

Discovering and diagnosing honey bee killers

Varroa Mite Sampling

What could be killing the bees?

Background

The parasitic mite, *Varroa destructor*, has single-handedly shaken the beekeeping industry and global health of European Honeybees (*Apis mellifera*). As its scientific name suggests, the mite is capable of massive destruction, killing colonies within three years without intervention. The threat of Varroa mites was not fully realized until they successfully jumped hosts from the Asian Honeybee (*Apis cerana*) to the previously unexposed European Honeybee.

The Varroa mite is a member of the arachnid family, just over one millimeter in length, and lacks hearing and sight. It has four pairs of legs and piercing and sucking mouthparts. Numerous sensory hairs all over its body act as receptors to sense its environment. “The suckers on its feet enable it to grip the bee’s body so it can use its mouthparts to pierce the bee’s exoskeleton and feed on its hemolymph, a circulatory fluid similar to blood.” (<https://beehealth.bayer.us/learn-about-pollinator-health/stressors/varroa-mites>). A recent study has also found that honeybee fat bodies, tissues analogous to mammalian livers, are the primary food for Varroa mites (Ramsey et al. 2019).

In addition, Varroa mites are carriers and spreaders of secondary disease pathogens that may impact honeybees. “Nearly twenty honey bee viruses have been discovered and the majority of them have an association with Varroa mites, which act as a physical and or biological vector. (<https://beehealth.extension.org/honey-bee-viruses-the-deadly-varroa-mite-associates/>) Examples include deformed wing virus, sacbrood and black queen cell virus. See https://www.aphis.usda.gov/plant_health/plant_pest_info/honey_bees/downloads/2016-2017-National-Survey-Report.pdf for detailed disease data.

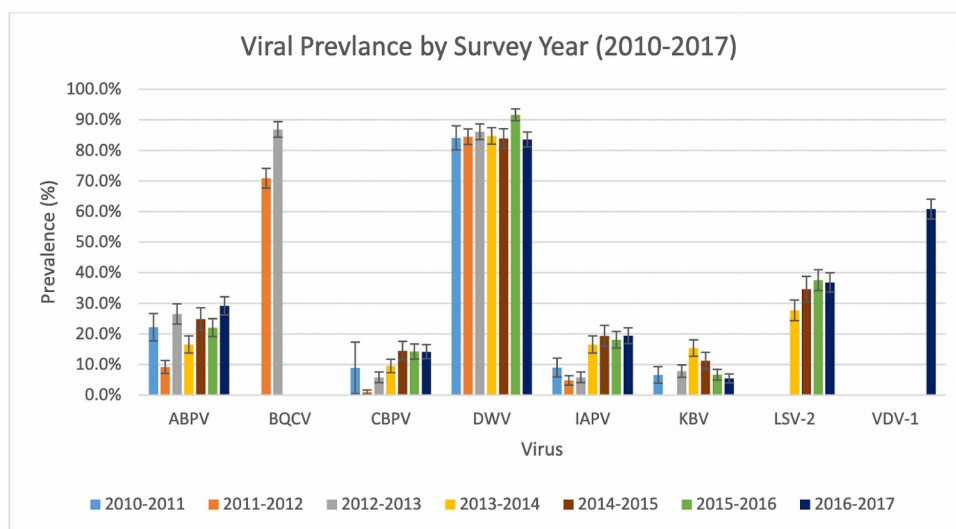


Figure 7: Yearly changes in viral prevalence from 2010 to 2016 (95% confidence intervals shown)

A varroa mite on a bee is equivalent in scale to having a tick the size of a dinner plate on a human.

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Materials

ethanol or 90% isopropyl alcohol
sample of bees from a colony
mason jar with lid or varroa checker (Varroa EasyCheck)

Procedure

1. Watch this video: <https://www.youtube.com/watch?v=QxYE2LLTYAo>
2. Find a hive or ask a beekeeper for a source of bees. [Only an expert should collect the bees for the mite test to make sure the queen was not included in the sample.]
3. Prior to bee collection fill mason jar or Varroa checker jar with ~ 100mL of Ethanol or Isopropanol. They can be randomly collected from a single frame, but be sure to locate the queen and protect her from the sample!
4. Run the open face of the jar gently down the frame, a motion that causes the bees to fall into the jar containing alcohol.
5. Quickly close the jar and vigorously shake for 1 min.
6. Count and collect the varroa mites from the bees.
7. If there are 3 mites for every 200 bees, a beekeeper usually addresses the problem by using a miticide.

Reflection

1. Based on your findings, what is your recommendation to this beekeeper?
2. How might you determine if there are viruses being carried by these mites to these bees?