

USDA study concludes neonics not driving bee deaths—As White House set to announce pollinator revival plan'

Even as a special [White House created task force](#) is poised any day now to address concerns over supposedly vanishing honeybees, new research suggests that the very premise of the federal investigation may be misplaced.

Last summer, President Obama asked the Environmental Protection Agency to investigate conflicting reports that pesticides, and in particular a class of chemicals known as neonicotinoids, were the probable cause of mysterious bee deaths and declining numbers of beehives.

The latest headline on farmers' critical pollinator? The numbers of beehives are actually growing, continuing a multi-year improvement—gradually repairing the damage wrought by the 2006 mass bee die off known as Colony Collapse Disorder.

The Department of Agriculture announced late last week that honey production, which had been disrupted after CCD devastated the bee population nine years ago, continues to improve, up 14 percent. The total number of hives also increased again, by 100,000 or 4 percent, as it had increased the year before and the year before that.

More to the point as to the acrimonious debate over whether and how much neonicotinoids are impacting bee health, the total number of beehives today is higher than it was in 1995 when neonics as they are often called had just come on the market.

The report also comes just days after a USDA-sponsored study [concluded](#) that widely promoted claims that neonics are the primary driver of been health problems seriously distort the scientific explanation as to why bees have struggled over the past decade.

Simple or 'simplistic' explanations for bee deaths?

Here are the data for the number of managed beehives in North America, showing the stabilizing situation even before last week's 4 percent increase:

Screen Shot 2015-03-22 at 5.17.37 PM
Sources: USDA and [Statistics Canada](#)

After a rocky few years as the CCD crisis unfolded, beehive numbers stabilized and then began a gradual improvement—and now stand at 20-year highs in North America and worldwide.

The eruption of CCD and the subsequent fall-off in over wintering bee hive counts has prompted understandable and justifiable concern. But—while mainstream scientists warned against politicizing a complex and developing situation, advocacy groups coalesced around one rather simple—entomologists called it simplistic—explanation: bee deaths were caused by the growing use of neonics.

Neonicotinoids are a class of insecticides introduced in the 1990s precisely because they were thought to be less harmful to beneficial insects and humans than the aging chemicals they gradually came to replace. They are most often used by farmers who coat them on seeds, which then grow into plants that systemically fight pests.

Even as the CCD's concerns faded—scientists now believe it was a short-lived phenomenon that has occurred numerous times over the past few centuries—environmental groups continued to post thousands of blogs and stories citing one out-of-context study or another as the 'definitive' explanation for a mystery that most mainstream experts say is complex and not easily reducible to the kind of black hat/white hat kind of narrative that so appeals to advocacy groups.

The real cause of bee health problems is gradually coming into sharper focus. In the latest in a string of studies looking at the relationship of pesticides found in pollen to honey bee colony health, independent researchers, [publishing](#) in PLOS ONE, politely slammed many past studies that hyped pesticides, neonics in particular, as the likely driving cause of CCD.

The scientists—all independent and working in a cooperative agreement with the [USDA-ARS Bee Research Laboratory](#)—[found](#) that many past researchers often based their experiments on extremely high amounts of pesticides—far more than a bee would normally encounter in its life. They looked instead at field realistic doses of pesticides, although always testing at the high end of what bees might actually experience.

They deliberately fed honeybee colonies the neonic pesticide imidacloprid in a dose-response experiment based on real-world pesticide levels: 5 and 20 µg/kg doses are in the reported high range of residues present in pollen and nectar in seed-treated crops. They also included a 100 µg/kg dose as a worst-case exposure level, representing imacloprid applied to flowering crops. (That level caused a large kill of bumblebees in a [2013 Oregon incident](#).) Bee exposure occurred over nearly three weeks, longer than bees are usually exposed to neonics, so they they could not be accused of under-dosing them.

What did they find? Even at the highest dose of pesticide exposure, the researchers found no difference in the performance of the treated and untreated hives. They found no evidence that imidacloprid affected foraging activity during and after exposure in their experiments.

Directly contradicting claims by advocacy groups whose complaints prompted the forming of the White House task force, the longer the time period the less pesticides were found. "Bee Death Study Clears Bayer's Insecticide as Sole Cause [of CCD]," [concluded](#) Bloomberg in its summary analysis. "A widely used insecticide developed by Bayer AG and tied to deaths of honeybees isn't the main cause of the fatalities, University of Maryland researchers said in a study that may weaken arguments used by environmentalists seeking to ban the chemical."

