A REVIEW COVERING 1988–2014

Pesticide Usage on Oilseed Rape

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Neonicotinoid insecticides were introduced as a seed treatment for oilseed rape (OSR) in 2000 and the last time OSR was harvested from seed treated with neonicotinoid insecticide was in 2014. Budge et al (2015) provide evidence that farmers who used neonicotinoid seed treatments reduced the number of autumn insecticide sprays on OSR.

Pesticide Usage Surveys

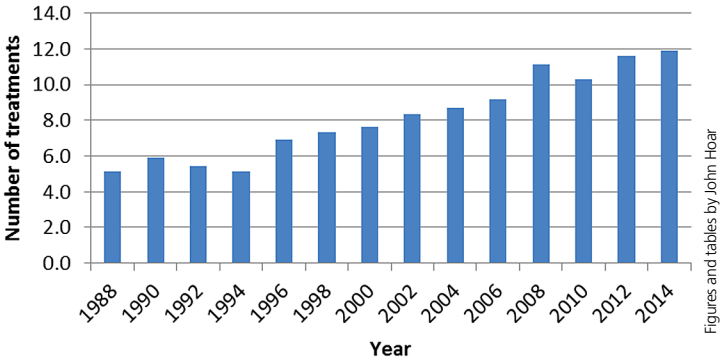
Data were taken from pesticide usage survey reports for arable crops, published biennially by the Food and Environment Research Agency (Fera), from 1988 to 2014. The 2014 report (Garthwaite et al, 2015) is available for download (see References).

Fera defines pesticides as commercial formulations containing active substances used as insecticides, fungicides, herbicides, molluscicides, seed treatments, etc.

The surveys provide data on pesticide usage for each arable crop by the treated area in hectares (ha) and by the weight of active substance (kg or tonne). The term 'treated area' is the area treated with a pesticide, including all repeat applications, some of which may have been applied to the land in preparation for planting, or applied to the margins of the crop.

A distinction is made between the number of active substances, pesticide products and pesticide spray rounds, and the relationship between them. Active substances can be combined into products (or formulations) which may then be combined with other products into a single spray round, ie, a tank mix of products, rather than applying each product individually.

Therefore the number of active substances will normally exceed the number of products which, in turn, will exceed the number of spray rounds. For example, in 2014 the average number of pesticide applications on all arable crops consisted of six sprays rounds, 12 products and 17 active substances (excluding seed treatments).



Figures and tables by John Hoar

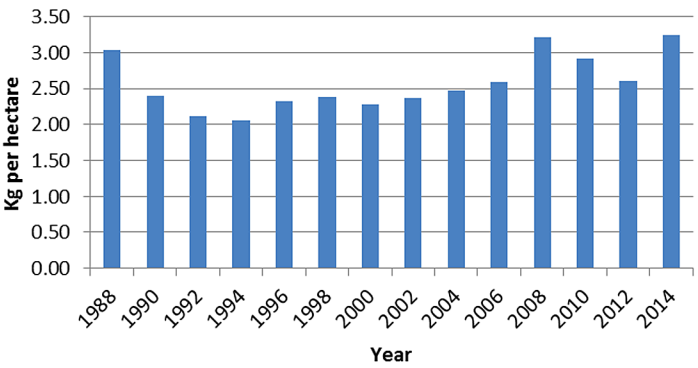
Figure 1. Pesticides – times treated

Pesticide Usage on OSR, 1988–2014

In 2014, 674,580 hectares of OSR were grown in the United Kingdom, 98% of which was sown in the autumn of 2013, before the moratorium on neonicotinoid seed treatments took effect on 1 December 2013.

The pesticide treated area was 8,031,179 hectares (including seed treatments), ie, an average of 11.9 pesticide treatments per hectare of OSR grown. Figure 1

Figure 2. Pesticides – kilograms per hectare



A review of the pesticide regimes for oilseed rape between 1988 and 2014, with a focus on insecticide treatments since 2000

Pesticide	Spray rounds	Products	Active substances
Herbicides	3.7	4.5	5.7
Fungicides	3.2	4.1	5.5
Insecticides	2.4	2.4	2.4
Molluscicides	1.4	1.5	1.5
Total	**10.7**	**12.5**	**15.1**
All pesticides	**7.1**	**11.4**	**14.1**

Table 1. Pesticide spray rounds, products and active substances applied to oilseed rape in 2014

shows the number of times OSR crops were treated with pesticides since 1988.

