

Two Culprits Linked to Bee Decline, More Research Needed



(*Beyond Pesticides*, October 8, 2010) Scientists may have found the missing link behind the colony collapse disorder (CCD): a combination of a virus and a fungus, though more research is needed to determine the exact cause and effect that these two culprits have on CCD. Prior to this study, scientists have hypothesized that there are numerous factors, including pesticides, that depress the immune and nervous system of bees, creating a vulnerability to other factors, such as those identified in this study. Army scientists in Maryland and entomologists in Montana teamed up to find that the co-occurrence of the viruses, the invertebrate iridescent virus (IIV) with the fungus *Nosema ceranae* (which was previously implicated as a culprit) consistently marked a colony collapse. The study, ***Iridovirus and Microsporidian Linked to Honey Bee Colony Decline*** was published October 6th in the online science journal *PLoS One*.

Researchers looked at the proteins of thousands of healthy and collapsing bee colonies using mass spectrometry-based proteomics (MSP) that revealed two previously unreported RNA viruses in honey bees in North America, one of which is the IIV. Researchers say this virus is similar to a virus that was first reported in India 20 years ago, as well as a virus found in moths. Interestingly, researchers point out that due to its potency IIVs have been considered for potential use as a biopesticide for controlling boll weevils, mosquitoes and other insect pests.

It's important to point out that while this is an important step in solving the mystery of the bees, there may very well be more than just these two factors at play. Because our survival depends on healthy pollinators, we must take a precautionary approach and continue working towards finding a solution. We still don't know what role the combination of pesticides play in the grand scheme of healthy pollinators, why CCD is so prevalent right now, or what factors are allowing IIV or *N. ceranae* to spread and kill the bees.

"We truly don't know if these two pathogens cause CCD or whether the colonies with CCD are more likely to succumb to these two pathogens," Jerry J. Bromenshenk, Ph.D. of the University of Montana said in a statement to the ***Associated Press***.

In the past four years, scientists have connected many other suspects to colony collapse disorder. Researchers had previously suspected and then **dismissed** *N. ceranae* because it was found in both healthy and failing colonies. Earlier this year, a study conducted by **Penn State University** found that there is widespread pesticide contamination of beehives. This research did not find a direct correlation from pesticides to colony collapse, because like the *N. ceranae* fungus, these chemicals were also present in healthy hives. What it does imply is that bees and their hives are being exposed to high numbers of toxic chemicals and that the synergistic, aggregate, and cumulative effects from exposure need to be explored for their possible contribution to bee mortality, fitness and even potentially colony collapse. The fact that this new study discovered a combination of two things as a cause for CCD highlights the importance of studying the effects of these materials in combinations.

Pesticides, especially neonicotinoids, have been previously implicated as a cause for CCD, and a **previous study** criticized risk assessments for downplaying their potential role. These pesticides are a class of chemicals that target nerve cells in a similar way as nicotine, acting as neurotoxins to insects. One of the most commonly used neonicotinoid is the insecticide imidacloprid, manufactured by Bayer Crop Science and used in agriculture to control aphids, beetles, and other sucking insects. Imidacloprid has been linked to neural effects in honeybees, including disruptions in mobility, navigation, and feeding behavior - similar behaviors that are being displayed by bees suffering from CCD. The use of imidacloprid was banned in France after it was suspected to be responsible for the decline of honeybee populations in the late 1990s.

First reported in 2006, CCD is unlike other ailments that have affected honeybees in the past because worker bees simply disappear rapidly, never returning to the hive where the queen still lives with a small cluster of bees amidst pollen and honey stores in the presence of immature bees (brood). It has been reported that losses of honeybee colonies across 21 states in the winter of 2007-8 averaged 35%, with a high degree of variability. Large declines of honeybee colonies were also experienced in select European countries, where average losses were 26%. For more information, read Beyond Pesticides previous news coverage on **pollinators**.

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