Pan European Study on the Impact of Neonicotinoid Suspension on Farming

1. Summary

Neonicotinoids are the most widely used class of insecticides. They were first registered for use in 1994 and can be applied both as seed a treatment and as a foliar spray. Crop protection products containing neonicotinoids are considered to be important to manage insect pests in different agricultural systems. In the late 2000s some kinds of neonicotinoids began to come under increasing scrutiny over their potential environmental impacts. As a result, neonicotinoid insecticide registrations were suspended by the European Union (EU) starting from December 2013. As a result, farmers have to grow crops such as winter oilseed rape (WOSR), corn and sunflower without using seeds treated with neonicotinoid.

In 2014, Syngenta commissioned a survey to be undertaken by Market Probe to evaluate the consequences of the suspension on the registration of neonicotinoids on farming in all EU member states. The objective of the study is to provide an understanding of the impact of the neonicotinoid suspension on farming and mainly highlights the suspension's impact on growing area, yield, crop quality and production cost.

For this study, three countries were selected for data collection namely the UK, Germany and Hungary. In all countries, winter oilseed rape growers and farm advisors were interviewed twice: once at the end of 2014 to review the autumn season (Wave 1) and once at the end of 2015 to review the complete season of winter oilseed rape (Wave 2). Different growers were interviewed for Wave 1 and Wave 2 and these were the study highlights:

Wave 1

- Among the farmers interviewed, more than 50% of the total winter oil seed rape area grown has been affected by some sort of flea beetle this autumn. Reseeding has been an extra cost that some farmers have had to bear due to early crop damage by these insect pests.
- To control insect pests, farmers increased the use of post-emergent insecticide applications. For example, farmers in the UK had already applied more foliar insecticides halfway through the season compared to the whole of the previous season. More frequent applications of insecticides to control insect pests have increased fuel and labor costs.
- Increased foliar insecticide applications do not resonate with an agricultural sector that would ideally use fewer inputs. The use of more foliar applications may increase the exposure of beneficial insects to insecticide sprays.

- Farmers in the UK and Germany plan reductions in winter oilseed rape acreage because insecticides used instead of neonicotinoid treated seed do not provide the same level of protection**.** Also, farmers and farm advisers expect further development of resistance of pests against these insecticides.
- If the suspension on the neonicotinoids is lifted, the vast majority of the farmers have indicated that they will use neonicotinoid treated seed again.

Wave 2

- The majority of the farmers interviewed said that the neonicotinoid suspension has an impact on their winter oilseed rape management.
- At the end of the season, the use of post-emergent insecticide applications was 50% higher as compared to before the neonicotinoid suspension in the UK and in Germany. In Hungary, the use of foliar insecticides increased with 19%.
- Farm advisors are concerned about the potential environmental impact of an increased use of foliar insecticides. They are of the opinion that there is a lack of rational and scientific arguments to defend the suspension.
- Crop yield has not been impacted to the level that was expected during Wave 1 when a third or more of the respondents expected a decrease in harvested quantity.
- Following the current reduction in winter oilseed rape growing area of about 20% in the UK and Germany, farm advisors are of the opinion that the suspension may have a negative impact on the availability of habitat and food for pollinators.
- Also, a reduced winter oilseed rape area may result in less crop rotation and diversity, lower yields and as such reduced cash flows.
- More than 90% of the farmers have indicated that they would use neonicotinoid treated seed again.

2. Metadata

Description of the data sets Wave 1	1. UK winter oilseed rape Wave 1 2. Germany winter oilseed rape Wave 1 3. Hungary winter oilseed rape Wave 1
Wave 1: Date of first publication	03 February 2016
Wave 1: Date of last update	03 February 2016
Description of the data sets Wave 2	1. UK winter oilseed rape Wave 2 2. Germany winter oilseed rape Wave 2 3. Hungary winter oilseed rape Wave 2
Wave 2: Date of first publication	03 February 2016
Wave 2: Date of last update	03 February 2016
License for re-using the data	This work is licensed by the ODI (The Open Data Institute) (http://theodi.org/).
Requirements around citing/attributing the data set	Market Probe 2015. Pan European Study on the Impact of Neonicotinoid Suspension on Farming – Report/Dataset 2014-2015.

3. Structure of the data

Wave 1 (Example used UK WOSR)

Variables described below are for numeric variables only. All other variables are strings. Of note, some numeric variables have been masked in order to offer privacy to respondents.

