Image: Viesinsh/Deposit Photos

Almost ALL of our food requires pollination, and most of the pollination is by honeybees. The current disease seriously reducing honey bee populations is extremely serious.

The world's first insect vaccine is here, and it could help with stopping a fatal bacterial disease in honeybees. A study published on October 17 in the journal *Frontiers in Veterinary Science* found honeybees born from vaccinated queens were more resistant to American Foulbrood (AFB) infection than hives with unvaccinated queens. Not only would the vaccine help in improving colony health, but it might increase commercial beekeeping to make products, such as honey and medical wax.

Several factors have contributed to declining honeybee populations—higher temperatures from climate change, pesticides, and drought to name a few. "Bee health is a multifaceted problem and many factors play into the survival or perishing of a beehive," says Dalial Freitak, associate professor at the University of Graz in Austria and senior author of the study. "As in any organism, diseases can cause havoc, especially if other stressors are at play." The current vaccine tackles AFB, a devastating disease that's caused early outbreaks in US beehives since the early 1900s.

AFB is caused by the spores of the larva of the bacteria *Paenibacillus*. Young honeybees ingest the spores in their foods and in one to two days, the spores take root in their gut, sprouting out rod structures. Like an aggressive cancer tumor, the rods quickly multiply before invading the blood and body tissues and killing the young insect larva from the inside. By the time they die, new spores have formed to infect the bees that come in to clean up the honeycomb cells where the deceased laid. Beekeepers may also accidentally spread the disease by exposing contaminated honey or equipment to other bees. Freitak estimates at least 50 percent of beehives globally have AFB. While cultivators may not see any noticeable symptoms of the disease at first, it can feel like a ticking "time bomb" with an outbreak potentially happening at any moment, she says.

The recent study tests the safety and effectiveness of an oral breeder vaccine—an immunization that's passed down from parents—to increase resistance against *Paenibacillus* larva. The oral vaccine is mixed into a new queen's food which she ingests before being introduced into the hive. Once digested, the vaccine contents are transferred into the fat body, the storage organ in insects. Vitellogenin, or the yolk proteins that provide nutrients for growing embryos, bind to pieces of the vaccine and deliver it to eggs in the ovaries. "A little piece of vaccine into the ovaries stimulates an immune response and it's where you need it the most," says Annette Kleiser, the CEO of biotech company Dalan Animal Health that created the vaccine. "A lot of these diseases are when the larvae get infected in the first few days when they hatch."

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