

Bee deaths raise red flags about neonicotinoid pesticides



A Swarm of Troubles

By Sarah B. Hood

Bee deaths have been making news over the past decade as agricultural scientists have attempted to solve the mystery of unexplained hive failures and mass bee die-offs. Parasites, disease, pollution and cell phones have all been suspected, but now a rash of recent bee deaths in Ontario has been conclusively linked to one widely used type of agricultural pesticide.

Ontario bees have become more susceptible to winter die-off since the arrival of the Varroa mite (*Varroa destructor*) in the early 1990s. But significant summer die-offs over the past two years point to an additional risk from neonicotinoid pesticides used on corn and soybean crops. The finding is disturbing, since it hints that these chemicals may also be toxic to species farther up the food chain.

Ontario's Ministry of Agriculture and Food (OMAF) reports that about 3,000 registered beekeepers manage approximately 100,000 honeybee colonies, contributing \$25 million to the provincial economy. But the implications of widespread bee

mortality reach far beyond honey and its related products; many food crops and farm animals depend on the action of insect pollinators to survive.

"Bees are responsible for one-third of the food that we eat," says provincial apiarist Paul Kozak, who is associated with OMAF. "Even the meat and dairy that we eat rely on forage that's pollinated by honeybees. Other pollinators definitely play a part too, but as far as agriculture goes, honeybees are essential."

OMAF estimates that at least \$171 million would be lost annually in Ontario if bees were to disappear. "Those are older figures, and that doesn't take into account dairy and meat production or the blueberries outside the province that are pollinated mainly by Ontario bees," says Kozak. And dollar figures hardly reflect the challenge of making do without one-third of the province's usual food sources.

Dan Davidson, president of the Ontario Beekeepers' Association, estimates that honeybees are responsible for about 80 per cent of plant

pollination in Ontario; a figure that's rising, he says. "Pollinators living in the wild are disappearing. Farmers aren't getting that pollination from the wild, so they're being forced to buy hives. Bees are an indicator species; that's why everyone is so concerned."

There is no immediate prediction of honeybee extinction, but even at the current rates, bee decline is "going to take some livelihoods away from beekeepers," Davidson says. "So far, beekeepers have been able to keep up with the deaths of their bees, but this year has been very tough. If it continues on next year, some people will be out of business."

Before the arrival of the Varroa mite, bee populations used to drop by five to 10 per cent over the winter months. By the mid-'90s, when the mites had become established in Ontario, winter losses had risen to about 17 per cent. "Now we're dealing with 35 per cent loss on average," Davidson says, pointing out that some colonies have been reduced by as much as 70 per cent

to 80 per cent. “Since 2007, we’ve had some very high levels of winter loss. Typically, the level of winter loss that would be considered sustainable would be 15 per cent. We’ve had more than double that. This last winter we had winter loss of more than 40 per cent mortality.”

Gillian Leitch, a professional landscaper, a beekeeper and a volunteer with the David Suzuki Foundation’s Homegrown National Park, says that in Durham, near Owen Sound, winter mortality rates have been fluctuating between 20 per cent and 40 per cent over the past few seasons. “In a good year with an early spring, the Varroa mites get a head start because they’re feeding on the larvae. When the bees have a down year, the Varroa is also down,” she says.

“When beekeepers can control their Varroa mites, they can do very well,” says Kozak. But, as if the aggressive parasites weren’t enough to deal with, another problem has arisen in recent years. “Outside of the winter, we’ve had a problem that’s becoming more and more apparent: bees dying under atypical conditions – something is not right and the colony is not functioning as it should be. A beekeeper will phone us and report what’s suspected to be a pesticide incident,” he says.

When Health Canada’s Pest Management Regulatory Agency (PMRA) was called in to investigate these types of cases in the spring and summer of 2012, about 70 per cent of the dead bees were found to have been exposed to neonicotinoid pesticides. “They have concluded that the majority of pollinator mortalities over the past two years have been as a result of exposure to neonicotinoids,” Kozak says.