Question number	Name of variable	Description	Unit	Data type
Q17	% of crop affected by flea beetle	% of crop affected by flea beetle	%	Numeric
Q24	% of area reseeded	% of area reseeded (calculated – ha reseeded/ Q8 ha WOSR planted this autumn)	%	Numeric
Q25	Estimated cost	Estimated cost to reseed	£	Numeric
Q26B	Cost of yield reduction	Anticipated cost of yield reduction	£/tonne	Numeric
Q26D	Cost of quality reduction	Anticipated cost of quality reduction	£/tonne	Numeric
Q27	% of crop that can be grown successfully	% of crop that can be grown successfully without decline in yield or quality	%	Numeric
Q30a	Number of foliar treatments applied in 2013/2014	Number of foliar treatments applied in 2013/2014	Number of applications	Numeric
Q30b	Number of foliar treatments applied so far 2014/2015	Number of foliar treatments applied so far 2014/2015	Number of applications	Numeric
Q33	Yield 2013/2014 season	Yield 2013/2014 season	Tonnes/ha	Numeric
Q34a	Insect control spend prior to suspension	Insect control spend prior to suspension	£/ha	Numeric
Q34b	Estimated spend post suspension	Estimated insect control spend post suspension	£/ha	Numeric
Q37b	% increase in foliar insecticide costs	% increase in foliar insecticide costs	%	Numeric

Wave 2 (Example used UK WOSR)

Variables described below are for numeric variables only. All other variables are strings. Of note, some numeric variables have been masked in order to offer privacy to respondents.

Question number	Name of variable	Description	Unit	Data type
Q11	% of crop affected by pest	% of crop affected by pest	%	Numeric
Q16C	% decrease in yield as a result of suspension	% decrease in yield as a result of suspension	%	Numeric
Q16D	Cost of yield reduction	Cost of yield reduction	£/tonne	Numeric

Q17C	% decline in quality as a result of suspension	% decline in quality as a result of suspension	%	Numeric
Q17D	Cost of quality reduction	Cost of quality reduction	£/tonne	Numeric
Q19	% of crop that can be grown successfully	% of crop that can be grown successfully without decline in yield or quality	%	Numeric
Q24A	Number of foliar treatments applied in 2013/2014 season	Number of foliar treatments applied in 2013/2014 season	Number of applications	Numeric
Q24B	Number of foliar treatments applied in 2014/2015	Number of foliar treatments applied in 2014/2015	Number of applications	Numeric
Q27A	Yield 2013/2014 season	Yield 2013/2014 season	Tonnes/ha	Numeric
Q27B	Yield 2014/2015 season	Yield 2014/2015 season	Tonnes/ha	Numeric
Q28A	Insect control spend prior to suspension	Insect control spend prior to suspension	£/ha	Numeric
Q28B	Insect control spend post suspension	Insect control spend post suspension	£/ha	Numeric

4. Background and methods

Background to the neonicotinoid suspension

Neonicotinoids were introduced in the 1990s and are mainly used as seed treatments.

Neonicotinoids are a group of systemic insecticides first registered for use in 1994 that can be applied to a crop as a seed treatment or a foliar spray and are the most widely used insecticides for crop protection (Cresswell and Thomson 2012).

The neonicotinoid class of insecticides—which includes imidacloprid, acetamiprid, clothianidin, thiamethoxam, thiacloprid, dinotefuran and nitenpyram—are considered an important tool for pest management in many agricultural systems (Cutler et al 2014). The neonicotinoid imidacloprid is currently the most widely used insecticide in the world.

In the late 2000s some kinds of neonicotinoids began to come under increasing scrutiny over potential environmental impacts. The use of neonicotinoids was linked in a range of studies to a number of adverse ecological effects, including honey-bee colony collapse disorder (CCD) and loss of birds due to a reduction in insect populations. Increased scrutiny eventually led to the suspension on the registration of neonicotinoids in the European Union (EU).

The EU suspension on the registration of neonicotinoids came after the European Commission proposed the suspension in response to a report by the European Food Safety Authority (EFSA) in January 2013 that determined that three neonicotinoids – thiamethoxam, clothianidin and imidacloprid – posed an unacceptable risk to bees. With the EU vote, now all three are suspended from use for an unlimited time on flowering crops such as corn, oilseed rape and sunflowers.

The EU Commission committed itself to review any new scientific information which is submitted to them within 2 years of the suspension entering into force (i.e. end of 2015). The suspension on the registration will be reviewed in light of additional data but won't necessarily be lifted.

The suspension of neonicotinoid use on winter oilseed rape came into effect in the UK on the 1st of December 2013. Winter oilseed rape seed sown before this date (i.e. up to and including the autumn of 2013) could be treated with neonicotinoid.

The suspension also came into effect in Germany and Hungary on winter oilseed rape in December 2013.

In Hungary the use of foliar insecticides containing these neonicotinoids on winter oilseed rape was suspended for the 2013/2014 growing season but was authorized for use during the 2012/2013 season. Foliar neonicotinoid insecticides were not authorized for use on winter oilseed rape in the UK or Germany.

The neonicotinoids under review are primarily used in seed treatments, notably for the management of flea beetles, aphids and cabbage root fly. Loss of these seed treatments means insecticide sprays will need to be used instead at crop emergence.

