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Decimation of Bee Colonies Has Various Possible Causes

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Description
 Parasites, pathogens and pesticides are all possible suspects in the staggering decline of honeybees, said Cornell associate professor of entomology Nicholas Calderone, during a media teleconference May 10.

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Newswise — Scientists are working hard to understand the sources of a staggering decline in honeybees in as many as 27 U.S. states and countries in Europe and Asia this winter, said Cornell associate professor of entomology Nicholas Calderone, during a media teleconference May 10.

In the United States, half a million to a million colonies out of a total 2.4 million colonies have died this winter. Both tracheal mites (*Acarapis woodi*) and varroa mites (*Varroa destructor*) have threatened the bee industry since the 1980s, causing similar catastrophic die-offs to bee populations in the winters of 1995-96 and 2000-01. The mites feed on U.S. honeybees and act as a vector for a number of bee viruses, though varroa mites are especially deadly. While many bees this year exhibit symptoms of mite damage, about 25 percent of the deaths this year cannot be attributed to mites or any other known honeybee pest, Calderone said.

Finding the cause of the problem is vital for U.S. agriculture. Many fruit, vegetable and seed crops, worth between \$8 billion and \$12 billion each year, rely on honeybees for pollination.

"Just like in the immediate aftermath of a natural disaster," Calderone said, "there are a lot of conflicting and inaccurate reports" circulating in the media. "What we do know is that there are an awful lot of dead bees. We are looking for patterns."

Genetically modified foods, mites, pathogens, pesticides and electromagnetic radiation from cell phones have all been proposed as possible causes of the bees' demise. But, Calderone said, the

Image Gallery



Lindsay France/Cornell University Photography

Entomology professor Nicholas Calderone speaks with reporters at the Dyce Honeybee Laboratory off Freese Road near Cornell, May 10.

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actual causes are unknown at this time.

A number of studies suggest that a protozoan, a single-celled parasite called *Nosema ceranae*, may be playing a role. The protozoan infects the midgut of honeybees. Some beekeepers have noted that treating bee boxes with gamma rays used for food irradiation has allowed healthy hives to return to the boxes, leading to speculation that a pathogen like *Nosema* could be involved in the some bee deaths this year, Calderone said.

Another possible culprit is a class of insecticides known as neonicotinoids, which has been widely detected on pollen at low concentrations in other countries experiencing die-offs. At certain levels these insecticides may impair the bees' abilities to learn, leading some scientists to believe exposed bees may leave the hive and get lost. "The studies don't seem to indicate that the doses they [the bees] are encountering are having any detectable effect on foraging behavior," though more research is needed, said Calderone.

As yet, there is little evidence that insecticides or electromagnetic radiation have led to bee deaths, Calderone added.

But, he said, even if the cause of the new deaths were "cured tomorrow, we would still be operating in crisis mode due to mite damage."

Miticides have been used to combat mites, though over time the mites develop resistance, requiring constant development of new chemicals. Also, miticides can only be used at certain times of the year because if used during a nectar flow, they can contaminate the honey crop. There is also evidence that miticides can accumulate in the bees' wax combs to levels that could be harmful to the bees themselves.

At present, research experiment stations at land-grant universities like Cornell are putting together funding plans for research to investigate the cause of this year's bee declines. Also, the federal government is considering allotting tens of millions of dollars for long-term competitive grants for programs that target honeybees' overall health.

Calderone himself will spend this summer traveling throughout the Northeast to the ranges of migratory honeybees to collect samples of pollen from honeybee colonies being used for pollination of blueberries, cranberries and vine crops to screen for pollen nutrient levels, mites, *Nosema*, neonicotinoids and other pesticides.