

9. ALTERNATIVES TO INSECTICIDES / NEONICOTINOIDS

Key points

- Neonicotinoids are important to protect crops such as cereals, oilseed rape and sugar beet from damaging pests such as aphids. They are used on around 30% of cropped land.
- Neonicotinoids have an alternative mode of action to other insecticides and so can be used against pests resistant to other insecticides and to help prevent the build up of resistance.
- If neonicotinoid uses were to be restricted, it is likely that the uses lost would be replaced by other types of authorised insecticide. There would be consequences for the economics of farming and the production of food.
- There would also be some shifts in the profile of risks to the environment, although this should not be overstated as approved products will not carry unacceptable risks.

- Defra and CRD are carrying out work to analyse these economic and environmental consequences. We have approached key industry representatives for information to help in this work.

Q&A

Benefits of neonicotinoids to farming

Q. What are neonicotinoid pesticides?

A. This is a group of insecticides which act systemically (that is, travel through plants). There are five neonicotinoid active substances - acetamiprid, clothianidin, imidacloprid, thiacloprid and thiamethoxam. Each active substance is formulated for use in a range of products.

Q. How are they applied to crops?

A. Some of these active substances are approved for use as seed treatments (clothianidin), some as foliar applications (acetimiprid and thiacloprid) and some for both (imidacloprid and thiamethoxam). In terms of area treated almost 90% of the use is as seed treatments. However, foliar use is significant and includes use on crops such as oilseed rape. Application of the pesticide to the plant seed ensures that the pesticide reaches the pest/disease problem specific to the plant.

Q. What are the benefits of these pesticides?

A. Neonicotinoid insecticides prevent damage to important crops such as cereals, oilseed rape, brassicas and sugar beet from pests such as aphids. When the aphid feeds on the crop it can introduce viruses which cause disease such as barley yellow dwarf virus (affecting cereals) and beet yellow virus (affecting sugar beet). They can have serious effects on crop yields and quality.

Neonicotinoids are important as they provide an alternative mode of action to organophosphate and pyrethroid insecticides. This allows them to play a key role in helping to prevent the build up of resistance in the pests concerned.

Resistance to the main alternatives to neonicotinoids (pyrethroids and organophosphates) has emerged to a significant degree in pollen beetle (which is a widespread pest of oilseed rape) in France, Poland and Germany. Although resistance in the UK is limited to relatively small pockets of Eastern England, use of foliar neonicotinoids is the recommended strategy for containing resistant communities.

Q. How widely are neonicotinoids used?

A Neonicotinoid use has increased steadily since imidacloprid first came on the market in 1994. They are now used on a significant proportion of cropped land, around 30% in 2010. Small amounts of neonicotinoids are used in home garden (amateur) pesticides.

Q. What do neonicotinoids cost?

A As relatively modern pesticides, neonicotinoids are not cheap. There is thus a strong cost incentive for farmers to limit their inputs to what they need.

Q Why is there no evaluation of economic benefit as part of the regulatory process?

A Efficacy is part of the assessment for product authorisation. To pass, the product must be effective against the proposed target pest. The target pest must be one that could be harmful under the conditions in which use is proposed.

There is no requirement to establish or quantify economic benefit. This is because the regulatory system does not trade off costs and benefits. The safety standards for the most valuable products are not lower than those for less critical products.

Q Why does the product Biscaya include a recommendation against pollen beetle when this is not a relevant pest?

A Pollen beetles migrate into winter oilseed rape crops in Spring to feed on pollen and lay eggs. If flowers are not open, beetles bite into and kill buds. Damage to buds declines as the flowers begin to open and pollen becomes more easily obtainable.

This damage to flower buds can greatly reduce yields. For example, in Germany in 2006, pollen beetles that were resistant to pyrethroids destroyed 30,000 ha and seriously damaged 200,000 ha of winter oilseed rape.

Such resistance is now well established over much of central and eastern Europe, as well as Scandinavia. In the UK, resistant individuals were first found in Kent in 2006 and in other parts of southern and eastern England in 2007 and 2008. Between 2009 and 2011, resistance continued to spread westward and northward. Having insecticides with alternative modes of action, such as the neonicotinoids, is an important anti-resistance strategy.

