

Bee Deaths Reversal: As Evidence Points Away From Neonics As Driver, Pressure Builds To Rethink Ban

John Entine - <http://www.forbes.com/sites/jonentine/2014/02/05/bee-deaths-reversal-as-evidence-points-away-from-neonics-as-driver-pressure-builds-to-rethink-ban/2/>

If the Environmental Protection Agency moves to restrict neonicotinoid pesticides because of fears that they are causing bee deaths, it will happen in spite of the mounting evidence rather than because of it.

Last December, the European Commission [banned the use of neonicotinoids, often called neonics, for two years](#). The moratorium, support for which was [channeled](#) by the precautionary politics that now dominate science-based regulation in Europe, took effect just as numerous new studies—including one released this past week—shed increasing doubt on the belief that neonics play a central role in bee health.

Now the focus is on Canada. Farmers in the United States are worried about a domino effect if regulatory officials there buckle under pressure from anti-pesticide campaigners to ‘do something,’ which could result in copycat moratoriums.

The “crisis” prompting this hand-wringing is an [age-old problem](#) in the bee world: unpredictable bee deaths. They’ve occurred periodically for more than a century, but reemerged with a vengeance in 2004 in the California almond fields, where casualty rates briefly approached 60 percent. Beekeepers called it the ‘vampire mite scare’ because of its likely [link to varroa mites](#)—parasites that feed on the bodily fluid of bees—and on miticides used to combat them.

In 2006, there were [fresh reports](#) of unexplained bee deaths in what was known as Colony Collapse Disorder, or CCD, in which all the worker bees from a colony abruptly disappeared without a trace—no dead bodies to be found. The cause of the mysterious surge is still unclear. But as the crisis receded, attention turned to a less dramatic but more long-term challenge to bee health—sometimes also referred to as CCD, although experts believe it is a different phenomenon with different causes: the increasing number of bees that fail to survive through the winter.

On average, about 10 to 15 percent of bees die each winter. In recent years, that percentage has spiked to as high as 35 percent. Highly charged words like “[beepocalypse](#)” or “[beemageddon](#)” began turning up everywhere on the Internet. As measured a reporter as Dan Charles at NPR characterized the bee deaths as “[a crisis point for crops](#).” But what was causing the die-offs?

Like the fictional parents in the edgy comedy show *South Park* who blame Canada for all of their woes, activists often coalesce around an issue and then come up with a simple but sometimes simplistic narrative to frame it. Strident opponents of modern agricultural technology initially [blamed GMOs](#) for bee deaths, and some still make that claim, although there is zero evidence to back it up. When that didn’t get traction, the focus switched to neonics.

Even their sharpest critics acknowledge that the class of pesticides is extremely effective. Often applied only to the soil or used as a seed treatment, they were introduced in the late 1990s without incident as a less toxic replacement for the mass spraying of organophosphate and pyrethroid pesticides, which are both known to kill bees and wildlife. Organophosphates in particular have been linked to health problems in workers. Despite their comparatively benign toxicological profile, however, neonics have emerged as Public Enemy Number 1 in the eyes of anti-pesticide campaigners.

“It’s time to ban dangerous neonicotinoid pesticides,” [headlined](#) *Mother Earth News*, after Europe imposed its two year moratorium.

“[A] [growing body of evidence](#) has pointed to a group of insecticides called neonicotinoids, widely used on corn, soy, and other US crops, as a possible cause [of bee deaths],” [wrote](#) Tom Philpott in *Mother Jones*.

