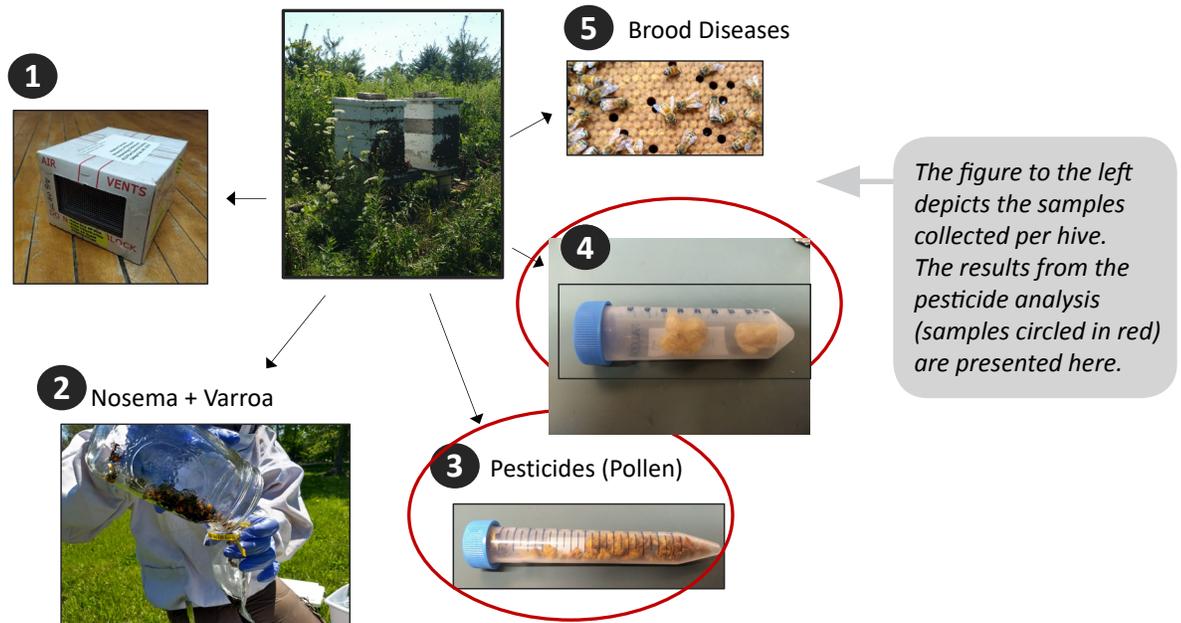


The Research Buzz

by Hannah Whitehead, Honey Bee Extension Educator, UMass Amherst, February 2020

Welcome back to **The Research Buzz**, a recurring column where I summarize some of the newest and coolest in bee research. This week, I'm devoting the whole column to the results from a recent UMass study. In the summer of 2018, **we collaborated with 40 hobbyist beekeepers across the state to gather data on bee health.** We visited each apiary twice (early summer and late summer) and sampled two colonies. We collected bees to test for *Nosema*, *Varroa* and Viruses, and gathered wax and beebread (stored pollen) to test for pesticides. The pesticide analysis was conducted by the McArt Lab and Chemical Ecology Core Facility at Cornell University. **Below, I've summarized results from the pesticide analysis. You can find detailed info in the [full report](#).** If you would like me to present these results to your bee club, email: hwhitehead@umass.edu.



OVERVIEW: {

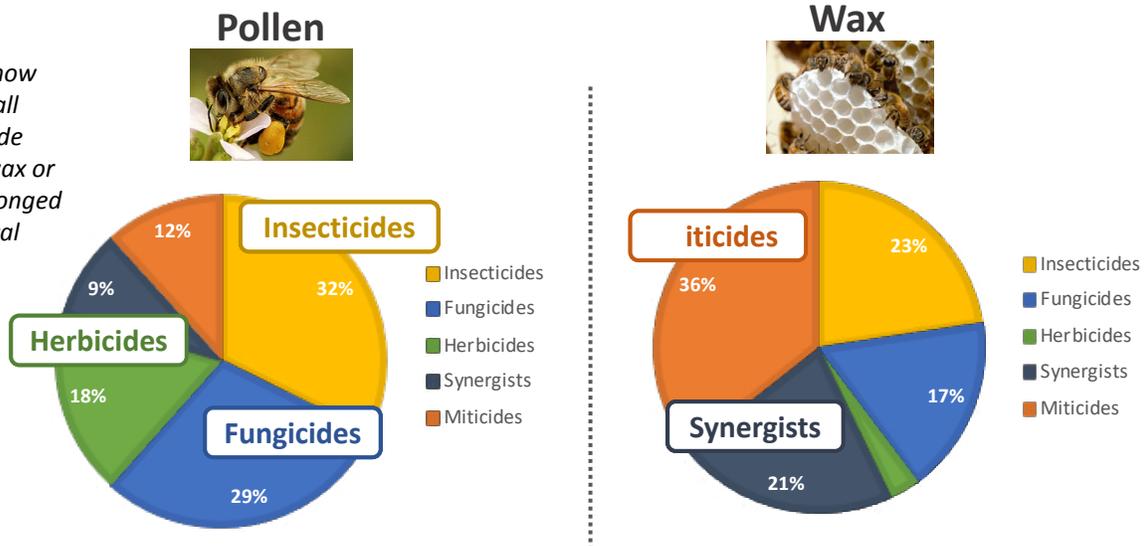
- 266 pesticides tested
- 58 pesticides found in at least one sample
- 3.87 = average number of pesticides per pollen sample (the range was 0-13)
- 3.81 = average number of pesticides per wax sample (the range was 1-10)



