

# SAVING THE EU'S POLLINATORS

*The banning of three main neonicotinoid pesticides by the European Union is seen as an important step in helping bee numbers to recover.*

The European Union recently voted to ban the three main neonicotinoids: imidacloprid which was developed by Germany's Bayer CropScience, clothianidin created by Bayer CropScience and Japan's Takeda Chemical Industries, as well as thiamethoxam from Switzerland's Syngenta. The three neonicotinoids, a class of pesticides based on the chemical structure of nicotine, have been widely used in agriculture over the past 20 years.

Neonicotinoids act as nerve agents and mounting research has shown they cause wide ranging harm to individual bees, including memory damage, shorter life spans, behavioural changes and reducing queen numbers. The EU ban is expected to come into force by the end of 2018 and will mean the pesticides can only be used in greenhouses.

"Bee health remains of paramount importance for me since it concerns biodiversity, food production and the environment," said Vytenis Andriukaitis, the EU's health and food safety commissioner.

A decade ago bee colonies across Europe and the United States suddenly began dying in a still unexplained plague dubbed "colony collapse disorder". In some EU member states the number of bee colonies has declined by more than 50 per cent. In the United States the number of managed bee hives plunged from 5.5 million in 1961 to less than 2.5 million in 2012. The number of hives has increased slightly to 2.7 million but worries about the colonies' overall health persist.

Environmentalists have long blamed neonicotinoids for declining bee and insect numbers, but a lack of research and contradictory findings failed to support this conclusion. However, this changed in February this year when the European Food Safety Authority (Efsa) released a report based on a meta-analysis of more than 1500 studies.

It found that the risk to bees varied depending on the crop and exposure route, but that "for all the outdoor uses, there was at least one aspect of the assessment indicating a high risk".



**Right:** Bees and other insects are vital for global food production as they pollinate three-quarters of all crops

The Efsa assessment included bumblebees and solitary bees for the first time. It also identified that the high risk to bees does not stem from neonicotinoid use on non-flowering crops such as wheat, but from wider contamination of the soil and water which leads to the pesticides appearing in wildflowers or succeeding crops. A 2017 study of 200 honey samples revealed global contamination by neonicotinoids. The rates were highest in North America with 86 per cent of samples containing one or more neonicotinoid, followed by Asia (80 per cent) and Europe (79 per cent).

Jose Tarazona, head of Efsa's pesticides unit, said: "The availability of such a substantial amount of data has enabled us to produce very detailed conclusions. There is variability in the conclusions and some low risks have been identified, but overall the risk to the three types of bees we have assessed is confirmed."

Bees and other insects are vital for global food production as they pollinate three-quarters of all crops. The plummeting numbers of pollinators in recent years has been blamed, in part, on the widespread use of pesticides. Efsa's first assessment in January 2013 found "unacceptable" risks to bees from neonicotinoids and paved the way for a partial EU ban three months later. It banned the use of the three main neonicotinoids on flowering crops – principally oilseed rape, maize and sunflowers – as they were regarded as the most attractive to bees.



Research on the negative effect of neonicotinoid pesticides on bee populations gathered steam in recent years.

Peter Neumann, chair of the Institute of Bee Health at Bern University and author of a 2015 European Academies Science Advisory Council (EASAC) report, put the costs of pollination loss in Europe at €14.6 billion.

The decline of Europe's bee populations has been on the public and policy-makers' radars for some time. Less attention was paid to the plight of other flying insects but a 2016 study published in scientific journal *Plos One* revealed that they have also

**Above:** The plummeting numbers of pollinators in recent years has been blamed, in part, on the widespread use of pesticides

## NEONICOTINOIDS

Neonicotinoids were introduced in the 1990s and saw a significant uptake by farmers. Neonicotinoids ('new nicotine-like insecticides') are effective against:



Chewing insects (eg. grasshoppers, beetles)



Sucking insects, both above and below the soil (eg. aphids)

### WHAT DO THEY DO?

Neonics are more toxic to invertebrates than they are to mammals. They act on the central nervous system of insects, causing **leg tremors, rapid wing motion, disoriented movement, paralysis** and **death**.

The EU has one of the strictest procedures for authorizing pesticides use in the world.

Insecticides are pesticides used by farmers to protect crops from harmful pests and insects.



There are 7 different substances in the family of neonicotinoids. Imidacloprid is the most widely used. In 2013, The EU restricted some of its users, as well as for clothianidin and thiamethoxam.



