



Honey bees at work in the hive

andy Oliver faced a serious challenge. Although he had raised bees since 1967, this California apiarist's colonies were nearly wiped out twice by two different parasites: the tracheal mite in the 1980s and the Varroa mite in the 1990s. By the time honey bee colony collapse disorder (CCD) made national headlines in 2007, some reports began singling out neonicotinoids. These insecticides, used in seed treatments, foliar products and soil applications, control thrips, aphids and other yield-robbing pests. Oliver wasn't convinced that solving the bee health mystery was this simple, however.

"The blame-it-all-on-one-thing crowd is off-base," says Oliver, a full-time beekeeper from Grass Valley, Calif., who earned his master's degree in biological science with a specialization in entomology. "The biology of bee health is very complex. Both science and anecdotal evidence make it clear that insecticides are not the only issue impacting bees."

Oliver, who manages 1,000 hives with his two sons, says the scientific literature and experiences of his fellow beekeepers confirm his viewpoint. "A beekeeper from France recently visited me, and he's seeing many of the same bee health issues we are, even though his area is filled with organic dairies and organic crop production."

Putting Seed Treatments to the Test

Many university studies from the southern U.S. to Canada have shown that neonicotinoids are not showing up in the reproductive parts of plants when used properly, says Gus Lorenz, Ph.D., a professor of entomology at the University of Arkansas.

"This is extremely good news for farmers and beekeepers. When my colleagues and I started hearing reports about declining bee health, we were concerned," he says.

"We wanted to be as proactive as possible in determining whether neonicotinoids were causing bee health issues."

Lorenz and his fellow scientists from Tennessee and Mississippi collected a massive data set, including soil samples, wildflower samples, soybean flowers, corn pollen and even the bees themselves, to check for residue from fields where growers used neonicotinoid seed treatments. "In Arkansas alone, we had almost 700 samples," says Lorenz, who noted that all the samples were sent to a U.S. Department of Agriculture (USDA) laboratory in North Carolina for analysis.

The results showed that very little dust from neonicotinoid-treated seeds was landing on the wildflowers. In addition, the risk of neonicotinoid residue being transferred to the reproductive parts of wildflowers and crops was extremely low or nonexistent. This is positive not only for bee health, but for ag productivity, too.

"The neonicotinoid class of chemistry is extremely important to growers, especially in the mid-South," Lorenz says. "Neonicotinoid seed treatments are often the bestand sometimes the only-way to control insect pests."

For example, neonicotinoids are vital in cotton production to manage thrips, which can destroy cotton guality and easily reduce cotton lint by up to 100 pounds per acre when left unchecked. "Thrips have been prevalent in recent years, and neonicotinoid seed treatments have provided much more effective control than foliar applications," Lorenz says. Foliar applications are often more difficult to apply due to inclement weather early in the spring when frequent rainfall occurs.

Canadian Canola Study Examines Bee Health

Other recent university studies also support the value and safety of neonicotinoids. The initial data analysis from a

Syngenta Spearheads Operation Pollinator

While Varroa mites have made honey bee colonies more fragile, so have declining habitat and reduced food supplies. To boost bee health, Syngenta developed Operation Pollinator® to establish pollinator habitat in field borders, hedgerows, filter strips, marginal one-acre plots adjacent to agricultural fields. cropland and Conservation Reserve Program (CRP) land.

will go a long way toward helping bees," says Jay Overmyer, Ph.D., a Syngenta technical expert in ecotoxicology.

A global initiative, Operation Pollinator started in Europe more than 12 years ago and has expanded across the U.S. in the last

several years. Syngenta has been working with scientists at the University of Florida, Michigan State University and the University of California, Davis, to determine what types of flowering plants can be grown successfully in

"The focus is habitat creation and restoration as well as management for native "Increasing the amount of flowering habitat pollinators," says Overmyer, who noted that Syngenta is also working with Marriott International, Inc., to establish Operation Pollinator plots on Marriott's U.S. golf courses. "We don't have all the answers yet, but Operation Pollinator is providing new options to protect bee health."



