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[Menu](#)

- [Top Stories](#)
- [World](#)
- [Politics](#)
- [Canada](#)
- [Business](#)
- [Health](#)
- [A & E](#)
- [Tech & Sci](#)
- [Your Community](#)
- [Weather](#)
- [Offbeat](#)
- [Audio](#)
- [Video](#)
- [Photos](#)
- [Blogs](#)

- [News](#)
- [Sports](#)
- [Music](#)
- [Radio One](#)
- [Television](#)
- [My Region](#)
- [Program Guide](#)

[Home](#)[News](#)[Top Stories](#)

Story



Bee researchers raise more warning flags about neonicotinoid pesticides

New research suggests that widely used neonicotinoid-coated agricultural seeds are building up in pollen and groundwater, and contributing directly to the collapse of bee colonies. Not everyone agrees.
special report

Bee researchers raise more warning flags about neonicotinoid pesticides

Neonicotinoid build-up is contributing to collapse of colonies, researchers say. Not everyone agrees

Janet Thomson [CBC News](#)

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What's killing the world's honey bees? Europe has banned popular agricultural pesticides containing neonicotinoids, while Canada and the U.S. have taken a more cautious approach, saying more evidence is needed. Reuters

This spring most Canadian corn and soybean growers will be planting another crop of pesticide-coated seeds, even as researchers raise new warnings that the practice may have deadly side effects for bees and other wildlife.

The heated debate around the use of the neonicotinoid-coated seeds, developed by Bayer CropScience and introduced here about a decade ago, has divided farmers, beekeepers and scientists, and turned Canada into a kind of environmental battlefield.

To protect its bees, Europe banned the use of neonic pesticides last year, while U.S. authorities have so far taken a more cautious approach, saying these pesticides are just one possible factor in the collapse of so many bee colonies. Bayer filed a [court challenge](#) against the EU ban in August last year, saying the EU has wrongly linked the pesticide to bee deaths.

- [Read: Bayer Crop Science's written response to CBC inquiries about neonicotinoid-treated seeds](#)

Bayer and Health Canada maintain that proper planting practices minimize the risk to bees, while others say use of neonics should be suspended until the questions being raised by researchers and beekeepers have been answered.

Over the past few years, neonicotinoids have become the dominant insecticide in everything from corn and canola to flea collars for pets.

But some believe this insecticide, particularly the version that coats the seeds and protects the plant as it matures, is responsible for the decline in honey bees.

- [Interactive: Honey bee deaths start with pesticide, end with virus](#)



[Click on this image to view the interactive: Honey bee deaths start with pesticide, end with virus \(CBC\)](#)

When Health Canada tested dead bees last spring it found neonicotinoid on 70 per cent of them. At the time, it was thought the bees had become exposed to the dust that's kicked up during the planting process.

"Current agricultural practices related to the use of neonicotinoid-treated corn and soybean seed are not sustainable due to their impacts on bees and other pollinators," Health Canada then declared in a statement dated Sept. 13, 2013.

To address the dust concern, Health Canada's pesticide regulatory agency and the makers of the insecticide developed new best practices guidelines for farmers to go into effect this spring.

As part of the initiative, Bayer introduced a new lubricant that its lab tests suggest will help the treated corn seed flow through the planter, reducing total dust by 90 per cent and the active ingredient by 40 to 70 per cent.

Bayer told the CBC: "The new fluency agent has been shown to dramatically reduce dust when compared to the current industry standard lubricants."

But when the Ontario Ministry of Agriculture and Food tested the new lubricant under field conditions, it found dust was still problematic. OMAF field crop entomologist Tracey Baute says, "the lubricant, the fluency agency, does reduce the amount of active ingredient in the dust by 21 per cent."

"We're still trying to determine if a balance can be made in the use of these products and protecting the pollinators," Baute adds.

Veteran Ontario beekeeper Tibor Szabo Jr. is not impressed. "A 21 per cent reduction of something that's very, very toxic isn't going to make me feel better," he says. "Do I think it's going to save the bees? Heck no."

"There's a heck of a lot more to this than dust."

New research

Indeed now some researchers are saying that dust from planting could be just part of a bigger issue with neonics.

Canadian environmental scientist Madeleine Chagnon has spent the past 20 years studying honey bees.

When she analyzed dead bees she discovered a bio-marker that suggested the bees had come into contact with neonicotinoids whether they had been exposed to planting dust or not. This suggests that they were exposed to the pesticide while collecting pollen from maturing plants, says Chagnon.



