

Colony Collapse Disorder

By Susan Bellerose

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We often take honeybees for granted, swatting them away from us in annoyance as they buzz from flower to flower, collecting pollen and nectar. However, honeybees are responsible for pollinating roughly one-third of all of the food crops that we consume in the United States, including apples, strawberries, almonds, asparagus and broccoli. Local beekeepers such as Lu Lu McAndrews, pictured below, may cultivate hives to sell honey, or may use bees to pollinate their own crops. There is also an industry of migratory beekeepers traveling across the country, hauling their hives from field to field to assist farmers in pollinating their crops.



Dover beekeeper Lu Lu McAndrews with some of her beehives. She uses organic methods rather than pesticides to maintain her hives. Since pesticides may be the culprit behind CCD, organic methods could be the key to addressing the problem.

Given the importance of honeybees, it is of concern that the number of bee colonies in the U.S. has fallen by more than half since 1947, from 5.9 million colonies to roughly 2.4 million colonies today. Reasons for this decline include the increasing use of pesticides since World War II, viruses, fungi, and pests such as varroa mites. Most worrisome, however, is a recent and dramatic die-off of honeybee colonies that has

been occurring in the U.S. and other parts of the world. This die-off has been labeled "Colony Collapse Disorder," or CCD for short.

CCD was first identified on U.S. soil in November of 2006, and is now being reported in at least 35 states. Some commercial beekeepers have lost as much as 90% of their bee populations. According to the Department of Entomology at Pennsylvania State University, it is not clear whether CCD is a completely new phenomenon. The most unusual characteristic of CCD is that the bees seem to abandon the hives, which is atypical for such a social and organized species, and there is no buildup of dead bees in or near the hive. The hive is likely to contain the queen, who may still be laying eggs, but there are few adult bees present to tend to the brood nest. Despite the presence of honey and pollen in the hives, parasites wait an unusually long time to invade. CCD can occur rapidly, with a hive "collapsing" within as little as two days. Given the importance of bees to pollination of essential crops, colony collapse can have disastrous consequences if left unchecked.

The U.S. Department of Agriculture, led by entomologist Jeffery Pettis, is working with more than 60 scientists from North America to ascertain the causes of CCD in an effort to stop the hive destruction. These scientists have been examining a number of possibilities including pesticide poisoning, mites, pathogens and diseases. Pesticides are being examined because, even in small amounts, they can disrupt bee foraging and honey production. Sharon Labchuk, a member of Earth Action, has stated that none of the 1000 organic beekeepers on her organization's email list, including commercial beekeepers, are reporting losses from CCD, which may indicate that use of chemicals is leading to weakening immune systems in bees. Another factor that may be contributing to CCD is the additional stress placed on bees today; they are bred commercially to be larger, fed artificially which leads to poorer nutrition, and hauled over long distances by truck to pollinate.

The Los Angeles Times reported in April 2007 that scientists are also closely examining the parasite *Nosema ceranae* as a possible cause of colony collapse disorder in this country. Scientists took samples of collapsed hives where *Nosema* was present and irradiated those hives, killing the pathogens. Those hives were then repopulated successfully with Australian bees, so early results point to a disease or parasite that was killed by radiation as the likely culprit. However, these findings are preliminary, and the USDA's Pettis is not ready to pinpoint the cause of CCD on *N. ceranae*, since that microbe has been present in healthy colonies as well as in colonies that have collapsed. The situation is fluid, but one thing is clear. If scientists are not able to identify and stop the hive destruction soon, it could have disastrous consequences for many of our most important food crops.

For up-to-date news on CCD, see <http://maarec.cas.psu.edu>.

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