Foundation checks out an Operation Pollinator plot near the University of California, Davis.

comprehensive 2012 field study near Guelph, Ontario, has not shown any acute toxicity to honey bees as a result of exposure to canola grown from seeds treated with the neonicotinoid clothianidin.

"I believe that the more important factors affecting bee health are nutrition issues, along with Varroa mites and the viruses they vector," says Cynthia Scott-Dupree, Ph.D., a professor in the University of Guelph's School of Environmental Sciences, who along with Chris Cutler, Ph.D., at Dalhousie University in Halifax, Nova Scotia, led the study. "It's important to stay focused on balanced outcomes. because we need to find sustainable solutions that allow growers to continue producing crops efficiently and beekeepers to manage colonies with reduced impact on bee health over the long-term."

Knowledge is the key to maintaining this balance. "I want crop protection product regulation and bee health issues to be based on sound science." Oliver says.

A Continuing Focus on Safety

Recently, the European Commission (EC) decided to restrict some uses of three neonicotinoids, including clothianidin, thiamethoxam and imidacloprid, for two years beginning December 2013.

"The EC breached EU pesticide legislation and incorrectly applied the Precautionary Principle in its decision," says John Abbott, Ph.D., regulatory team leader for Syngenta. "The Environmental Protection Agency (EPA) and other U.S. agencies take a science-based risk assessment and bee-protective approach, and there have been numerous studies conducted confirming that neonicotinoids can be used safely."

Syngenta will continue to work with university and extension researchers, conservation groups, the North American Pollinator Protection Campaign, grower and commodity associations, federal and state government agencies, the Agricultural Retailers Association, CropLife America, the American Seed Trade Association as well as other industry partners to find additional measures to continue to protect bee health, says Palle Pedersen, Ph.D., a Syngenta Seedcare technology manager, who spoke at the EPA Pollinator Summit in March 2013. For example, Syngenta is working with different companies to evaluate new polymers that keep neonicotinoid seed treatments, like Cruiser® insecticide, on the seed more effectively. A new polyethylene wax to control dust is expected to be on the market soon.

"When the seed moves through the planter, this causes abrasions that can scrape off small amounts of the seed treatment's active ingredient, and this can be released as dust from pneumatic planters," says Jay Overmyer, Ph.D., a Syngenta technical expert in ecotoxicology. "We're looking at ways to reduce the amount of dust released from

A bee pollinates the blossom of an almond tree in Fresno County, Calif.

> 'I believe that the more important factors affecting bee health are nutrition issues, along with Varroa mites and the viruses they vector." -CYNTHIA SCOTT-DUPREE

pneumatic planters through modifications of the exhaust, which would direct the dust toward the ground, and new lubricants that reduce friction between the seeds."

Maintaining the viability of seed treatments is important because they provide highly targeted insecticide applications that offer significant economic and environmental benefits to growers. "For many below-ground insect pests like wireworms, grubs and seed corn maggots, there are no rescue treatments once the seed is planted," says Pedersen. After summarizing 10 years of data, he has found that when Cruiser has been used as a seed treatment, it has provided a 9.1-bushel-per-acre yield advantage when compared to corn without a seed-applied insecticide.

"We are looking at the issue in a holistic way and coordinating our research, development, stewardship and educational efforts, because we're all in this together," says Abbott.

Feeding a Hungry World

Without a doubt, bees and other pollinators are critical to U.S. agriculture and the food supply. Up to one-third of the food that Americans eat depends on pollination by honey bees. The almond industry, which is 100 percent dependent on honey bees for pollination, for example, requires the use of 1.6 million colonies annually. That's approximately 90 percent of all live, managed honey bee colonies in the U.S., Oliver says. Bee pollination is responsible for more than \$20 billion in increased U.S. crop value each year.

Syngenta recognizes that bee health is vital to agriculture and the global food supply. "Bees are essential, and we care about their important role as pollinators," says Pedersen. "With the world's population heading toward 9 billion by 2050, we'll have to integrate crop and seed solutions to increase yields faster to ensure adequate food production while protecting bee health."