The total weight of pesticide active substances applied to OSR in 2014 was 2190 tonnes (including seed treatments), ie, 3.25 kg per hectare of OSR grown. Herbicides (74%) and fungicides (19%) accounted for 93% of pesticides by weight. Figure 2 shows the weight per hectare of pesticide active substances applied to OSR since 1988.

Table 1 shows the number of pesticide spray rounds, products and active substances used on OSR in 2014.

Figure 3 shows the number of pesticide active substances used on OSR since 1988.

However, not all oilseed rape crops were treated with each pesticide and Table 2 shows the percentage area of OSR treated with each pesticide in 2014.

Insecticide Usage on OSR, 1988–2014

Table 2 shows that 83% of the OSR area was treated with foliar-applied insecticides. In 1988, the comparable area was 62%.

In 2014, the total weight of insecticide active substances used on OSR was 28.3 tonnes (excluding seed treatments), ie, 50.5 grams per hectare of OSR treated with foliar-applied insecticides. Figure 4 shows the weight per hectare of insecticide active substances used on OSR since 2002.

The active substances most used in spray insecticides are the pyrethroids, accounting for 97% in 2014. Since 1992, pyrethroids have accounted for over 90% of insecticide active substance used on OSR. Figure 5 shows the number of insecticide spray rounds, products and active substances used on OSR since 2002.

Seed Treatments for OSR, 1988–2014

Seed treatment on the 2014 OSR harvest consisted of either insecticides only or a combination of insecticide and fungicides.

Thirty per cent of OSR seed was treated with an insecticide formulation of beta-cyfluthrin (a non-systemic pyrethroid) and clothianidin (a systemic neonicotinoid). Forty-six per cent of OSR seed was treated with an insecticide and fungicide formulation of fludioxonil and metalaxyl-M (fungicides) and thiamethoxam (a systemic neonicotinoid). Thus 76% of the 2014 OSR harvest was grown from seed treated with a neonicotinoid insecticide.

Figure 6 shows the percentage of OSR grown from seed treated with insecticides since 1988.

