Colony Collapse Disorder

Colony Collapse Disorder is the phenomenon that occurs when the majority of worker bees in a colony disappear and leave behind a queen, plenty of food and a few nurse bees to care for the remaining immature bees and the queen. Once thought to pose a major long term threat to bees, reported cases of CCD have declined substantially over the last five years. The number of hives that do not survive over the winter months – the overall indicator for bee health – has maintained an average of about 28.7 percent since 2006-2007 but dropped to 23.1 percent for the 2014-2015 winter. While winter losses remain somewhat high, the number of those losses attributed to CCD has dropped from roughly 60 percent of total hives lost in 2008 to 31.1 percent in 2013; in initial reports for 2014-2015 losses, CCD is not mentioned.

Related Information

- Also see Pollinator Health Concerns

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Discovering a Problem

During the winter of 2006-2007, some beekeepers began to report unusually high losses of 30-90 percent of their hives. As many as 50 percent of all affected colonies demonstrated symptoms inconsistent with any known causes of honey bee death:

- Sudden loss of a colony's worker bee population with very few dead bees found near the colony.
- The queen and brood (young) remained, and the colonies had relatively abundant honey and pollen reserves.

But hives cannot sustain themselves without worker bees and would eventually die. This combination of events resulting in the loss of a bee colony has been called Colony Colapse Disorder.

Though agricultural records from more than a century ago note occasional bee "disappearances" and "dwindling" colonies in some years, it is uncertain whether the colonies had the same combination of factors associated with CCD. What we do know from the data from beekeepers for 2014/2015 is that, while colony loss from CCD has declined, colony loss is still a concern.

Dead Bees don't Necessarily Mean CCD

Certain pesticides are harmful to bees. That's why we require instructions for protecting bees on the labels of pesticides that are known to be particularly harmful to bees. This is one of many reasons why everyone must read and follow pesticide label instructions. When most or all of the bees in a hive are killed by overexposure to a pesticide, we call that a beekill incident resulting from acute pesticide poisoning. But acute pesticide poisoning of a hive is very different from CCD and is almost always avoidable.

There have been several incidents of acute poisoning of honey bees covered in the popular media in recent years, but sometimes these incidents are mistakenly associated with CCD. A common element of acute pesticide poisoning of bees is, literally, a pile of dead bees outside the hive entrance. With CCD, there are very few if any dead bees near the hive. Piles of dead bees are an indication that the incident is not colony collapse disorder. Indeed, heavily diseased colonies can also exhibit large numbers of dead bees near the hive.

Why It's Happening

There have been many theories about the cause of CCD, but the researchers who are leading the effort to find out why are now focused on these factors:

- Increased losses due to the invasive varroa mite (a pest of honey bees).
- New or emerging diseases such as Israeli Acute Paralysis virus and the gut parasite Nosema.
- Pesticide poisoning through exposure to pesticides applied to crops or for in-hive insect or mite control.
- Stress bees experience due to management practices such as transportation to multiple locations across the country for providing pollination services.
- Changes to the habitat where bees forage.
- Inadequate forage/poor nutrition.
- Potential immune-suppressing stress on bees caused by one or a combination of factors identified above.

What is Being Done

The U.S. Department of Agriculture (USDA) is leading the federal government response to CCD. In 2007, USDA established a CCD Steering Committee with representatives from other government agencies, and academia. EPA is an active participant in the CCD Steering Committee. The Steering Committee has developed the Colony Collapse Disorder Action Plan (PDF) (28 pp, 2 MB, About PDF). The plan has four main components:

1. Survey/Data Collection to determine the extent of CCD and the current status of honey bee colony production and health.

2. Analysis of Bee Samples to determine the prevalence of various pests and pathogens, bee immunity and stress, and exposure to pesticides.
3. Hypothesis-Driven Research on four candidate factors including:
    - new and reemerging pathogens,
    - bee pests,
    - environmental and nutritional stresses, and
    - pesticides.
4. Mitigative/Preventive Measures to improve bee health and habitat and to counter mortality factors.

In October 2013, the CCD Steering Committee hosted the national stakeholder conference on honey bee health. The conference brought together a broad group of stakeholders to examine the federal governement's course of action to understand colony collapse disorder and honey bee health. Based on input from the stakeholders at this conference, the CCD steering committee is drafting a revised CCD and honey bee health action plan.

More information about the honey bee health conference.

What EPA is Doing

Our role in the federal response to CCD is to keep abreast of and help advance research investigating pesticide effects on pollinators. While our longstanding regulatory requirements for pesticides are designed to protect beneficial insects such as bees, since 2007 we have been looking at many different ways of possibly improving pollinator protection. The Agency's efforts are now focused on EPA's role in the National Pollinator Health Strategy.

For More Information

- Find out more about colony collapse disorder from the USDA Agricultural Research Service
- Survey of bee losses winter of 2014/2015
- Managing pesticide risk to insect pollinators -- Organisation for Economic Cooperation and Development EXIT

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