University of Quebec environmental scientist Madeleine Chagnon has been studying the problems facing bee colonies for 20 years. (CBC)

"They're taking in something that they will ultimately die from, and they're taking this into the hive and feeding on it all winter, then we wonder why we have winter mortality."

For Chagnon, this means no amount of dust-reducing agents, better communication or labelling will prevent what is happening to honey bees. She's pushing for neonic products to be banned.

- [Watch MADELEINE CHAGNON video \(runs 1:17\)](#)

Other bee researchers have reached the same conclusion. Dutch toxicology consultant Henk Tennekes told the CBC, "there is little doubt that neonicotinoids are implicated in bee decline."

And [a new study by a Harvard University researcher and two Massachusetts' beekeepers](#), published earlier this month in the journal *Bulletin of Insectology*, also put the blame squarely on neonicotinoids for what has been called colony collapse disorder.

Tennekes's book *The Systemic Insecticides: A Disaster in the Making* has been compared to Rachel Carson's *Silent Spring*, which warned of the impending disaster of DDT in the environment in the 1960s.

"Even if Bayer were to succeed in reducing one route of exposure to virtually zero, many other routes of exposure are not affected," he said.

Bayer's response

[CBC News asked Bayer repeatedly to provide someone who could respond directly to this new research. But the company would only respond via email through its public relations firm. Read our email exchange and what Bayer has to say.](#)

He suggests that the continued use of neonics will "cause a collapse of the ecosystem" because they create breaks in the natural food chain.

Not everyone agrees with these dire assessments.

Ernesto Guzman is one of the most respected bee researchers in Canada, and a world expert on pathology in honey bees. As head of the Honey Bee Research Centre at the University of Guelph, Guzman does not see pesticides as the main culprit.

Guzman says that bee mortality in the spring is caused in part by pesticides, as evidenced by Health Canada's spring mortality results of 2013. But he insists

that whether or not systemic insecticides are the main threat to honey bee health is still debatable.



Ernesto Guzman, head of the Honey Bee Research Centre at Guelph University, says pesticides are not the main culprit when it comes to the mass deaths of honey bees. (CBC)

"Certainly pesticides are in fashion now and we hear a lot about them, but other factors also have to do with colony mortality, such as parasites like the Varroa mite," he says.

Guzman is not alone, either, in this assessment. The U.S. Department of Agriculture and the Environmental Protection Agency said last May, following a long study, that pesticides are just one of the many stressors contributing to the declining health of honey bees.

And there are scores of scientists who say neonics, when used properly, are safe for all non-target wildlife.

- [Watch ERNESTO GUZMAN video \(runs 1:19\)](#)

Groundwater

It was thought that insecticide-treated seeds were less harmful to the environment because the pesticide is planted underground along with the seed.

Seed supplier Steve Denys, a grain farmer and vice-president at Pride Seeds in Chatham, Ont., says that is one of the selling features: "Once the insecticide is in the ground there's no impact on the honey bees, and less impact on the environment than insecticides that are sprayed on crops."



Steve Denys, a corn farmer and vice-president of Pride Seeds in Chatham, Ont., says coated seeds are a huge improvement for the environment over previous spraying practices. (Courtesy Steve Denys)

But there is new research that indicates the insecticide may stay active in the soil and the groundwater.

During and shortly after spring planting last year, Laval University entomologist Valerie Fournier tested rainwater in cornfields. "Water samples, collected either in May or in June [2013], were shown to contain neonics in concentrations that are concerning for the bees," Fournier says.

She adds that insecticides in the water could cause "multiple sublethal effects" for bees, such as "impaired foraging behaviour, reduced food consumption, increased viral load and reduced fecundity and queen production."

A 2013 Dutch study from Utrecht University found that surface water collected from neonicotinoid-treated potato, horticultural and chicory fields "contained so much insecticide that it could actually be used directly as a lice-control pesticide."

Dutch researcher Jeroen Van der Sluijs says a bee drinking that water would die within a day.

Fournier notes that once a bee comes into contact with the insecticides, no matter the concentration, the effect is irreversible. The neonics bind with nerve cells and block their ability to function, which explains why some bees cannot find their way back into the hive.

- [Watch VALERIE FOURNIER video \(runs 1:09\)](#)

Systemic behaviour

Last July, in a study funded partially by the Grain Farmers of Ontario association, Baute took samples of pollen from foraging bees as they returned to their hives and as Ontario corn was starting to tassel.



Laval University entomologist Valerie Fournier is finding high concentrations of neonics in groundwater. (CBC)

She found that the pollen had been primarily collected from corn and soy beans.

When she tested the neonicotinoid levels in the pollen she found an average above five parts per billion.