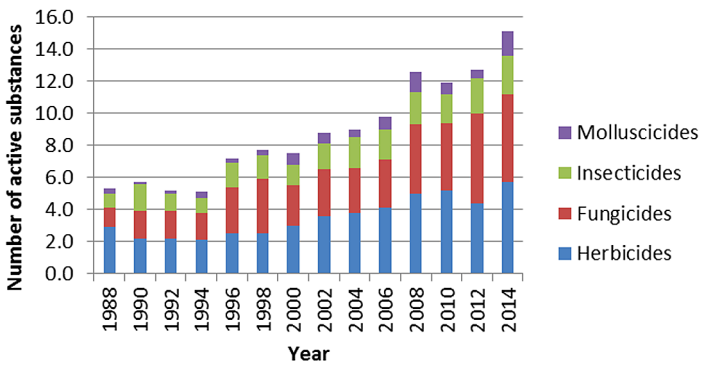


Figure 3. Pesticides – active substances

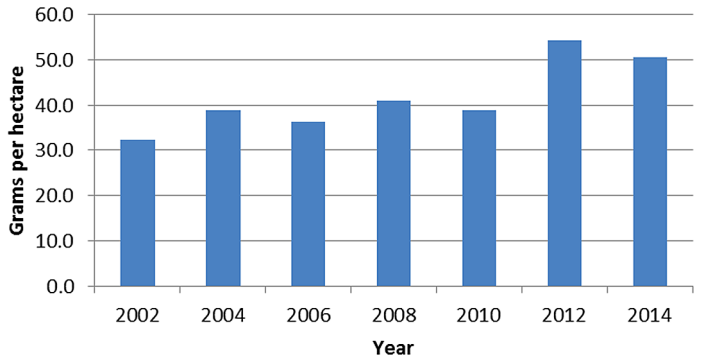


Figure 4. Insecticides – grams per hectare

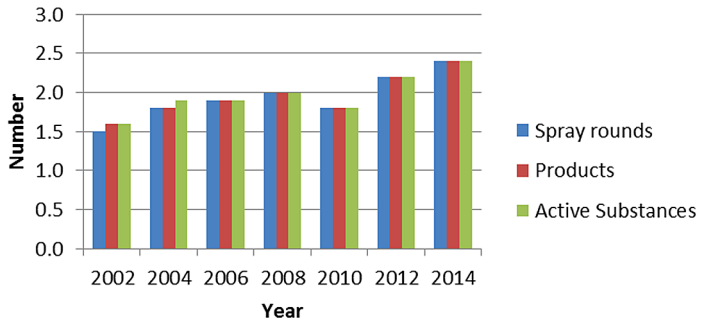


Figure 5. Insecticides – spray rounds, products and active substances

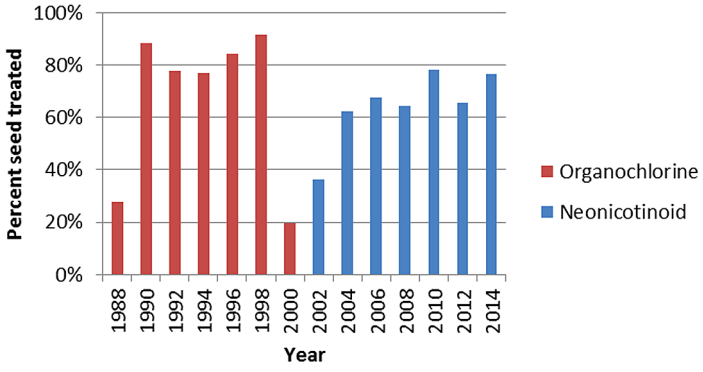


Figure 6. Seed treatments – oilseed rape

Table 2: Percentage area of oilseed rape treated with pesticides in 2014

Insecticides	Fungicides	Herbicides	Growth regulators	Molluscicides and repellents	Seed treatments
83.1%	98.1%	98.4%	8.0%	55.1%	95.8%

Prior to 2002, an organochlorine insecticide (gamma-HCH) was used in a mixed seed treatment with fungicides. In 2002, a pyrethroid (beta-cyfluthrin) and neonicotinoid (imidacloprid) replaced gamma-HCH. In 2010, clothianidin replaced imidacloprid as the main insecticide seed treatment, while thiamethoxam became available as a formulated mixture with fungicides.

Summary

Although pesticide treatment for OSR will vary from place to place and year to year, depending upon local conditions and needs, this review of pesticide usage on OSR between 1988 and 2014 has identified a long-term upward trend.

Overall, the average number of pesticide treatments on OSR has more than doubled since 1994 (Figure 1), accompanied by an increase in weight of pesticide active substances, from 2.1 kg/ha in 1994 to 3.3 kg/ha in 2014 (Figure 2).

The combined number of pesticide active substances has more than doubled during the same period (Figure 3).

In respect of insecticides, the weight of insecticide active substances per hectare increased from 32 g/ha in 2002 to 50 g/ha in 2014 (Figure 4). The number of insecticide spray rounds, products and active substances has also increased since 2002 (Figure 5).

Claire Waring

Analysis indicates that there has been a significant increase in pesticide usage on oilseed rape since the early 1990s

Conclusion

Since the early 1990s, pesticide usage on OSR has increased significantly in terms of the number of times treated, weight per hectare applied and number of active substances.

Although Budge et al (2015) established that neonicotinoid seed coatings enabled farmers to reduce the number of insecticide sprays on OSR, this is not evident from the survey data after 2000 when neonicotinoid seed treatments were introduced.

As Figures 4 and 5 illustrate, the weight of insecticide active substance per hectare and the number of insecticide spray applications has continued to increase after the introduction of neonicotinoid insecticide seed treatments in 2000. ⌘

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References

Budge, GE, et al (2015). Evidence for pollinator cost and farming benefits of neonicotinoid seed coatings on oilseed rape. *Scientific Reports*, **5**, 12574. doi: 10.1038/srep12574 (www.nature.com/articles/srep12574)

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