Chensheng Lu's conclusions discredited

The new study can also be seen as a direct rebuke of the controversial [research](#) by Chensheng Lu, a Harvard University environmental scientist who used doses 10-100 times higher than found in the real

world to support his claim, accounted before he embarked on his research project, that neonicotinoids were the driving cause of CCD.

Lu reached folk hero status among environmentalists last May after the Harvard School of Public Health launched a promotional campaign touting his latest, controversial [research](#): “Study strengthens link between neonicotinoids and collapse of honey bee colonies,” a press release claimed.

News of the “definitive” study exploded on the Internet. Many environmental and tabloid journalists painted an alarmist picture based on Lu’s research: “New Harvard Study Proves Why The Bees Are All Disappearing,” [“Harvard University scientists have proved that two widely used neonicotinoids harm honeybee colonies,”](#) and [“Neonicotinoid Insecticide Impairs Winterization Leading to Bee Colony Collapse: Harvard Study”](#) are typical examples of hundreds of blog posts.

Scientists now say that the Lu study, published in an obscure pay for play journal, proved only that feeding bees poisonous levels of an insecticide can and will kill them. University of Illinois Department of Entomology Chair [May Berenbaum](#), who headed up the National Academy of Sciences 2007 National Research Council [study](#) on the Status of Pollinators in North America, has [called](#) Lu’s research “effectively worthless” to serious researchers.

The experimental design and statistical analysis are just not reliable. ... He never tested for the presence of pathogens, so his conclusions dismissing other likely causes don’t follow from his data. The whole study just doesn’t hold together. And I’m not being a fusspot here. It’s unfortunate this was presented as a Harvard paper because it gives this credibility that it doesn’t deserve.

Ideology driving federal response?

The buzz that followed the publication of Lu’s 2014 study is a classic example of how dicey science can combine with sloppy reporting to create a ‘false narrative’—a storyline with a strong bias that is at once compelling and wrong. The Lu study was a scientific outlier, albeit one that fit the prejudices of advocacy groups. The eager embrace and promotion of this fatally flawed research illustrates how simplistic ideas get rooted in the public consciousness. And it shows how ideology-driven science threatens to wreak public policy havoc.

Lu is on the board of The Organic Center, an arm of the multi-million dollar Organic Trade Association, a lobby group with strong financial interest in disparaging conventional agriculture, synthetic pesticides and [neonics](#) in particular—a conflict of interest that Lu never acknowledges and to my knowledge no other journalist has reported.

This latest USDA guided study goes along way to reversing the misinformation that has rippled forth in the year since the Lu “solved” the bee death mystery. Are there any prominent entomologists who endorse Lu’s alarmist findings? I couldn’t find any in months of trying.

A *Mother Jones* [article](#) by controversial activist-journalist Tom Philpott suggesting the Lu had all but

solved the mystery of bee deaths quoted Jeffrey Pettis, an entomologist and research leader at USDA's Beltsville's Bee Laboratory, as appearing to be supportive. "Pettis told me that he thought Lu's study 'adds to the list' of studies showing that pesticides pose a significant threat to honeybees," he wrote. I emailed Pettis about that quote:

I was trying to be diplomatic when I talked to Philpott but the Lu study should not have been published. It is not good science. I was trying to say that it adds to the list that pesticides and bees don't mix but it is not a paper that shows that neonics cause problems simply because it was poorly replicated with high dosages used.

Pettis is one of the authors of this latest, far more sober and professionally researched, analysis. The Maryland researchers did acknowledge that neonics are not exactly harmless, but they are far down the list of health challenges faced by bees.

"It contributes, but there is a bigger picture," they [said](#) in a news release. Other factors are thought to include parasites such as Varroa mites and Nosema fungus, a bacterial disease known as foulbrood, viruses, drought and loss of habitat.

