***Pesticide Linked to Colony Collapse Disorder***

By Maureen O’Connell

Bees are back in the news, and the information is alarming. It focuses on the possible cause of Colony Collapse Disorder (CCD). In 2005, beekeepers and farmers in the United States and Europe noticed a dramatic decline in the number of honeybees. Some were reporting losses of thirty to ninety percent of their hives. This is not the first time we have seen significant loss of bee populations; but, today, losses are different. The main symptom of CCD is simply no or a low number of adult bees present in a hive; there is a live queen and no dead bees in the hive. Often there is still honey in the hive, and immature bees are present. The loss is due to uncharacteristic bee behavior: Adult bees are failing to return to the hive as if they have lost their navigational abilities. Those left in the hive will starve to death without the worker bees supplying the hive with food.

Many studies have been conducted to find the cause of this disorder, but none were conclusive. Viruses, fungi, mites, insecticides, and stress were offered as explanations. One theory was that the bees were being killed by cell phone signals; specifically, the transmissions were interfering with the bees’ navigational abilities. In the end, there still was not enough cause-and-effect connection to pin the problem to any one factor. Now, you might ask, what the significance of some bees dying is. This situation is bad news not just for honey lovers. According to the United States Department of Agriculture (USDA), one third of the United States (U.S.) food supply depends upon pollination from bees. The economic value of bees in the U.S. is estimated at $14.6 billion; to the world economy, it is $212 billion.

There has not been much new information about CCD until recently. In the May 22, 2012 issue of *The New Yorker Magazine* there was an article entitled “Colony Collapse Disorder and Pesticides.” It mentions Dave Hackenberg, a Pennsylvania beekeeper, who was one of the first people to draw attention to CCD. He did not believe that the causative factor was a virus, a fungus, a mite, or stress. He blamed it on a new class of pesticides called neonicotinoids. In hindsight, many noted scientists think that he was onto something.

Neonicotinoids are synthetic analogues of the natural insecticide nicotine. They were developed in the 1990s and are commonly used in agriculture and backyard gardening products. The specific pesticide is imidacloprid. They are fast-acting systemic insecticides that disrupt the nervous systems of the insects that destroy crops or the flowers in your garden. How do they affect bees? Bees can be exposed to this highly-toxic substance in two ways: through nectar from plants or through high-fructose corn syrup. The nectar is toxic because the corn seeds or other seeds are commonly treated with imidacloprid before being planted. Being a systemic pesticide, it is taken up by the vascular systems of the growing plants. Many beekeepers feed their hives with corn syrup after harvesting honey. The syrup is made from corn crops which have been treated with imidacloprid, and the cycle continues.

Three fairly recent studies have implicated neonicotinoids, and specifically imidacloprid, as the direct cause of CCD. British scientists published in the journal *Science* the results of a study which raised bumblebees on a diet of pollen, some of which had been treated with imidacloprid. The colonies receiving the treated pollen showed significantly-reduced growth rates and produced fewer new queens. In April, the results of a more accusatory study conducted by scientists at the Harvard School of Public Health were released. Their research suggests that “nerve-agent pesticides cause a huge drop in the number of queens and disrupts the bees’ ability to find their way back to the hive…Leader of the study, Professor Alex Lu, claims to have found ‘convincing evidence’ that imidacloprid is the likely culprit for the sharp decline since 2006 and the phenomenon known as Colony Collapse Disorder in which adult bees abandon their hives.” Over the course of study of twenty-three weeks, ninety-four percent of the bees in hives exposed to imidacloprid died.

In the past several years, many countries in Europe have banned the use of this class of pesticides as a precautionary measure. The results have restored bee populations. Where does the U.S. stand? There is no ban. CCD remains a mystery in the U.S. for too many people. Many of the studies of CCD have been conducted by the agrochemical industry and companies who manufacture these suspect pesticides. The German agrichemical giant Bayer markets these nicotine-derived chemical pesticides. This seems a lot like hiring a fox to guard the chicken coop. On the May 11, 2012 *Nightly News* with Brian Williams, he spoke about research conducted by Purdue University that indicated that neuro-active insecticides chemically related to nicotine may be the potential cause of CCD. In this report, Dr. David Fischer, Bayer Cropscience Environmental Toxicologist, denied the connection between neonicotinoids and CCD.

September 2012 will be the fiftieth anniversary of the publication of Rachel Carson’s book, *Silent Spring,* her seminal study on the effects of pesticides on wildlife. What little we have learned.

In *Silent Spring* Rachel Carson said this about systemic pesticides:

*The world of systemic insecticides is a weird world, surpassing the imaginings of the brothers Grimm. It is a world where the enchanted forest of the fairy tales has become a poisonous forest. It is a world where a flea bites a dog and dies … where a bee may carry poisonous nectar back to its hive and presently produce poisonous honey.*

“The hives were dead silent,” Lu, the author of the Harvard study, said of the boxes of bees treated with imidacloprid. “I kind of ask myself: Is this the repeat of *Silent Spring*? What else do we need to prove that it’s the pesticides causing Colony Collapse Disorder?”