

Briefing

Neonicotinoids & bees: Scientific studies increase the case for a permanent ban

On 16 January 2013, British and European scientists urged that certain neonicotinoid chemicals ('neonics') should be suspended from some uses.

Their review of evidence for the European Food Safety Authority (EFSA) identified that the use of neonics pose a 'high acute risk' to bees. <http://www.efsa.europa.eu/en/press/news/130116.htm>

The EFSA review led to the European Commission (EC) to propose and pass in May 2013 a partial and temporary, two year, restriction on the use of three neonicotinoids. That restriction is being reviewed during 2015.

Since the restriction came into force on 1 December 2013, at least 9 independent scientific studies and reviews of evidence have added to the weight of evidence that the widespread use of neonicotinoids is a fundamental cause of bee harm and decline.

This briefing summarises each of the recent studies and reviews.

1. Task Force on Systemic Pesticides Worldwide Integrated Assessment (WIA) on the Impact of Systemic Pesticides on Biodiversity and Ecosystems

In June 2014 the largest and longest global study into the effects and risks of systemic pesticides including neonics was published by the *Task Force on Systemic Pesticides*.

The Task Force's *Worldwide Integrated Assessment on the Impact of Systemic Pesticides on Biodiversity and Ecosystems (WIA)* examined over 800 scientific studies spanning five years to 2013-14, including industry sponsored ones.

The WIA is the single most comprehensive study of neonics ever undertaken, is peer reviewed, and published as free access so that the findings and the source material can be thoroughly examined by others. The Task Force concludes that neonicotinoids "are causing significant damage to a wide range of beneficial invertebrate species and are a key factor in the decline of bees." <http://www.tfsp.info/press/>

The study also found systemic chemicals to be harming other wildlife, water and soil quality:

Harm: <http://www.tfsp.info/findings/harm/>

Ecosystems: <http://www.tfsp.info/findings/ecosystems/>

Species: <http://www.tfsp.info/findings/species/>

2. Neonics and birds – Dutch study

In July 2014, a peer-reviewed study found the decline of birds to be associated with pesticide use and water contamination in The Netherlands as covered in the press:

BBC: <http://www.bbc.co.uk/news/science-environment-28216810>

The Guardian: <http://www.theguardian.com/environment/2014/jul/09/neonicotinoids-farmland-birds>

3. US Environment Protection Agency (EPA) report on neonics

On 16 October 2014 the US Environmental Protection Agency (EPA) reported that the use of neonics on soya beans is of '**little or no overall benefit**' to the quality of the crop, raising questions about why farmers have been paying to use them and how well they have been tested before being licensed for use. (Our emphasis) <http://www.panna.org/epa-confirms-neonicotinoids-are-little-or-no-benefit-soybeans>

4. UK Insect Pollinators Initiative (IPI) study into neonicotinoids

On 21 October 2014, the results of various studies under the Insect Pollinators Initiative (IPI) were revealed at a dissemination event at the Wellcome Trust. One of the IPI studies, by the Universities of Dundee, Newcastle and Royal Holloway London, examined neonicotinoid pesticides. <http://www.dundee.ac.uk/research/main/news/20100608120233/702.html>

The study found that '**significant impairment of foraging behaviour in bumblebees exposed to field realistic levels of neonicotinoids**. Exposed bees collected less pollen, took longer to take foraging trips and show no evidence of improving their ability to gather food from flowers (learning). These effects on the behaviour of individual bees have knock on effects for their colony...' (Our emphasis) <https://twitter.com/pauldezylva/status/524529554216730624>

5. Review of the metabolic pathways of neonics and fipronil

This review studied "**extensively their metabolic pathways, showing how they form both compound-specific and common metabolites which can themselves be toxic. These may result in prolonged toxicity.**

The review concluded, "Considering their wide commercial expansion, mode of action, the systemic properties in plants, persistence and environmental fate, coupled with limited information about the toxicity profiles of **these compounds and their metabolites, neonicotinoids and fipronil may entail significant risks to the environment.** A global evaluation of the potential collateral effects of their use is therefore timely." (Our emphasis)

Environmental Science and Pollution Research, January 2015, Volume 22, Issue 1, pp 5-34
<http://link.springer.com/article/10.1007%2Fs11356-014-3470-y>

6. Scottish bumblebee study

In February 2015, a study into bumblebee brain function by the Universities of Dundee and St Andrews found further evidence of neonics' role in bee decline, specifically, the bees' ability to forage.

