because NST has negligible impacts on yield, and demonstrated negative effects on non-target organisms, the authors conclude that the "insurance" of using NST in soybeans is not worth the cost to farmers or the environment.**

Tim Bath, Kokomo Tribune

Why is this research important?

Seed treatments on corn and soybean represent the largest use of neonicotinoids in the US, and treated seed comprises about 34-44% of soybean acres planted. If extension agents and crop advisers no longer recommend neonicotinoid treated seed for soybean production, it could help to reduce the presence of neonicotinoids in our agricultural landscapes, while also benefiting farmers.

Read the full study here.

3

Can *Varroa* spread via flowers?

We know that *Varroa* mites can spread between colonies via robbing and drifting - but can they also spread via flowers? That's the question that Tom Seeley and his team at Cornell asked a few years ago. Mites had been found on flowers in the past and had been shown to survive on flowers for up to 6 days. For this study, the researchers placed mites on a sugar feeder and on several different flower types. Then they introduced honey bee foragers and observed mite and bee behavior. **Of the 74 experimental mites, all but three successfully infested a bee** (two were blown off by the wind, and one was groomed off by the bee). ~ 30% of infested bees groomed themselves, though only one managed to permanently detach the mite.

Peck, Smith and Seeley 2016

Why is this research important?

This study shows that mites are able to infest bees on flowers. However, we don't know how often this occurs, or whether it is an important route of mite transmission - plenty of questions for future studies to explore!

*Read the full study here. Watch a **cool video** of these observations here.*

4

Honey bee colonies grow bigger with complete diets

Researchers at Tufts University recently published a study on dietary diversity and colony growth, which was conducted beside a wildflower meadow in *Grafton MA*. They installed colonies with pollen traps, and divided them into three groups: one group (pollen trap "on") was fed a synthetic supplement containing 6 out of 10 essential amino acids; the second (pollen trap also "on") was fed a synthetic supplement containing all 10 essential amino acids; the third (pollen trap "off") was allowed to freely collect wildflower pollen. **They found that the amino acid-restricted colonies didn't grow over the course of the summer, and the full-supplement colonies grew at about 1/3 the rate of the colonies that foraged naturally.** The researchers concluded that a full set of essential amino acids is critical for colony growth, and that it is important to remember that pollen contains essential nutrients beyond amino acids, like lipids, proteins, and secondary metabolites. They say that a complete diet is critical for colony growth, and planting wildflower strips near monocultures may help improve pollen diversity and bee health.

Americanmeadows.com

Why is this research important?

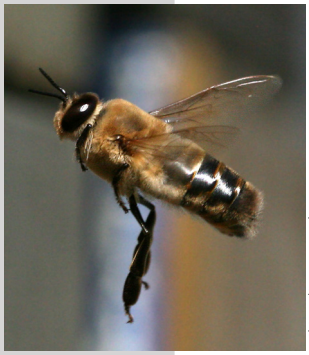
It provides more evidence that a diverse diet is important for bees, and points to potential benefits of wildflower plantings.

Read the full study here.

5

A "sexual arms race" between queens and drones?

For honey bee queens, it is advantageous to mate with as many drones as possible to ensure genetic diversity. However, the more drones that the queen mates with, the smaller each drone's relative contribution to hive genetics. This creates a "sexual conflict" (common in social insects!) in which **the optimal number of matings is higher for queens than for drones**. In order to reduce the number of subsequent queen mating flights, it turns out that drones have evolved a sneaky solution: in a new study, researchers show that drone semen passes into the hemolymph and **causes genetic changes that compromise queen eyesight about 24 hours after mating**. Not only that, but they found that inseminated queens left for subsequent mating flights sooner than those injected with saline solution, that they were less susceptible to visual cues, and were more likely to get lost on mating flights. All of this points to a subtle sexual arms race: in which drones reduce the queen's ability to go on subsequent mating flights, and queens hasten subsequent mating flights in order to secure maximum genetic diversity before their vision is compromised.



Wikipedia; Waugsberg

Read the full study here.

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