



Notes

from the Lab:

The Latest Bee Science Distilled

by Scott McArt

As I'm sure everyone is aware, there's a lot of buzz about global pollinator declines lately. But are declines restricted to pollinators, or are we actually experiencing global *insect* declines in general?

This is the topic of our second "Notes from the Lab", where we highlight "*More than 75 percent decline over 27 years in total flying insect biomass in protected areas*", written by Caspar Hallmann and colleagues and published in the journal *Plos One* [12 (10): e0185809 (2017)]. This paper has been making major waves among both scientists and non-scientists. As I write this, the paper has been viewed nearly 400,000 times in only 4 weeks since it was published.

For their study, the authors caught bees, flies, moths, butterflies and other flying insects every year for the past 27 years in natural areas in Germany. When they looked at the results, they found a steady decline in insect biomass (i.e. the weight of all insects trapped) over those 27 years.

The authors also looked at many things that may have led to this decline, including changes in temperature, precipitation, amount of forest and arable land. It turns out these things had very little influence on the insect declines. Instead, other things led to the declines. What are those "other things"? That is perhaps one of the key questions for this generation of entomologists.

Wow, 75% reduction in insects... is this the first time someone has noticed? The simple answer is "no". As beekeepers, we're all aware of bee declines. But similar declines have also been observed in other bugs, especially moths and butterflies.

The more complex answer: By focusing on "insect biomass", the study by Hallmann and colleagues is one of the first to show that very general insect declines are occurring (in other words, it's not just honey bees, or just Monarch butterflies, or just...). This is what makes this study particularly important: it's not just rare and vulnerable species that are declining. Lots of insects are declining, and they're declining a lot.

What's causing insect declines? This is the million dollar question. Or, if you consider that insects and the services they provide are worth ~\$57 billion per year to the US economy, perhaps it's the \$57 billion question in the US.

Climate change is well-known to be influencing bee, butterfly and moth declines. However, changes in climate over the 27 years that the study took place did not substantially influence the observed declines. In addition, land use change did not appear to influence insect declines during the study. This leaves us with those "other things" as the likely cause of the declines. The authors suggest that agricultural intensification is perhaps the most plausible "other thing". Agri-

cultural intensification has resulted in drastic reductions in weedy field margins and increased usage of new crop protection methods, especially in Europe and North America in the past few decades.

Reductions in forage availability and ubiquitous pesticide exposure should sound familiar if you're a beekeeper who follows the pollinator health literature. And the study by Hallmann and colleagues suggests it's not just pollinators that are impacted by current agricultural practices. If we believe their results, clearly it's high time to stop griping and work proactively with growers, industry representatives and regulatory agencies to develop better agricultural practices. Otherwise, we're likely to continue to see results similar to Hallmann and colleagues into the future.

Until next time, bee well and do good work. *Scott McArt*

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