Dr Chris Connolly of the University of Dundee said: "Our research demonstrates **beyond doubt** that the level of neonicotinoids generally accepted as the average level present in the wild causes brain dysfunction and colonies to perform poorly when consumed by bumblebees. In fact, our research showed that the ability to perturb brain cells can be found at 1/5 to 1/10 of the levels that people think are present in the wild. This is not surprising as

pesticides are designed to affect brains of insects so it is doing what it is supposed to do but on a bumblebee as well as the pest species.

“The bumblebees don’t die due to exposure to neonicotinoids but their brains cells don’t perform well as a result and this causes adverse outcomes for individual bees and colonies. This is not proof that neonicotinoids are solely responsible for the decline in insect pollinators, but a clear linear relationship is now established. We can now be confident that at these levels, neonicotinoids disrupt brain function, bee learning and the ability to forage for food and so limit colony growth.” (Our emphasis)

<http://www.dundee.ac.uk/news/2015/bee-brains-and-colony-health-jeopardised-by-pesticide-exposure.php>

<http://www.heraldscotland.com/news/environment/bumblebee-brains-impaired-by-low-levels-of-pesticides.117559765>

7. European Academies Science Advisory Council (EASAC) - review of evidence

In April 2015, the EASAC published a review of evidence in which it concluded that current use of neonicotinoids has negative effects on a range of organisms that provide ecosystem services like pollination and natural pest control, as well as on biodiversity.

The EASAC said that there is an increasing body of evidence that the widespread prophylactic use of neonicotinoids has severe negative effects on non-target organisms that provide ecosystem services including pollination and natural pest control.

The EASAC added that there is clear scientific evidence for sub-lethal effects of very low levels of neonicotinoids over extended periods on non-target beneficial organisms. These should be addressed in EU approval procedures. It also advised that the current practice of prophylactic usage of neonicotinoids is inconsistent with the basic principles of integrated pest management as expressed in the EU's Sustainable Pesticides Directive, and it recommended that the widespread use of neonicotinoids (as well as other pesticides) constrains the potential for restoring biodiversity in farmland under the EU's Agri-environment Regulation. http://www.easac.eu/fileadmin/Reports/Easac_15_ES_web_complete.pdf

8. Newcastle University - Bees prefer foods containing neonicotinoid pesticides

On 22 April 2015, this Newcastle University study (Wright et al) was published in *Nature*, the science journal. The study concludes that bees preferred to eat solutions containing neonicotinoids, even though the consumption of these pesticides caused them to eat less food overall.

The study undermines claims that harm from pesticides can be avoided or reduced by planting other sources of nectar and pollen nearby and concludes that this “might not be enough to decrease the risk of poisoning pollinators with pesticides”.

Instead, the study concludes that treating flowering crops with commonly used neonicotinoids “presents a sizeable hazard to foraging bees” and recommends that reducing pesticide use “may be the only certain” way to halt bee and pollinator decline.

9. Swedish field trial - Seed coating with a neonicotinoid insecticide negatively affects wild bees

Also published in *Nature* on 22 April 2015, this long awaited field trial of neonicotinoids in southern Sweden is significant because it examines how the use of neonicotinoids in field conditions on the widely grown crop, oil seed rape, affects both wild solitary bees (*Osmia bicornis*) and bumblebees (*Bombus terrestris*) and managed honey bees (*Apis mellifera*).