While that is well below Health Canada's lethal dose benchmark of 38 pbb, beekeeper Tibor Szabo suggests that it is enough to contribute to chronic poisoning in honey bees.

Knowing that the corn pollen continues to express active pesticide well into the late summer shows the systemic nature of the neonicotinoids, Szabo says.

As the bees feed on the stored pollen all winter long, the pesticide causes a "delayed toxic effect in the beehives," he suggests.

"We're all still trying to learn more about the sublethal side of this", says Baute. "Chronic or sublethal, it's very hard to separate the two."

Trace amounts

University of Saskatchewan biologist Christy Morrissey studied the levels of neonics in Prairie wetlands and concluded that "upwards of 80 to 90 per cent of the wetlands adjacent to tens of millions of acres of neonicotinoid-treated canola are contaminated."

Though the concentrations are only in the parts per trillion range, under chronic exposure that would have toxic effects on sensitive aquatic invertebrates, she says.



N.S. apiary Scotian Bee Honey lost over 50 per cent of its hives this past winter, 2013-14, primarily because of the cold, it said. (CBC)

"You should be aware that these compounds are much more toxic and are in the water far longer than other insecticides used on the market," Morrissey says. "So they [bees] basically are being hit continuously with the chemical."

However, Steve Denys, the Ontario seed supplier and corn farmer, says if researchers go looking for minute traces of just about anything they could find it. "I could probably find coffee residue from a Tim Horton's cup in the field if I looked hard enough for it", he says.

Virtually all of the 21 million acres of canola planted in Canada is neonicotinoid-treated, says Canola Council of Canada market access manager Brian Innes. But he says "there have been no reported problems of harm from neonics on pollinators in any of the fields."

Barry Brown, a Saskatchewan beekeeper whose hives are in a "sea of yellow" — meaning they are surrounded by canola fields — says he lost 23 per cent of his hives over the winter.

"We don't have the smoking gun, but I don't think he could actually say no bees have been harmed by neonics in Saskatchewan," Brown says about Innes's assertion.

Meanwhile, in a 32-square-kilometre area in central-east Saskatchewan, Morrissey says she found concentrations of the chemical three to four times higher than what has been deemed habitable for insects. Morrissey's water and sediment samples were collected from wetlands in agricultural fields.

"We're not talking about a little regional problem. We're talking about something that's happening over tens of millions of acres," she told CBC News. "The longer that the chemical is in the water, the longer the exposure time for the bugs."

Birds and amphibians

Based on her findings, Morrissey says she also suspects that further up the food chain there's an impact on birds. She concludes that there are potential consequences for wetland-dependent species such as amphibians, waterfowl and aerial insectivorous birds.

She's not alone. In March 2013, former Environment Canada senior researcher Pierre Mineau, whose specialty is pesticide ecotoxicology, co-authored a paper for the American Bird Conservancy called, *The Impact of the Nation's Most Widely Used Insecticides on Birds*.

The main chemical compounds used in neonics are imidacloprid, clothianidin and thiamethoxam, and Mineau's findings show the chemicals stay on the seeds that are then eaten by birds.

The study found that a single kernel of imidacloprid-treated corn can kill small and "blue jay-sized birds," and sicken larger ones. It concluded that "imidacloprid is too acutely toxic to be used as a seed treatment insecticide on any seed type."



Ontario bee keeper Jim Coneybeare, one of the people calling for a ban on pesticides. (cbc)

Third generation Ontario beekeeper Jim Coneybeare is among those calling for a ban on the insecticides "as soon as possible, because [otherwise] we are going to lose the bee-keeping industry."

But he is not optimistic this is going to happen.

"I think we're into neonics so deep ... because chemical companies are making billions of dollars on the usage of these products."

- [Watch JIM CONEYBEARE video \(runs 1:28\)](#)

Denys insists that the new seed technology is an improvement not only for farmers, but for the environment. "On my bean crop, before neonics, I used 100 times the amount of active ingredient to provide protection."

What's more, he says because farmers spend less time tilling their fields they burn fewer fossil fuels than before.

Health Canada shows no signs of pursuing a ban, and instead is working with the industry to try and find better ways to reduce the chances of exposing non-target insects to the pesticide.

A spokesperson recently told the CBC, "The [regulatory] agency is currently re-evaluating the neonicotinoid insecticides, which will include an examination of residues in the environment."

Bayer CropScience, the makers of the controversial seed coating, told the CBC that the company "will continue to promote better collaboration between farmers and beekeepers to [improve bee health](#) and ensure the adoption of best management practices."

Bayer adds that it is "committed to meaningful stewardship efforts to safeguard honey bee health and maintain sustainable agricultural practices."



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