HFFA Research GmbH

Banning neonicotinoids in the European Union

An ex-post assessment of economic and environmental costs

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Content

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List of abbreviations

AHDB – Agriculture and Horticulture Development Board

AWU – Annual Working Unit

BCPC – British Crop Production Council

BUND – Friends of the Earth Germany
(German: Bund für Umwelt und Naturschutz Deutschland)

CBD – Convention on Biological Diversity

CIS – Commonwealth of Independent States

CSFB – Cabbage Stem Flea Beetle

DEFRA – Department for Environment, Food and Rural Affairs

EEA – European Environment Agency

EASAC – European Academies Science Advisory Council

EC – European Commission

ECB – European Central Bank

EFSA – European Food Safety Authority

ESA – European Seed Association

EU – European Union

FAO – Food and Agriculture Organization

GDP – Gross Domestic Product

GEF-BIO – Global Environment Facility Benefits Index of Biodiversity

GHG – Greenhouse Gas

HGCA – Home Grown Cereals Authority

KTBL – Association for Technology and Structures in Agriculture
(German: Kuratorium für Technik und Bauwesen in der Landwirtschaft)

LEL – State Institute for the Development of Agriculture and Rural Areas (German: Landesanstalt für Entwicklung der Landwirtschaft und der ländlichen Räume)

NBI – National Biodiversity Index

OBT – Observaçao da Terra

OSR – Oilseed Rape

UBA – German Environmental Agency (German: Umweltbundesamt)

UK – United Kingdom

UNEP – United Nations Environment Programme

ZMP – Central Market and Price Information System (German: Zentrale Markt- und Preisinformationen GmbH)

Executive summary

In January 2013 the European Commission proposed to restrict the use of neonicotinoids in the European Union. Since 1 December 2013 farmers have been unable to buy or sow seeds that are treated with these active ingredients on crops that are known to be attractive to bees. When implementing the restrictions, the European Commission confirmed that within two years after imposing the ban on neonicotinoids it would initiate a review of new scientific and other relevant information on the risks posed to bees. Thus, the European Food Safety Authority is currently reviewing the available material to formulate conclusions based on updated risk assessments.

A holistic risk and impact assessment of neonicotinoids should also evaluate the verifiable risks and costs which can be allocated to the agricultural sector facing the ban. This study has been conducted to provide that view. More particularly, this research aims at providing a condensed, science-driven and expert-triggered judgement on various economic and environmental effects of the ban on neonicotinoids in European agriculture using the case of oilseed rape.

Altogether, 13 relevant clusters of scientific studies dealing with mainly agronomic impacts of the ban on neonicotinoids in oilseed rape production in member states of the European Union have been identified. Analysing them leads to several conclusions, i.e. consequences of the ban on neonicotinoids. Major findings of this meta-analysis are displayed in the following overview.

Overview on major findings of the meta-analysis conducted within this study

Study	Region	Yield impact (in percent)	Additional foliar applications (in number per hectare)	Total economic impact (in million EUR per region)
Alves et al. (2016)	UK	–1.0	2.00	–33.0
ESA (2015)	EU	–5.1	0.75	–547.5
ESA (2016)	EU	–3.1	0.50	–331.4
Hughes et al. (2016)	SC	–0.5	0.23	–0.469
Kim et al. (2016)	FR	–5.0	n. a.	–146.0
	DE	–5.0		–99.2
	UK	–9.0		–79.6
Market Probe (2015)	DE	–5.4	1.20	–157.3
Market Probe (2015)	HU	–2.1	0.60	–11.7
Market Probe (2015)	UK	–3.2	1.00	–45.1
Meszka et al. (2016)	PL	–10.0	0.33	–182.6
Nicholls (2016; 2015)	UK	–3.5	n. a.	–33.2
Scott/Bilsborrow (2015)	EN	–1.1	1.90	–34.4
Vasilescu et al. (2015)	RO	–22.0	1.35	–103.3
White (2016)	UK	–2.7	1.81	–49.9
European Union (total)	***EU***	***–4.0***	***0.73***	***–512.5***

Source: Own figure.