The study found that the use of the neonicotinoid seed coating reduced the density of wild bumble and solitary bees in the flowering oilseed rape (OSR) fields and adjacent

uncultivated field borders. Bees benefited from feeding on large fields containing many more and larger flowers of oil seed rape but **“the negative impact of the seed coating on wild bee density persisted.”** (Our emphasis)

Wild solitary bees failed to nest in areas next to fields treated with neonicotinoids. Use of the neonicotinoid coated seed correlated with a reduced ability of the solitary bee to nest in areas next to fields treated with neonicotinoids. The researchers suggest that this is probably because the exposure affected the bees’ ability to navigate. Also, wild bumble bees were also affected with this the use of the neonicotinoid seed coating “negatively related to colony growth and reproduction”.

The study concludes that: The use of neonicotinoid treated seeds in real field conditions **“has negative effects on wild bees**, with potential negative effects on populations” and says “This finding is important because of the urgency to understand whether the use of neonicotinoid insecticides pose an unacceptable risk to bees.”

“Second, the impact of clothianidin seed coating in oil seed rape differs between the wild bees studied and the honeybee. This implies that **the use of honeybees as model organisms in environmental risk assessments of neonicotinoids may not allow generalizations to other bee species.**” This is significant because pesticide industry tests and PR rarely mentioned wild bees and tend to focus on managed honey bees which have a very different biology and foraging behaviour.

The study conclusions add that, “We question whether prevailing risk assessment standards, where predominantly short-term and lethal effects are assessed on model species under laboratory conditions, can be used to predict real-world consequences of pesticide use for populations, communities and ecosystems.” This finding undermines the inadequacy of the way pesticides are tested before they are licensed for commercial use.

Also, the study finding that pyrethroid treatments could not be detected undermines claims that the use of these is worse than neonicotinoids. This is significant because the pesticides has repeated claimed that restrictions on Neonics would lead farmers and growers to resort to pyrethroid-based chemicals.

Will a ban on neonicotinoids reduce crop yields?

In June 2014 the National Farmers Union (NFU) claimed significant crop losses owing to the lack of neonic use.

On 25 June 2014, as part of efforts by Syngenta to gain approval to derogate from the EU restriction, NFU Vice President, Guy Smith, claimed on the BBC Radio 4 programme, *Farming Today*, that oil seed rape was being devastated due to the present restriction in the use of some neonicotinoids.

He said: “...we have just found that 70% of the Swedish Spring Oil Seed Rape crop was destroyed this year by flea beetles.”

Buglife, the conservation charity, said the claims were unfounded <https://www.buglife.org.uk/news-&-events/news/buglife-exposes-misleading-claims-swedish-oil-seed-rape-yield-loss>

Mr Smith apologised on twitter for the error. The 2014 ADAS Harvest Report subsequently showed that any loss of crops was “in line with the 5 year average” for crop losses i.e. within normal expected seasonal and annual fluctuations. <http://www.hgca.com/markets/market-news/2014/october/06/adas-final-2014-harvest-summary-report.aspx>

Leading bee expert, Professor Dave Goulson of the University of Sussex, (founder of the *Bumblebee Conservation Trust* and best-selling author of ‘*A Sting in the Tail*’) responded to

claims that the UK's Oil seed rape crop is being devastated by as much as 50% by infestations of flea beetle and that restrictions on use of certain chemicals are misplaced: <http://splash.sussex.ac.uk/blog/for/dg229/2014/10/10/are-crops-being-devastated-without-neonicotinoid-protection>

Increased evidence on thiacloprid

Thiacloprid is also a neonicotinoid insecticide but was not reviewed by EFSA and is not covered by the restrictions.

However several published studies indicate harm to bees, including their ability to navigate, from their exposure to this insecticide.

Although thiacloprid has a lower toxicity - in terms of its lethal dose - to bees than the three neonicotinoids covered by the temporary EC restrictions, it may be found at higher levels in pollen and nectar than neonicotinoids applied as seed coatings due to being sprayed.

More evidence about the studies on thiacloprid can be found [here](#).

Clear case for a permanent ban

Friends of the Earth considers that the original EFSA review of three neonicotinoids and the independent scientific evidence published since then add up to a compelling case for:

- The existing ban on three neonicotinoids to be made permanent.
- The ban to be extended to include all neonicotinoids
- The ban to be extended to apply to all uses.

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