Case study on „Neonicotinoid insecticides“

Case study introduction

Neonicotinoid insecticides (in short: neonics) are among the most widely used group of insecticides in the world. They work differently from other pesticides as they are taken up by the plant sap and translocated to all parts of the plant. Initially, they were praised for providing targeted and cost-effective protection for crops. However, evidence of unintended effects on non-target species emerged, and the use of neonics was linked to incidents of large-scale bee deaths and honeybee colony collapses. The possibly irreversible damaging effects on important ecosystem services such as pollinating insects was a main reason for taking precautionary measures. The EC regulated three types of neonics in 2013 and 2018. However, controversies about risks and regulations continued. Diverging perceptions on scientific uncertainty, risk assessments, and on the application of the precautionary principle, are central in these controversies.

Relevance to the precautionary principle

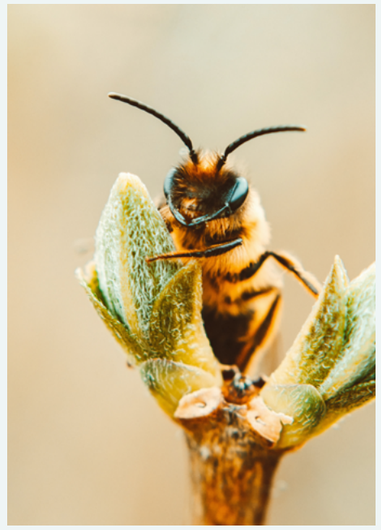
The precautionary principle is included in Regulation (EC) No 1107/2009 concerning the placing of plant protection products on the market. The regulation further specifies that pesticides already approved on the European market can be reassessed if new evidence on risks is found. This enabled the EC to initiate a reassessment process of three types of neonics.

The regulations implemented by the EU to ban three types of neonics can be termed precautionary, because risk assessment is beset by scientific uncertainty on the exact ecotoxicological impacts of neonics. However, because the regulations were implemented long after substantive knowledge on the risk had emerged, some also see the regulative measures as preventive rather than precautionary.

Potential impact

In the context of increasing pest resistance to established pesticides, agrochemical industry hailed the invention of neonicotinoids as signifying a new era of pest management, providing cost-effective, highly targeted and long-lasting protection of crops against pests. The industry also warned that a ban on neonics in the EU would have negative consequences and lead to crop losses. The benefits of neonics have however been questioned, and several comprehensive studies have not found clear and consistent evidence on yield benefits on a range of crops. There are many uncertainties on the relationship between the use of neonics and yield benefits, which also may be impacted by unpredictable changes in the density and developments of both pollinating and pest insects.

The risks discussed in relation to neonics are mostly environmental, with the main attention on pollinators. Since the 1990s, evidence has been mounting that the large-scale use of these chemicals plays a key role in colony collapses and is an important driver of pollinator decline. There is also growing evidence on risks for other species and ecosystem services, such as earthworms and aquatic invertebrates. The possibly irreversible damaging effects on important ecosystem services have led to precautionary action and controversy on whether a complete phase-out of neonics is justified. Independent researchers, beekeepers associations and NGOs have argued that all neonics should be completely banned, and that innovation should focus more on alternative means of crop protection and reduction of pesticide use (in line with the aims of reducing pesticide use as promoted in Directive 2009/128/EC).



Neonics seems to be the class of insecticides that has produced the most severe collateral damage on non-target invertebrates ever.

Key promises of the neonic innovation included that they would be carefully targeted and would have a high specificity, but both claims proved to be wrong.

Key uncertainties

Scientific uncertainties are central in the controversies around this case. A main uncertainty stems from the complexity of interacting causes that contribute to the global trend of pollinator decline. Regarding neonics, there is uncertainty and a lack of knowledge on residue levels, and it is difficult to estimate a realistic level of exposure for different types of insects. There are uncertainties regarding the sub-lethal effects on different kinds of species, and a complexity of factors (including a cocktail of pesticides) that impact different species. Therefore, scientific assessments on both the unintended effects of neonics, and on the relative importance of neonics in pollinator decline are contested. There are ambiguities about how to estimate/measure causes and effects, about what kinds of studies (field vs. lab studies) are valid and/or reliable, and about how to interpret different studies and risk assessments.

There are also uncertainties about the actual benefits of neonics, which are particularly difficult to measure when the use is prophylactic (application of pesticides to all seeds even when there are no signs of pests). Further, the economic impact of a significant decline of pollinators would be very challenging to assess.

Interesting links

- EU Ban on Neonics – Too Little, Too Late: www.greeneuropeanjournal.eu/eu-ban-on-neonics-too-little-too-late/
- Worldwide Integrated Assessment: www.tfsp.info/en/worldwide-integrated-assessment/
- Neonicotinoids: www.ec.europa.eu/food/plant/pesticides/approval_active_substances/approval_renewal/neonicotinoids_en
- Neonicotinoid pesticides are a huge risk – so ban is welcome, says EEA: www.eea.europa.eu/highlights/neonicotinoid-pesticides-are-a-huge

Further information

University of Bergen
Centre for the Study of the Sciences and the Humanities
www.uib.no/en/svt

Authors:
Laura Drivdal, *Researcher*
Jeroen van der Sluijs, *Professor*

For the **references** used for the case study, please look into the full report available at: www.recipes-project.eu/results/case-study-4-neonicotinoid-insecticides

UNIVERSITY OF BERGEN

RECIPES
Precaution • Innovation • Science

RECIPES is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement no. 824665. The views and opinions expressed in this factsheet are purely those of the writers and may not in any circumstances be regarded as stating an official position of the European Commission.

www.recipes-project.eu
@RECIPESproject