Research Published by: University of Florida

Scientists have successfully tested a unique method of **strengthening honey bee immune systems to help them fight off lethal diseases**, which have contributed to significant losses of the essential pollinator worldwide.

In a new study, **researchers from the University of Florida**, **the Agricultural Research Service-USDA, Louisiana State University, and the University of Nebraska-Lincoln** discovered that stimulating honey bee cells to produce free radicals helped the bees withstand a variety of viruses. In reality, in large-scale field studies, the therapy significantly reduced, and in some cases nearly eliminated, virus activity.

"**This approach is especially exciting because it doesn't just target a specific type of virus but also helps with many different viruses**," said senior author Daniel Swale. Swale is the UF Emerging Pathogens Institute's associate director for training and special projects, as well as an associate professor at the UF/IFAS entomology and nematology department.

"**We also demonstrated that our treatment works both in the lab and in colonies of 80,000 bees in the field.**" This is significant because bees are exposed to so many different viruses and stressors in a hive context, so successfully regulating viruses in that environment is encouraging," said Swale, who did some of this research while at **Louisiana State University**.

By pollinating numerous crops, honey bee colonies and the beekeepers who maintain them play a vital role in food production. Honey bee numbers have declined significantly in recent years, and viruses, while not the leading cause of honey bee fatalities, are a major component.

"**Varroa mites are the leading cause of honey bee losses, but it's important to note that, in addition to physically weakening bees, varroa mites also transmit viruses to bees.**" "It would be a big step forward if we could mitigate viruses in honey bee colonies," said Michael Simone-Finstrom, a co-author of the study and a research molecular biologist with the ARS Honey Bee Breeding, Genetics, and Physiology Research Lab in Baton Rouge, Louisiana.

The researchers altered potassium ion channels, a protein found in the cells of bees and most living things, in the experiment using a chemical called pinacidil. Changing these routes resulted in slightly more free radicals.

"**While free radicals are frequently detrimental to cell health, in moderation, as demonstrated in this study, they can be therapeutic.**" "**In this case, the extra free radicals signal the immune system to ramp up, which helps the bees fight viruses**," said Troy Anderson, a co-author of the work and an entomology professor at the University of Nebraska-Lincoln.

The medicine was given to honey bee colonies by combining it with sugar water and pouring it over the honeycomb at night. The sugar water was subsequently ingested by the bees and supplied to their larvae. Because bees are continually moving in and out of the hive throughout the day, giving them medicine at night maximizes the number of bees who will receive it.

The medication protected bees from six potentially lethal honey bee viruses: The **Israeli acute paralysis virus**, the **deformed wing viruses A and B**, the **black queen cell virus**, and the **Lake Sinai viruses** 1 and 2. The researchers also discovered that pinacidil helped more bees survive in varroa mite-infested colonies.

According to the researchers, administering pinacidil to commercial honey bee colonies may only be practical for some beekeepers, but the discovery opens the door to uncovering new active components that may function better and cost less.

"**One of the most important findings of this study is that potassium ion channels can be used to improve immune system function in honey bees and possibly other insects.**" "We'd like to find a molecule, like a peptide, or a new technology that has the same effect as pinacidil but is more accessible to beekeepers," Swale explained.
Source: **miragenews.com**