1) Herbicides and Fungicides were more commonly found in *Pollen* Miticides and Synergists* were more commonly found in *Wax*

*Synergists are chemicals that are often added to pesticide mixes. They are relatively non-toxic on their own, but increase the toxicity of certain insecticides by inhibiting insects' ability to detoxify pesticides. Only one synergist (piperonyl butoxide) was included in this analysis.

These charts show the portion of all positive pesticide detections in wax or pollen that belonged to each chemical class



2) Most Frequently Detected Pesticides: *Coumaphos* and *Piperonyl Butoxide*

Coumaphos

Coumaphos (trade name: Checkmite+) is a miticide that was once commonly used but is now rarely applied because mites have developed resistance to it, and it can negatively impact bee health (especially queens and drones). However, it is highly persistent in wax. **In our study, it was found in 94% of wax samples and 41% of pollen samples.** This is consistent with results from a [2010 national survey](#), which found coumaphos in the majority of sampled wax and pollen.



Piperonyl Butoxide (PBO)

PBO is added to pesticide mixes to increase the toxicity of insecticides. It works because it prevents insects from producing enzymes that break down toxins, so insecticides remain in insects' bodies longer. It is in >1,600 registered products. **We found it in 81% of wax samples and 34% of pollen samples.** Our results are consistent with a recent NY survey, which found PBO in the vast majority of wax samples.



3) Highest Risk* Pesticides: *Fipronil*, *Imidacloprid* and *Chlorantraniliprole*

*We calculated pesticide risk by comparing the toxicity of a pesticide to the amount detected (this is a method commonly used by the EPA and pesticide researchers). In other words, a relatively non-toxic pesticide found in high concentrations would be classified as “low risk”, as would a toxic pesticide found in very low concentrations. Pesticides classified as “high risk” are both toxic and found in relatively high concentrations. The following three highly toxic insecticides were found in levels near or above the EPA threshold for concern.

Fipronil/Fipronil sulfone

Fipronil is an insecticide used to control a variety of agricultural and turf pests, as well as household insects like fleas and roaches. It disrupts the insect nervous system, and is highly toxic to bees. **We found fipronil in 9% of pollen samples and 16% of wax samples; and we found fipronil sulfone (which is a fipronil break-down product) in 17% of pollen samples and 16% of wax samples.**



Imidacloprid

Imidacloprid is a neonicotinoid insecticide that is also used to control a variety of agricultural pests. It is also highly toxic to bees. **We found it in 23% of pollen samples and 16% of wax samples.**



Chlorantraniliprole

Chlorantraniliprole is used to control a variety of moth, beetle and fly crop pests. **We found it in 15% of pollen and 9% of wax samples.**



4) Neonicotinoids Detected in 33% of all Samples

Neonicotinoids are a relatively new class of insecticide with both lethal and sub-lethal toxicity to bees, and are of particular concern to beekeepers. We detected neonicotinoids in about 1/3 of samples, which is less than a [2016 Massachusetts study](#) (which found neonics in 73% of pollen samples), but higher than similar surveys from other states (a [2018 Virginia study](#) found imidacloprid in 6% of beebread samples, and a [2018 Maine study](#) did not detect neonics in any pollen samples). In our study (as well as the 2016 MA study), the most commonly detected neonicotinoid was imidacloprid.

Portion of samples containing at least one detectable neonicotinoid ->



Neonics present: 33%

Neonics absent