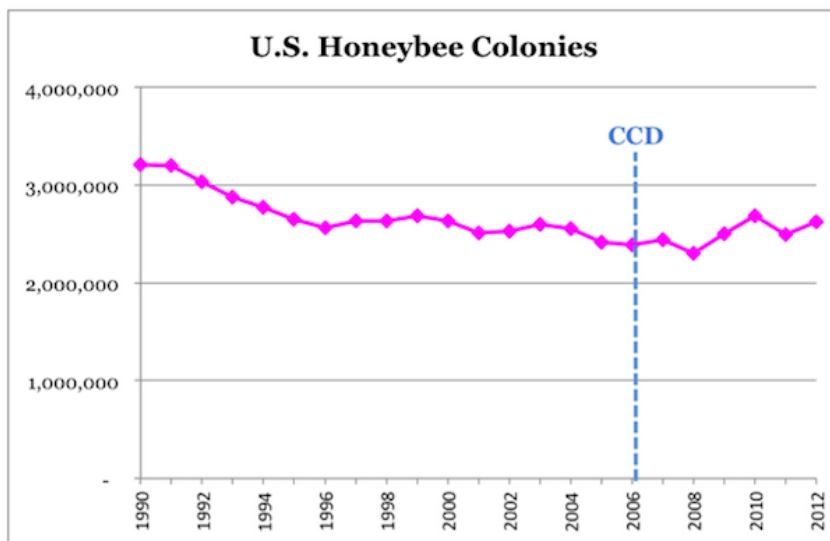
“EPA should cancel all uses of neonics where they can lead to harm for bees and other beneficial insects,” [wrote](#) Jennifer Sass of the Natural Resources Defense Council.

Are we facing a global bee crisis?

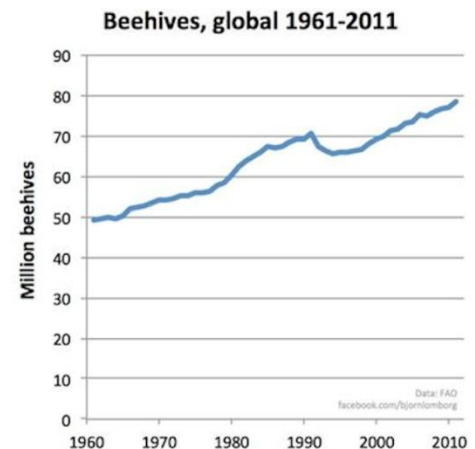
The intense rhetoric obscures two separate but intertwined questions. Are we facing a bee pollination crisis? And, what’s the cause of the recent spate of bee deaths? The answers should drive appropriate regulatory and scientific responses.

Close to one third of our food supply—blueberries and papaya, almonds and apples, and other fruits, vegetables, grains and nuts—is linked to pollination, and the honeybee is nature’s most celebrated pollinator. Though not all these foods are 100 percent dependent on honeybees and would not by any means disappear without them, without the bee our diet would be less nutritious and less tasty.

However, while bees face challenges, the numbers simply don’t support the “beepocalypse” narrative nor identify neonics as the driver of die-offs. As *Scientific American*’s Francie Diep noted in a [recent article](#) sub-headlined “why colony collapse disorder is not that big a deal anymore,” [North American honeybee colony numbers have been stable](#) for years at about 2.5 million even as neonics usage became more widespread.



Source: USDA NASS Honey Production Report



The US picture echoes global trends. According to the United Nations’ Food and Agriculture Organization, the number of beehives worldwide, after a plunge in the early 1990s, well before the introduction of neonics, has been rising steadily.

While honeybee-keepers have been able to replace most lost hives, there are concerns that future bees may not be able to sustain a high replacement rate. But this is a complicated issue. Bees, whose normal life span is measured in weeks, generally regenerate quickly; a whole hive can come up to full strength again in six weeks. Some beekeepers with no colony problems have been known to replace 100 percent of their bees in early spring.

However, if beehives are not given proper time to rejuvenate, major problems can occur. Every February, two out of every three hives in the US are shipped to California for the almond bloom, which puts enormous unnatural stress on colonies. There is often no time for hives to emerge from normal winter declines and rebuild to full strength.

What's the role of neonics in bee health?

A split has developed in the research community as to the potential link of neonics to bee deaths. Just this past week, entomologists at a New Orleans conference [released details](#) from a soon-to-be published field study that concluded that neonics may not be as harmful to bees as portrayed in the media because they are not being expressed in plant pollen or the plant's reproductive parts at levels that are high enough to hurt the bees.

“When we look at the literature and the Internet, what it says is that neonicotinoids applied as seed treatments are then taken up into the plant and expressed in the pollen and in the nectar,” [said](#) primary researcher Gus Lorenz, an extension entomologist with the University of Arkansas. “Well, that's not so much what we found.”