Even more surprising, said Pettis and his colleagues, over the course of the experiment, pesticide residues declined, eventually becoming non-detectable within colonies' beebread and honey. As [Wired noted](#) in its analysis, that's one of the things that makes imidacloprid so popular, as the pesticide is designed to break down quickly. In fact, in one of the three years more "queen events," or creation of special queen cells, were found in the treated colonies. And while colony overwintering survival did seem to be linked to high doses of the pesticide in one year, the link collapsed the following year. There was no consistent pattern suggesting reports of harm were anything more than random data noise.

"It's not surprising that higher levels will hurt insects," said [Dennis vanEngelsdorp](#), a leading bee researcher often credited with identifying and naming the 2006 CCD event. He was not involved in this study. "They're insecticides after all," he added. "But this study is saying that neonicotinoids probably aren't the sole culprit at lower, real-world doses."

That's consistent with mixed results of many other experiments with these pesticides. [vanEngelsdorp](#), said. In general, pesticides don't kill bees, but they can make other bee problems worse.

But even that statement needs to be put in context. All farming requires tradeoffs and risks. Best practices require striking a reasonable balance between costs and benefits. Farmers necessarily use pesticides; even organic farmers use them, extensively. And all pesticides, even organic ones, result in some collateral damage—the killing of some beneficial insects.

The most honest and realistic question therefore becomes: Which pesticides yield the most benefits to farmers while causing the least harm to the environment, including in this case, bees? Demands to neonics because they are 'part of the problem' make no reasonable sense, as all pesticides are part of the problem.

Real world impact of ban

If the U.S. government moves to restrict the use of neonics, what would replace them? In Europe, where neonics were banned 15 months ago after a ferocious lobbying campaign by activists, farmers have begun replacing them with older pesticides phased out years ago precisely because they caused too much collateral damage. So the panic solution—an open-ended moratorium on the use of neonics—has actually led to increased bee deaths.

The impact on farm production of the European ban is also coming into sharper focus, and the picture is ugly. Neonics are used most commonly on rapeseed, more commonly known in North America as canola. It's used primarily to make oil. While rapeseed production has reached record levels in the United States and Western Canada, in places where honeybee hive numbers are hitting record levels, Europe's farms are in disarray. Figures released earlier this month by [European farmer cooperatives](#) reveal regional rapeseed production is expected to fall by as much as 7 percent this year, compared to 2014.

"The situation is very serious, with declines of up to one million tons in rapeseed production estimated in Germany. Some areas have been particularly badly hit, like in parts of the UK where producers lost 40 percent of their production," said Arnaud Rousseau, chairman of the oilseeds working group.

Why the sharp drop off?

"What makes it worse is that there are no alternative tools [replacing neonics] for crop protection for the spring varieties and crops are being destroyed by flea beetle attacks."

This confirms anecdotal reports that have been mounting for months. As Matt Ridley [reported last fall](#) in *The Times of London*:

All across southeast Britain this autumn, crops of oilseed rape are dying because of infestation by [flea beetles](#). The direct cause of the problem is the two-year ban on pesticides called neonicotinoids brought in by the EU over British objections at the tail end of last year. ... Farmers in Germany, the EU's largest producer of rape, are also reporting widespread damage. Since rape is one of the main flower crops, providing huge amounts of pollen and nectar for bees, this will hurt wild bee numbers as well as farmers' livelihoods.

The EU farmers cooperative has called on the EU Commission to do a socio-economic impact assessment to look at the extent of the damage.

As the harmful consequences of the precipitous European moratorium deepen, all eyes are turning to Washington. Activists have been trying to jack up political pressure in the United States, just as the surge in bee deaths in the US and Europe appears to have reversed. Last September, a coalition of environmental groups co-wrote a [letter](#) signed by 60 Congressional Democrats urging the EPA to restrict neonicotinoid use citing Lu's work in arguing that "native pollinators" have "suffered alarming declines."

What's next? The White House pollinator task force is set to issue its evaluation of the honeybee health

“crisis” any day now, and it may include calls to further restrict the use of neonics.

Here’s the nuanced reality: The uncomfortably high number of bee deaths eludes the kind of definitive but reckless calls for action that could result in precipitous regulations. Science is not a set of results; it is a method. If the method is faulty, as in the case of the Lu study and the simplistic ‘neonics causes bee deaths meme’, the results are useless.

“This is a really complex issue with no quick and easy solutions,” May Berenbaum told me. These papers simplistically fingering neonics are” just not good science.”

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