Sources:

Cresswell JE, Thomson HM (2012). Comment on "A common pesticide decreases foraging success and survival in honey bees". Science 337.

Cutler GC, Scott-Dupree CD, Sultan M, McFarlane AD, Brewer L. (2014) A large-scale field study examining effects of exposure to clothianidin seed-treated canola on honey bee colony health, development, and overwintering success.

European Commission (2013). Commission Implementing Regulation (EU) No. 485/2013 of 24 May 2013 amending Implementing Regulation (EU) No 540/2011, as regards the conditions of approval of the active substances clothianidin, thiamethoxam and imidacloprid, and prohibiting the use and sale of seeds treated with plant production products containing those active substances. Official Journal of the European Union.

The Research

In July 2014, Syngenta commissioned a survey to be undertaken by Market Probe, an independent market research agency, in order to evaluate the consequences to farming following the neonicotinoid suspension in Europe.

The scope of the study is limited to 3 countries: Germany, Hungary and the UK. The crop covered in this research is winter oilseed rape (WOSR) in all three countries.

The main objectives of this research are:

- To understand the impact of the suspension on production quantity & quality**.**
    - Has there been a reduction in the crop area due to the suspension? What has been the effect of the suspension on the incidence of early flea beetle attacks and how many hectares have been affected? On how many hectares could the farmer properly (without any impact on crop growth, quality and yield) grow winter oilseed rape?

- To understand the impact of the suspension on production costs & on revenue as a result of crop damage.
    - Have the farmers incurred any additional costs as a result of changing their crop management? E.g. use of alternative chemicals, changes in the machinery used, impact on spray frequency, fuel use and labor costs etc. What have been the financial costs (if any) due to crop damage in terms of production quantity & quality?
- To monitor the impact of the suspension over time - the survey has taken place in two waves:
    1. After harvest in 2014 – This involved a full survey to meet the main research objectives and with additional qualitative feedback from growers
    2. After harvest in 2015 – This wave focused more on the core objectives. The 2nd wave covered the whole season.

Data collection tools and processes

The survey was conducted among key market influencers (KMIs) and growers of winter oilseed rape. Among the growers, the interviews were conducted with the person responsible for purchase decisions regarding pesticides. The respondents were all previous users of neonicotinoid seed treatments on winter oilseed rape prior to the suspension.

The grower respondents were selected at random from available crop/grower databases although minimum crop area cut-off sizes were imposed and quotas were set according to region and crop area in order to recruit a representative cross section of medium to large scale growers in the selected regions.

In the UK and in Hungary, farmer interviews were conducted within the main winter oilseed rape growing regions covering more than 85% and 90% of the total winter oilseed rape growing areas respectively in each country. In Germany farmer interviews were conducted in regions where a larger number of growers had used neonicotinoid seed treatments prior to the suspension, representing approximately 40% of the total winter oilseed rape growing area.

The data was collected via a semi-structured telephone interview using CATI (Computer Assisted Telephone Interviewing). The questionnaire was developed by Market Probe in English and approved by Syngenta prior to translation. The questionnaire was standardized across all countries with only minor local adjustments. For Wave 1 the duration of the interview was 30 minutes and in Wave 2 a slightly shorter, 20 minute interview was conducted with growers with a 15 minute interview for KMIs. The sample structure was identical for both waves, but different growers were interviewed for both waves of research.

Sample sizes Wave 1

	UK WOSR	Germany WOSR	Hungary WOSR
Growers	N=100	N=100	N=101
KMIs	N=10	N=10	N=10

Sample sizes Wave 2

	UK WOSR	Germany WOSR	Hungary WOSR

Growers	N=100	N=100	N=100
KMIs	N=10	N=10	N=10

Statistical significance of the results

Statistical error at a 95% confidence level for a sample of n=100

	Observed frequency (%)										
	1 or 99	5 or 95	10 or 90	15 or 85	20 or 80	25 or 75	30 or 70	35 or 65	40 or 60	45 or 55	50
Observed frequency	1%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Standard error (+/-)	1.95%	4.27%	5.88%	7.00%	7.84%	8.49%	8.98%	9.35%	9.60%	9.75%	9.80%

Please note that with a sample size of N=100, and an observed frequency of (say) 50% resulting from the interviews; we can be sure 95% of the time that the real frequency will be within +/- 9.8% of this figure. That is 50-9.8 = 40.2% and 50+9.8 = 59.8%, so the real frequency will be a minimum of 40.2% and a maximum of 59.8%.

The standard error indicates the reliability of a mean. A small standard error indicates that the sample mean reflects the actual population mean more accurately. A larger sample size normally results in a smaller standard error.

5. Contact Information

For further information please fill in the form on the website.

6. Change log

Data first published on 03 February 2016.

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