

Scientists Zero in on Honey Bee Ailment

Honey Bee Research Progresses, Aided by Public and Private Support

by Chuck Gill

Researchers in the College of Agricultural Sciences are making progress in pinning down the cause or causes of Colony Collapse Disorder (CCD), a mysterious ailment that threatens the beekeeping industry and the crops and native plants that rely on honey bees for pollination.

In fall 2007, a team led by Diana Cox-Foster, professor of entomology, reported a strong correlation between CCD and the presence of Israeli acute paralysis virus (IAPV), making the pathogen a prime suspect in the disease (see “The Case of the Missing Bees,”

Winter/Spring 2008). Since that time, researchers have introduced IAPV to healthy honey bee colonies in a controlled greenhouse environment in an effort to induce a collapse.

“Within one week of introducing the virus, we observed dramatic bee mortality, with bees dying outside the colonies across the room in the greenhouse,” says Cox-Foster. “Bees were found on the floor with paralytic-type movements, and guard bees were observed removing paralytic bees from colonies and flying across the room. The majority of these ‘twitcher’ bees were found to have IAPV.”

Cox-Foster notes that within a month, infected colonies had declined to small clusters of bees, many of which



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Researchers investigating Colony Collapse Disorder survey commercial hives in an apiary near Lewisburg. Scientists studying CCD are looking at pathogens, pesticides, and other possible causes.

cility at the University of California, Davis.

The donations were part of the company's "Häagen-Dazs Loves Honey Bees" consumer education campaign (www.helpthehoneybees.com) aimed at generating awareness among ice cream lovers about the dire situation facing managed and wild pollinators and what can be done to help.

"Häagen-Dazs ice cream is made from the finest all-natural ingredients, and the plight of the honey bee could mean

many of the ingredients used in our top flavors, like Vanilla Swiss Almond and Strawberry, would be difficult to source," says Häagen-Dazs brand manager Josh Gellert.

Cox-Foster says Häagen-Dazs' contribution allowed Penn State to purchase two expensive pieces of equipment that enable faster processing of samples and aid in the molecular detection and identification of viruses, pesticides, and other substances potentially harmful to honey bees and other pollinators. The gift also will support training of graduate and undergraduate students by providing small grants for student research on bee-related topics.

Häagen-Dazs also created the Häagen-Dazs Ice Cream Bee Board, an advisory group of university scientists and other beekeeping experts that will provide information on research findings and help develop educational materials for the public.

"This effort is taking a page from the beehive, where all the individuals play a role to make the hive success-

had lost their queens. "These data indicate that IAPV is a highly pathogenic virus," she says. "But they do not yet support a finding of IAPV as the sole cause of Colony Collapse Disorder. We still suspect that additional stresses are needed to trigger CCD."

Among the potential triggers being investigated are environmental chemicals. Penn State scientists analyzing pollen, wax, adult bees, and brood (larvae) have found the presence of dozens of chemicals, including pesticides used by agricultural producers to protect crops and by beekeepers to control hive pests such as parasitic mites.

"This raises several complicated questions," says Maryann Frazier, senior extension associate in entomology. "Some of these compounds could react with each other to cause toxic effects or could combine with viruses or poor nutrition to weaken immunity and cause

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colony collapse. We also need to do more research to understand these chemicals' sublethal effects on bees."

Though the role of chemicals in Colony Collapse Disorder is still unknown, Frazier notes that beekeepers need more options for controlling varroa mites so they can reduce their reliance on chemicals. "With the sheer number of compounds we're finding in hives, it's hard to believe that pesticides aren't contributing to the general decline in bee health," she says.

Meanwhile, government agencies, private businesses, and concerned individuals have stepped forward with financial resources to support the research. In February, ice cream maker Häagen-Dazs announced a gift of \$150,000 toward honey-bee-related programs in the college. The company also contributed \$100,000 to the Harry H. Laidlaw Jr. Honey Bee Research Fa-



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ful,” says bee board member Dennis vanEngelsdorp, Penn State senior extension associate and acting state apiarist for the Pennsylvania Department of Agriculture. “In this case, we have university and government scientists, the beekeeping industry, and now a major food-industry partner all making contributions to solve serious challenges to pollinator health.”

vanEngelsdorp says the outreach component of the Häagen-Dazs program is important for generating awareness and support. “It’s critical that the public understand that the honey bee is a keystone species that is an indicator of environmental health,” he says, noting that the gift will support development of an online, native-bee photo identification catalog for the Mid-Atlantic region to help people recognize pollinators when they encounter them.

Public education will also be served by the creation of educational programs

to be delivered by Penn State Master Gardeners, who will instruct homeowners and gardeners on establishing pollinator-friendly plantings. “Loss of habitat and flowering plants is an important factor in the decline of pollinators,” says bee board member Robert Berghage, associate professor of horticulture. “By growing ‘bee gardens,’ individuals can contribute to pollinator health by providing the food sources these insects need to survive and thrive.”

Häagen-Dazs also launched a new flavor this spring, Vanilla Honey Bee. A portion of proceeds from sales of the new flavor, as well as from all honey-bee-affected flavors in the brand’s product line—indicated by special labeling on the package—will go toward helping honey bees. In addition, nearly 150 consumers from the United States and Canada have responded to company advertising by visiting the associated

Web site and making direct contributions totaling almost \$7,000 to Penn State. “My five-year-old daughter saw the commercial, insisted we visit the Web site to save the bees,” wrote one donor.

Joining Häagen-Dazs in the effort is grocery chain Whole Foods

Market, which operates more than 270 stores in North America and the United Kingdom and bills itself as the world’s leading retailer of natural and organic foods. Several stores in the chain’s New England region have erected point-of-purchase displays with \$2 and \$5 tear-off coupons. Customers can present one or a combination of coupons to the cashier at checkout, and their tax-deductible donation to support Penn State honey bee research will be added to their order total.

The promotion was the brainchild of Bonnie Frechette, a marketing team leader at Whole Foods Market in Providence, Rhode Island, who had read

about the honey bees’ plight in *National Geographic*. “We like to do our part to help nonprofit organizations, and after learning about the bee crisis and Penn State’s research, we decided that that’s where we’d like to contribute,” says Frechette. “It has really created a buzz among our customers and a lot of conversation at the checkout.”

Others who have been inspired to help include:

- Krista Wright’s seventh-grade science classes at Washington Middle School in Dubuque, Iowa, which after doing a research project on honey bees raised \$500 to support Penn State studies.
- Elizabeth Schetman (www.beemuse.org/index.php), a teenaged beekeeper in Brooklyn, New York, who has collected more than \$5,000 from neighbors and friends to benefit honey bee research.

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To contribute to the research effort on Colony Collapse Disorder, readers can send a check, payable to Penn State, to The Pennsylvania State University, 230 Agricultural Administration Building, University Park, PA 16802. The check should be accompanied by a letter indicating the gift is to be used for honey bee research. Gifts to Penn State are tax deductible.