The researchers evaluated treated corn, soybeans and cotton. When they tested soybean flowers and cotton nectar, they found no traces of neonics at all. They did find microscopic traces of neonics in corn at what the EPA and toxicologists say are insignificant impact levels, with the highest having a mean of 2.3 parts per billion. To put that into perspective, one part per billion equals one second in 32 years. “It's not being expressed in the reproductive parts of the plants,” concluded Dr. Lorenz.

Yet those direct field observations conflict with some laboratory-based studies in leading journals and others in pay-to-play type publications in which bees treated in the lab with neonics are then released into the environment. In a French based [study](#) published in *Science*, a small percentage of free-ranging honeybees whose [brains were doused](#) with the neonic thiamethoxam got confused, failing to return to the hive. Another *Science* study, [focusing on bumblebees](#), found those exposed to high doses of the neonic imidacloprid had reduced colony growth rates and produced significantly fewer queens to found new colonies. Just last month, research in the low-impact journal *Excotoxicology* concluded that bumblebees exposed to imidacloprid were somewhat worse at gathering pollen than untreated bees although the nectar foraging efficiency of treated bees was not significantly different than the controls. Last year, the European Food Safety Authority (EFSA) released [three studies](#), none conclusive, raising questions about the potential role of neonics in bee health.

While concerning, the way some of the research was conducted raises caution about how much weight to place on their findings independent of real world confirmation. For example, the French thiamethoxam study came under sharp criticism because bees do not encounter the chemical by having their brains directly exposed. Any pesticide, if misapplied to crops, could collaterally impact bee function; that's one key reason why farmers, at the urging of scientists, phased out organophosphates. But that doesn't answer the question driving the current regulation frenzy: Are neonicotinoids as they are used in the real world the driving force behind bee deaths?

The US Agriculture Department and the EPA convened a working group two years ago to address that very question. Their [report](#), issued last May, put activists back on their heels. It [concluded](#) that neonics, while a contributor, were way down the list of possible causes. They cited as the primary drivers colony management, viruses, bacteria, poor nutrition, genetics and habitat loss. By far the biggest culprit—the report called it “the single most detrimental pest of honeybees”—was identified as the parasitic mite varroa destructor—the likely cause of the 2004 die-off.

The federal report echoed findings published last year by the United Kingdom's Department for Environment, Food and Rural Affairs ([DEFRA](#)), which [evaluated](#) the cause of bee deaths as the European Union was debating whether to institute a ban. DEFRA noted that the bees used in many of these lab experiments were exposed to doses hundreds of times higher than what they encounter in the wild, and they were often administered by injections.

“Laboratory-based studies demonstrating sub-lethal effects on bees from neonics did not replicate realistic conditions, but extreme scenarios,” the study concluded. “[E]ffects on bees do not occur under normal circumstances. Consequently... the risk to bee populations from neonicotinoids, as they are currently used, is low.”

DEFRA's caution about basing regulations on preliminary data was underscored last fall with the release of the most comprehensive [peer reviewed field study](#) on thiamethoxam, published in *Apidologie*. It concluded: “[A]t realistic (mean) exposure rates...no adverse impacts on brood production [of bumblebees] were found.”

The conflicting data were not enough to slow the regulatory express in Europe. In voting for a moratorium, European Commission politicians ignored DEFRA's analysis. It later emerged that EFSA appeared to have [deliberately suppressed evidence](#) of the relative safety of neonics after insider political lobbying by French officials. After the vote, Director-General of EFSA, Catherine Geslain-Lanéelle [resigned](#) to take up a job at the French Ministry of Agriculture, which had lobbied for a ban over the objections of Britain, Germany and other countries.

Yet another study released just last month raises further doubts about the neonic-bee death connection. A joint report issued by scientists affiliated with USDA and the Chinese Academy of Agricultural Sciences [concluded](#) that honeybee deaths (and likely bumblebee deaths as well) stem from the tobacco ringspot virus (TRSV), not from pesticides. It's long been known that foraging bees pick up the virus; what's new is that researchers discovered that the virus has evolved the ability to infect bees, and it now attacks their nervous systems. TRSV then spreads to other bees—a process known as “host shifting”—by the mites that feed on them.