All studies highlight that the ban on neonicotinoids has caused a yield decrease in oilseed rape production of the European Union. The measurable negative yield impacts differ between less than one and more than 20 percent depending on insect pressure and pest coverage of an individual study. On average, a yield depression of 4.0 percent for oilseed rape production in the European Union as a whole can be extrapolated from the studies.

Quality impacts of the ban are also covered in some of these studies. Smaller seeds and a lower oil content are major quality changes. On average, these developments in quality occurred in 6.3 percent of the harvest volume and account for a price difference of 36.50 EUR per ton affected.

Without the ban on neonicotinoids, 912,000 tons of OSR would have been produced more annually in the European Union. This loss in production is as large as the oilseed rape production volume in Romania and worth almost 350 million EUR. Quality depressions add an additional market revenue loss of more than 50 million EUR. Thus, total annual market revenue losses following the ban on neonicotinoids for the European Union as a whole and oilseed rape production amount to around 400 million EUR.

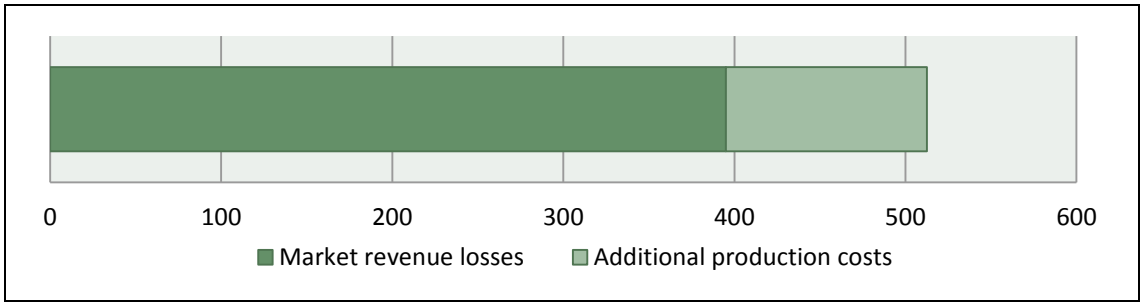
All the analysed studies confirm that in the absence of neonicotinoid seed treatment, insecticide foliar applications are used more often than before the restrictions came into effect. The application of pyrethroids appears to be the next best solution for combating insects. Additional sprays range from 0.2 to 2.7 applications per hectare depending again on insect pressure and pest coverage analysed by an individual study. The weighted average of additional insecticide (mainly pyrethroid) applications per hectare according to our extrapolation from the studies is 0.73 for oilseed rape production in the entire European Union. This additional application of pyrethroids and other insecticides has not only increased resistance problems but also oilseed rape production costs for the European Union as a whole by close to 120 million EUR annually.

However, this should be considered a rather low estimate of the real production cost increase as a consequence of the ban on neonicotinoids since costs attributable to other necessary management efforts could not be included in the extrapolations. This refers, first of all, to costs of additional monitoring activities, more re-drilling and higher seed rates which by far outweigh comparably small cost savings that can be attributed to a non-treatment of seed with neonicotinoids post the ban.

The additional production costs together with the losses in market revenue are equal to the total economic loss oilseed rape farmers in the European Union have experienced. These economic losses on-farm and per annum can be aggregated; they accumulate to more than 510 million EUR as the following graph depicts and

can be considered the sectoral income foregone in oilseed rape producing member states of the European Union as a consequence of the restrictions.

Economic losses in oilseed rape production of the European Union (in million EUR)



Source: Own figure.

Because of reduced transport, crushing, processing, packaging, trading activities, etc. along the value chain, additional income losses in other sectors of the economy can be related to the ban on neonicotinoids. These losses are worth approximately 360 million EUR. The total gross domestic product impact, therefore, is equivalent to an annual loss of almost 880 million EUR. Over a time period of two marketing years since the ban came into effect, this amounts to a national income loss for the European Union as a whole of more than 1.75 billion EUR.