### THEY ALSO RAISE ENVIRONMENTAL CONCERNS:

They've been linked to the decline of animal pollinators, specifically bees.

Risk of harming non-targeted species, such as other insects and birds.

Risk of contaminating other areas via air or ground water.

declined in both diversity and abundance in the last quarter of a century.

From 1989 to 2016, scientists in Germany annually collected insect samples across 96 unique locations in nature protected areas. During the 27-year study the average biomass of flying insects collected at the sites fell by 76 per cent.

The study highlighted that landscape and climate change were unlikely to have accounted for a large share of such a severe decline and stressed that the decline "suggests large-scale factors must be involved" with agricultural intensification "a plausible cause".

A 2018 report, which included participation from the United Nations Environment Program, Fauna & Flora International and the University of Cambridge, found that around 75 per cent of food crops rely on pollinators, making insects worth \$577 billion annually. Half that value comes from wild pollinators.

"Pollinator loss would potentially decrease crop production by about 90 per cent in at least 12 per cent of the leading global crops," said Gemma Cranston, director of natural capital at the Cambridge Institute for Sustainability Leadership.

Many scientists have supported tighter restrictions on neonicotinoids, pointing out not only their effects on bees but on the whole environment.

"Neonicotinoids not only contaminate plants, soil, and water, but surprisingly, they stay in the water and soil for a long time after they are sprayed," said Professor James Nieh, a biologist at the University of California San Diego. "That these chemicals drift outside of their application areas has now been demonstrated in multiple studies."

Neonicotinoids also impact on natural predators, including spiders and birds – who act as a form of natural pest-control valued at €91 billion annually worldwide – and on micro-organisms that ensure soil fertility (€22.75 billion).

The pesticide manufacturers and some farming groups have accused the EU of being overly cautious and suggested crop yields could fall, a claim rejected by others. "European agriculture will suffer as a result of this decision," said Graeme Taylor, at the European Crop Protection Association. "Perhaps not today, perhaps not tomorrow, but in time decision makers will see the clear impact of removing a vital tool for farmers."

The world's population is set to grow from seven billion today to nine billion in 2050. The pesticide industry argues that its products – a market worth about \$50 billion a year and growing – are vital in protecting crops and ensuring sufficient food supplies.



This was dismissed as a “myth” in March 2017 by UN food and pollution experts, who said pesticides cause “catastrophic impacts on the environment and human health” and accused pesticide manufacturers of a “systematic denial of harms”.

“It is a myth,” said Hilal Elver, the UN’s special rapporteur on the right to food. “Using more pesticides has nothing to do with getting rid of hunger. According to the UN Food and Agriculture Organisation (FAO), we are able to feed nine billion people today. Production is definitely increasing but the problem is poverty, inequality and distribution.”

The report, which was co-authored by Baskut Tuncak, the UN’s special rapporteur on toxics, said: “While scientific research confirms the adverse effects of pesticides, proving a definitive link between exposure and human diseases or conditions or harm to the ecosystem presents a considerable challenge, this challenge has been exacerbated by a systematic denial, fuelled by the pesticide and agro-industry, of the magnitude of the damage inflicted by these chemicals, and aggressive, unethical marketing tactics.”

Germany’s Bayer CropScience said that the ban is

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“a bad deal for the European agricultural sector and the environment, and one that will not improve the lot of bees or other pollinators.” Switzerland’s Syn-genta also said the decision was “disappointing, but not unexpected”.

Both companies challenged the 2013 partial ban at the European Court of Justice, and a ruling was expected as this issue of Flashes went to press. If the ruling is in favour of the two companies, the legal challenge will most likely continue. f

**Below:** Pesticide manufacturers and some farming groups have accused the EU of being overly cautious



## THE SIX MAJOR PESTICIDES

### ORGANOPHOSPHATES

Insecticides that target the nervous system. Several of them have been banned or restricted due to toxic accidental exposures.

### CARBAMATES

Insecticides that affect the nervous system similarly to organophosphates, but they’re less toxic as their effects wear off more quickly.

### PYRETHROIDS

Also affect the nervous system. They’re a laboratory-produced version of a natural pesticide that’s found in chrysanthemums.

### ORGANOCHLORINES

Including dichlorodiphenyltrichloroethane (DDT), these have been largely banned or restricted due to negative effects on the environment.

### NEONICOTINOIDS

Insecticides used on leaves and trees. They’re currently under scrutiny by the US EPA for reports of unintended harm to bees.

### GLYPHOSATE

Known as a product called Roundup, this herbicide has become important in farming genetically modified crops.