“Last year it was approximately 240 incidents in different locations, and this year it’s around 200 incidents. Each of those represents a location that can range from two to 50 colonies. We’ve had some counties that have had as many as one-third of the locations [affected], and a large

number of commercial locations have been having these incidents,” he says.

“We’ve had some bee yards where only one or two colonies appear to be affected, and other yards where every single colony appears to be impacted. We’ve had some where there’s just been a few dead or dying bees out front, and others where the colony has been rendered basically useless



“Bees are responsible for one-third of the food that we eat...”

Paul Kozak with Ontario's Ministry of Agriculture and Food (OMAF)



or non-functional,” says Kozak. “In some of the most serious cases, we’ve had a colony simply die out.”

Leitch reports that Durham beekeepers experienced losses of as much as 70 per cent this past summer. She points to the case of Dave Schuit, a commercial beekeeper in Elmwood, Ontario, which is located northeast of Walkerton. Schuit has been profiled in the news as one of the worst-hit beekeepers. In the summers of 2012 and 2013, his hives suffered devastating losses, including over a million bees from 32 hives on an organic farm in Brant Township last summer.

Neonicotinoids also kill other beneficial insects like ladybugs, lacewings and ground beetles, says Kozak. Last March, the American Bird Conservancy called for a ban on their use

in seed treatments due to potential danger to “birds, terrestrial and aquatic invertebrates, and other wildlife.”

Even more alarming, according to Davidson, “these chemicals are found at a very high rate in children with autism. It is a neurotoxin ... I don’t know if a lot of farmers know it’s not going to break down in the soil for about 20 years.”

In a Notice of Intent of September 13, 2013 titled “Action to Protect Bees from Exposure to Neonicotinoid Pesticides,” the federal PMRA has “concluded that current agricultural practices related to the use of neonicotinoid treated corn and soybean seed are not sustainable.” For the 2014 planting season, PMRA will be requiring corn and soybean farmers to use dust-reducing seed flow lubricants and safer seed planting practices, and calling for “enhanced warnings” on pesticide and seed package labels, while exploring potential research projects and other options to protect the health of bees.

OMAF has brought together a cross-industry Ontario Bee Health Working Group that includes government, academic and agricultural members, as well as beekeepers and representatives of the companies that



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10 Ways Municipalities Can Help the Bees

1. Keep informed. The issue of bee mortality is complicated, and new information is continually emerging.
2. Educate farmers. The Ontario Beekeepers' Association produces helpful fact sheets on the subject.
3. Educate the general public. Let people know when there's a chance to make their opinions heard.
4. Encourage all beekeepers, including hobbyists, to become registered.
5. Support community gardens and sustainable "fusion" gardening: "Mississauga has an awesome fusion garden program," says Leitch.
6. Don't spray roadside vegetation. "That's just a waste of clover," says Davidson.
7. Promote bee-friendly plantings, especially native varieties. "Petunias and geraniums are dependable, but they're not going to bring the fun kids to the yard," says Leitch.
8. Avoid digging garden soil until after 5 p.m. to protect wild bees that burrow into the ground.
9. Leave some uncultivated areas alone, and let some dead plants stand over the winter. "Wild bees nest in pithy stems," says Leitch. "It's such a great excuse to save money."
10. Prohibit pesticides. "Anytime you can do that, it's going to help," says Davidson.



manufacture neonicotinoid pesticides. The group has formulated a list of recommendations that will be assessed by the Premier for the spring of 2014. The Ontario government is also exploring research projects and funding various organizations related to bee health.

Some people are hoping that the federal and provincial governments will go farther. By mid-October, more than 40,000 people had signed an Ontario Beekeepers' Association petition calling upon the Premier to ban neonicotinoid pesticides entirely before the 2014 planting season. Europe is already moving in that direction. "Starting in December 2013, the European Union, based on a report from the European Food Safety Authority, is going to be implementing a two-year suspension of many uses of neonicotinoids, mostly focusing on flowering plants," says Kozak.

"I think a lot about what's next," says Davidson. "If we're having this much of a problem with this insecticide now, what's down the road for bees and humans? This is an important time to get it right, and I hope that everyone realizes how big this is for bees." ■

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