Already before banning neonicotinoids in flowering crops, negative economic impacts had been suggested by scientific research. The results of this analysis show that the ban has caused massive economic disruptions, which are much larger than expected prior to the implementation of the ban. Moreover, it turns out that currently available analyses, studies and papers as well as plenty of expert knowledge do not support criticisers who had considered scientific ex-ante assessments of implications due to restrictions on the use of neonicotinoids as being not realistic enough, overrating the negative effects of pests and showing a tendency of arguing in favour of industry lobbyists.

Banning neonicotinoids has increased global land conversion towards agricultural uses by 533,000 hectares since the 912,000 tons of oilseed rape missing in the European Union had to be produced somewhere else on this land to compensate for the losses at world market level. The vast majority of the land additionally needed is located in Oceania (mainly Australia) and the former Soviet Union (mainly the Ukraine) who are the European Union's major trading partners with respect to oilseed rape.

All this now agriculturally used land had sequestered carbon both above and below ground before it was converted into farmland as a consequence of the ban on neon-

icotinoids in the European Union. Consequently, a large part of this carbon has been released into the atmosphere in the form of CO_2. If it had been possible to circumvent such a ban, an emission of more than 80 million tons of CO_2-equivalents would have been avoided. This is equal to what Austria currently emits per year as greenhouse gases.

Converting more than 500,000 hectares of grassland and natural habitats constituting eco-zones rather rich in species compared to more or less intensely used arable land in the European Union also requires to take a look at the associated biodiversity losses. It turns out that global biodiversity equivalent to a loss of species when converting more than 250,000 hectares of Brazilian or 330,000 hectares of Indonesian natural or nature-like habitats, e.g. rain forests, has been lost due the ban on neonicotinoids in oilseed rape production of the European Union.

Finally, it can be concluded that the ban on neonicotinoids on balance has caused an additional water use of more than 1.3 billion m^3 at a global scale. Less oilseed rape has been produced in the European Union after the ban, and this decreased production needs less agricultural water remaining available for other purposes. Almost 1.5 billion m^3 of water have been domestically "saved" this way. However, since water productivity in many other parts of the world is not as high as here in the European Union, much more water has to be used in other regions to cultivate a compensatory amount of oilseed rape after banning the use of neonicotinoids here. In total it amounts to more than 2.8 billion m^3. This higher agricultural water use abroad outweighs the lower water use embedded in domestic oilseed rape farming post the ban.

All these findings are the result of conducting a comprehensive meta-analysis and applying scientific modelling and calculation approaches. Moreover, the results are supported by numerous experts. This broad-based consensus allows to state that a policy-decision such as the ban on neonicotinoids has its economic and environmental impacts, and such impacts are repeatedly substantial and too often negative.

Indeed, it turns out that not applying a technology – such as neonicotinoid treatment in oilseed rape production – may have some positive implications (on very specific environmental aspects) but definitely causes much more negative disturbances. These disturbances must be taken into account when making decisions. Pros and cons of applying or not applying a technology need to be assessed in a more balanced and holistic way; and if such a comprehensive assessment results in societal benefits of applying a technology outweighing the costs, then the technology should be applied. In the case of not banning neonicotinoids in oilseed rape production of the European Union such benefits to society are obvious as shown above.

Losing neonicotinoid seed treatment as a management option thus means: These benefits are lost!

This loss can only partly be lowered, e.g. through the use of pyrethroid and other insecticides. However, in the long term, this move towards second-best solutions may create other challenges, such as a stronger resistance problem. It is therefore necessary to have a rather broad tool box of management options available enabling farmers across the European Union to combat not only insects being enemies of our arable crops but all pests in a resource-efficient way. Neonicotinoid seed treatment is one of these tools, and it is a very valuable tool.

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Imprint

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