In an unlikely embrace of nuance, *Mother Jones'* Tom Philpott now grudgingly acknowledges that varroa mites could be the driver of bee deaths. “Disturbingly,” writes Philpott “in his [review](#) of the study, [the scientists] found that the virus also replicates in varroa mites, an established bee pest, and that the infected mites could help spread the virus.” This adds a new layer to the emerging consensus in the scientific community that the mites, in combination with other factors, are the central threat to bee health.

Canadian wild card?

But Canadian officials seem resistant to the emerging research trends. After the European Commission voted to ban neonics, anti-GMO, green and farm groups turned their focus on Canada, [pressuring](#) Ottawa to follow suit. The responsible agency, Health Canada's Pest Management Regulatory Agency (PMRA), aware that the evidence fingering neonics was spotty, vacillated, issuing an ambiguous [assessment](#) of reported bee deaths in Ontario and Quebec and a vague “[notice of intent](#)” order to regulate neonics, without providing details.

It's not as if PMRA does not have comprehensive research on neonics to rely upon. If bee health problems were critical in Canada, they would certainly have surfaced in the country's 19 million acres of canola farms, which are mostly in the west. Beekeepers who forage their bees in the canola fields, where neonics are used far more heavily than on Ontario and Quebec farms, say their hives are generally thriving. Apart from a single, ambiguous case, there have been no reports of bee kills attributable to neonics in all of western Canada in recent years.

PMRA could also have drawn upon previous studies, including [three major field investigations](#) on neonicotinoid pesticides in 2002, 2005 and 2012 by environmental biologist Cynthia Scott-Dupree of the University of Guelph and entomologist Chris Cutler of Dalhousie University. The researchers noted residues of neonics in ailing bee hives, but at levels hundreds of times lower than scientists believe would have any impact on bees. Their conclusion echoed recent findings by DEFRA, USDA and EPA: many factors contribute to bee deaths, but neonics in particular had “no effects” on their poor performance.

Scott-Dupree and Cutler's field research is widely recognized as among the most robust in the world in evaluating real world impacts of these pesticides. But under pressure from the Sierra Club allied with organic-focused beekeepers, the Ontario provincial government ensured that the two experts with the most detailed research on the issue would not be invited to participate. Although excluded from the Ontario study group, Cutler, Scott-Dupree, and David Drexler, an agronomy consultant, published an [analysis](#) of all bee-kill incidents reported in Canada from 2007-2012. Their key finding: “[V]ery few of the serious bee kills involve

neonicotinoid pesticides. Five times as many ‘major’ and ‘moderate’ pesticide-related bee kills were sourced to other non-neonic chemicals.“

Let’s be clear: the Ontario group was mostly for show. The main ‘output’ for this initiative—apart from the politicians’ imperative of appearing to ‘do something’—has always been to ‘light a fire’ under PMRA to capitulate to the complaints of the Sierra Club and Ontario beekeepers.

What would happen if PMRA moved to heavily restrict neonics? The failure of the federal agency to do elementary cost-benefit analysis and its apparent inclination to downplay field evidence could set the wheels of unintended consequences spinning into motion.

In Europe, where the neonics moratorium just took effect, farmers have had no choice but to return to older and less effective pesticides: organophosphates and pyrethroids. The dangers of organophosphates, which are highly toxic to bees, are widely known. Now, just last month, a study of pyrethroids by the Royal Holloway University of London published in the *Journal of Applied Ecology*—the first to examine the impact of the pesticide across the entire lifecycle of bumblebees—[found](#) that its use impairs brood reproduction and stunts growth, which is disastrous for bee health.

“Our work provides a significant step forward in understanding the detrimental impact of pesticides other than neonicotinoids on wild bees,” [said](#) co-author Nigel Raine. The scientists expressed particular concern that patchwork bans and moratoriums could result in stressing bee colonies even more.

In reviewing the emerging evidence on challenges to bee health, University of Illinois entomologist May Berenbaum, chairwoman of a major National Academy of Sciences study on the loss of pollinators, [said](#) recently that she was “extremely dubious” that banning neonics would have any positive effect. The key challenges to bee health going forward, entomologists say, are colony management issues, the blood-sucking varroa mite, the miticides beekeepers themselves use to control varroa infestations and various viruses, like TRSV.

