Beekeepers blame neonicotinoids for bee deaths

Recent research has suggested that neonicotinoid insecticides – used throughout the world to protect corn, soybeans, cotton, canola and other major crops – are harming pollinators. Because of that, the use of neonicotinoids is being reevaluated in many countries. Some groups want them banned altogether, but the manufacturers of neonicotinoid products claim they won't harm bees as long as they're used properly.

"Available data show that thiamethoxam-based products, used in accordance with label instructions, pose no known risk to bee health," according to Syngenta, which manufactures thiamethoxam, a neonicotinoid formulation. "Thiamethoxam has been used safely around the world for many years in more than 80 countries and on more than 20 different crops."

United States

In March, four beekeepers and five environmental and consumer groups filed a lawsuit against EPA in federal court for the agency's "failure to protect pollinators from dangerous pesticides." The lawsuit is challenging EPA's handling of thiamethoxam and clothianidin – another neonicotinoid formulation – and seeks to suspend their registrations, according to the Center for Food Safety, which is backing the plaintiffs.

Being insecticides, neonicotinoids are "highly toxic" to bees, but the critical point is how you use them, said David Fischer, an environmental toxicologist with Bayer CropScience, which produces clothianidin.

Clothianidin is used by Bayer as a seed treatment, applied to seeds that are buried in the ground. Bees aren't exposed to buried seeds, Fischer said.

"Under conditions of actual use, there's no effects on bee colonies," he said.

Foraging bees have been exposed if seeds weren't treated properly, or in unusual environmental conditions such as dust coming off corn seeds as they're being planted. Such incidents have occurred in Europe, Canada and the United States, but they're very rare, especially considering the millions of acres of treated seeds that are planted every year, Fischer said.

"There's been only a handful of confirmed incidents after all these years," he said.

Bees dying because of exposure to dust coming off treated seed is likely a problem that can be solved, but those incidents have "opened the door to other, broader questions about these pesticides and their effects," said Christian Krupke, an associate professor of entomology at

Purdue University.

Joel Coats, an insect toxicologist at Iowa State University, said there are many unanswered questions concerning the impact of neonicotinoids on bees and other non-target organisms.

“There’s a lot of concern and some data that points to the fact that we should reconsider their use.”

Krupke said neonicotinoids can protect treated crops and seeds from certain insects early in the season, but according to trials conducted in Indiana, insect pressures are often so low at that time of year that there is no need for the seed treatments. And yields from treated seed are not significantly different from those of untreated seed, he said.

“That does not mean there is no use for these compounds, but it does mean that we should reconsider the current approach of treating virtually every corn seed, and the vast majority of all other grain and oilseed crops, with these very powerful insecticides,” Krupke said.

“Proponents of these insecticidal seed treatments have been strongly emphasizing the fact that these pesticides are powerful and robust tools for managing a broad range of insect pests, yet are simultaneously saying that there are no non-target effects on other organisms, including pollinators,” he said. “Both logic, and our history with persistent and mobile compounds in the environment, suggest that these claims are likely incompatible with one another.”

Canada

In Ontario, Canada, a number of beekeepers are convinced that neonicotinoids were responsible for bee kills across the province in spring 2012. Canada’s Pest Management Review Agency (PMRA) examined 204 dead bee samples from the time period. Clothianidin was found in 70 percent of them.

“This is a new risk,” Connie Hart, senior PMRA science adviser, told Ontario beekeepers at their annual meeting last November. “Based on the information we have evaluated to date, the pesticides appear to have contributed to at least some bee losses this year.”

Murray Belyk, a manager of scientific affairs with Bayer, also spoke at the November meeting.

“Creating dust during seeding is a risk and needs to be addressed,” Belyk said.

Pierre Petelle, a vice president of CropLife Canada, an organization representing chemical companies, acknowledged the 2012 bee kill during a telephone interview last November.

“In 2012, we had incidences that derailed our proactive approach and threw us into the fire and forced us to react,” he said.

Bill Ferguson, a beekeeper in Huron County, Ontario, would like to see neonicotinoid products banned altogether. He doesn’t want a repeat of his 2012 experience. The beekeeper had high hopes for his bees that spring. The hives had come out of the winter in excellent shape, with low disease and mite pressure.

“On April 12, the seeding began at 8 a.m. in the field near my hives,” Ferguson said. “There was frost that morning; the temperature was around freezing. Bees are not able to maintain flight in that temperature. Within an hour and a half of the seeding process, bees were starting to come out of my hives and die.

“More than 200 bees, including drones, started dying every day in the hives; with their tongues sticking out,” Ferguson said. “Over 150 bee yards (in Ontario) reported similar problems to my own.”

Bayer and PMRA are developing voluntary best management plans to help growers take factors like wind direction into consideration at planting time. Bayer and CropLife Canada have suggested modifying planting equipment by adding shields, which can reduce the amount of insecticide straying from the planting site, or replacing the talc now commonly used to optimize

seed flow.

Bayer also is working on a way for farmers to apply the treatment to the seed as it's being planted. These problems can be solved with research and cooperation, said Fischer, the Bayer toxicologist.

The neonicotinoid problem doesn't stop at bee deaths, however, said Madeleine Chagnon, an environmental scientist at the Université du Québec a Montréal,

"The honeybee is known as a bio-indicator of the environment," she said. "If honeybees die, other organisms die also. That's for sure."

Europe

A proposal to ban neonicotinoid insecticides within the European Union was defeated in March, though EU member countries might reconsider that decision in the near future, according to the European Union Examiner.

Bayer and Syngenta were opposed to a ban.

"The failure to reach a conclusive decision is a clear recognition that there is no convincing argument against the continuing use of neonicotinoid-based products," according to a statement from Bayer.

Recent research in Europe has scrutinized the relationship between neonicotinoids and pollinators. In January, peer reviews of recent scientific data related to clothianidin, thiamethoxam and imidacloprid (another neonicotinoid formulation) were published in the EFSA Journal, an online publication of the European Food Safety Authority. The reports associated acute risks to pollinators with: the dust at planting from all three chemicals; the nectar and/or pollen from both cotton and canola treated with imidacloprid; the nectar and/or pollen of corn treated with clothianidin; and guttation fluid in corn treated with thiamethoxam. Other potential risks, including sub-lethal risks, to honeybees and other pollinators were examined, but no conclusions drawn in the EFSA reports because of a lack of data.

Syngenta described the EFSA report as "hurried and highly theoretical."

"This review made fundamental mistakes which led to a serious overestimation of the amount of pesticide bees are exposed to under field conditions," according to a Syngenta statement.

Other research papers have made claims similar to those of EFSA. A paper published in Nature last October, written by researchers at the University of London's School of Biological Sciences, claimed that after 28 days of exposure to imidacloprid, worker bee losses were at 40 percent.

Another paper, "Immune Suppression by Neonicotinoid Insecticides at the Root of Global Wildlife Declines," written by U.K., Dutch and Australian researchers and published in the September/October 2012 Journal of Environmental Immunology and Toxicology, claimed that neonicotinoid insecticides may be linked to global declines in honeybees and other pollinators.

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