Viewed from afar, it appears PMRA is tottering on a dangerous political and scientific tightrope. In panic mode, the default of agencies under the microscope is often, “When in doubt, regulate.” If Canadian officials should capitulate to the ban pressure, the decision would not be based on science—the evidence is moving gradually but decisively away from neonics as a culprit for bee deaths. The question for Canada and ultimately for US regulators: Will they examine the evidence? Or will politics drive the science?

Federal Report Points to Many Causes In Dramatic Bee Disappearance

WASHINGTON (AP) — A new federal report blames a combination of problems for a mysterious and dramatic disappearance of U.S. honeybees since 2006.

The intertwined factors cited include a parasitic mite, multiple viruses, bacteria, poor nutrition, genetics, habitat loss and pesticides.

The multiple causes make it harder to do something about what's called colony collapse disorder, experts say. The disorder has caused as much as one-third of the nation's bees to just disappear each winter since 2006.

Bees, especially honeybees, are needed to pollinate crops.

The federal report, issued Thursday by the Agriculture Department and the Environmental Protection Agency, said the biggest culprit is the parasitic mite varroa destructor, calling it "the single most detrimental pest of honeybees."

The problem has also hit bee colonies in Europe, where regulators are considering a ban on a type of pesticides known as neonicotinoids that some environmental groups blame for the bee collapse. The U.S. report cites pesticides, but near the bottom of the list of factors. And federal officials and researchers advising them said the science doesn't justify a ban of the pesticides yet.

May Berenbaum, a top bee researcher from the University of Illinois, said in an interview that she was "extremely dubious" that banning the pesticide would have any effect on bee health. She participated in a large conference of scientists that the government brought together last year to figure out what's going on, and the new report is the result of that conference.

Berenbaum said more than 100 different chemicals — not just the pesticides that may be banned in Europe — have been found in bee colonies. Scientists find it hard to calculate how they react in different dosages and at different combinations, she said.

Some of these chemicals harm the immune systems of bees or amplify viruses, said Penn State University bee expert Diana Cox-Foster.

At a news conference Thursday, Sonny Ramaswamy, a top USDA official, said the scientific consensus is that there are multiple factors "and you can't parse any one out to be the smoking gun."

USDA bee researcher Jeff Pettis also cited modern farming practices that often leave little forage area for bees.

Dave Gaulson of the University of Stirling in Scotland, who conducted a study last year that implicated the chemical, said he can't disagree with the overall conclusions of the U.S. government report. However, he said it could have emphasized pesticides more.

The environmental group, Pesticide Action Network North America blasted the federal government for not following Europe's lead in looking at a ban of certain pesticides.

Pollinators, like honeybees, are crucial to the U.S. food supply. About \$30 billion a year in agriculture depends on their health, said Ramaswamy.

Besides making honey, honeybees pollinate more than 90 flowering crops. Among them are a variety of fruits

and vegetables: apples, nuts, avocados, soybeans, asparagus, broccoli, citrus fruit and cranberries. About one-third of the human diet comes from insect-pollinated plants, and the honeybee is responsible for 80 percent of that pollination.

"It affects virtually every American whether they realize it or not," said EPA acting administrator Bob Perciasepe.

Zac Browning, a fourth-generation commercial beekeeper who has hives in Idaho, North Dakota and California, said the nation is "on the brink" of not having enough bees to pollinate its crops.

University of Maryland entomologist David Inouye, who was not part of the federal report, said he agrees that there are multiple causes.

"It's not a simple situation. If it were one factor we would have identified it by now," he said.

Inouye, president-elect of the Ecological Society of America, said the problems in Europe and United States may be slightly different. In America, bee hives are trucked from farm to farm to pollinate large tracts of land and that may help spread the parasites and disease, as well as add stress to the colonies, while in Europe they stay put so those issues may not be as big a factor.

At the news conference, Berenbaum said there's no single solution to the U.S. bee problem: "We're not really well equipped or even used to fighting on multiple fronts."