Research has been commissioned to refine the timing of treatment and the thresholds above which pollen beetle numbers are damaging and when an economic return from treatment can be expected. New guidelines, based on the latest research, were published by the Agriculture and Development Board earlier this year.

The 'Biscaya' label contains appropriate advice. This includes a restriction for one application to each crop and a recommendation to treat only at 'green bud' stage once thresholds have been reached. The user is advised to seek further guidance on the latest thresholds that are appropriate.

Use of neonicotinoids by amateurs

Q Is it true that these substances are available to anybody to use in their garden?

A. Yes. A range of products are available. The majority are based on the two neonicotinoids with lower acute toxicity to bees – acetamiprid and thiacloprid.

Q Can gardeners just do what they like?

A All home garden products contain instructions on their use on the label. No product is approved for garden use if its correct use requires training or protective equipment.

Consequences of possible restrictions

Q. What are you doing to explore the consequences of restrictions on neonicotinoids?

A. Defra has consistently said that it is prepared to take action on the basis of the evidence. We need to make sure that any action we do to take addresses the issue of neonicotinoid impacts on pollinators effectively. We also need to avoid or minimise unintended consequences. Any restrictions on neonicotinoids would have economic impacts. They could also carry risks to the environment or to human health. To avoid these consequences, so far as we can, we need to understand them.

We are therefore looking at what farmers would do in the face of restrictions on neonicotinoids and examining the implications.

Q. Would farmers use more damaging pesticides if they did not have neonicotinoids?

A. Farmers will use the available products. All of these have passed the regulatory tests but all carry some risks.

Q. Defra is apparently discussing with stakeholders the impact of likely restrictions. Who is being consulted?

A. CRD has, on Defra's behalf, approached key industry representatives to obtain information we need to carry out an economic analysis. The analysis will be Defra's own.

Q Why have you been talking to industry and not others?.

A It is important to understand the impact of any action that we might take and we believe the industry has the data we need to make this analysis.

Q What are the alternatives to using neonicotinoids?

A. The alternatives include pyrethroids, organophosphates and carbamates.

Q Are these alternatives likely to be more damaging to the environment?

A Each product has been assessed and has met the safety requirements set in legislation. However, each product will have different effects in the environment. Pyrethroids tend to be of low toxicity to birds and mammals but very acutely toxic to aquatic life and non-target arthropods. Pirimicarb, the main carbamate, is acutely toxic to birds, mammals and aquatic life but poses a low risk to honey bees and non-target arthropods and earthworms. Organophosphates tend to carry a moderate to high toxicity to most non-target species.

Q. What would taking action cost?

A. It would depend on the extent of the action taken. The cost factors are what we trying to establish.

Q. Will you use this as a further excuse for inaction?

A. If we do impose regulatory restrictions, this action will be based on our assessment of risk and the advice of the Advisory Committee on Pesticides. It is important that we understand the consequences of any action we might take.

IPM / alternatives

Q Isn't the prophylactic use of neonicotinoids on seeds contrary to IPM principles?

A. Seed treatment uses are not authorised if the pest does not occur frequently enough to warrant it, or if a foliar spray would be more appropriate. Assessment is based on:

- whether the target consistently occurs each season or is only a sporadic pest.
- whether the target is highly localised or is wide ranging on the particular crop.
- whether the target can cause economic damage that would warrant treatment.
- whether the target requires early/immediate measures. Aphids which are virus vectors are one example because of the speed with which viruses can be transmitted.

Current uses of the neonicotinoid seed treatments are considered appropriate. The main uses are for autumn control of cereal aphids (virus vectors), aphids on sugar beet or OSR (vectors of virus yellows), and assisting crop establishment at sowing by controlling soil pests. The

degree of protection afforded by seed treatments also means that the number of subsequent foliar sprays required is reduced.

Myzus persicae (an aphid) has long-established resistance to pirimicarb. Growers therefore rely completely on neonicotinoid seed treatments in sugar beet to prevent virus infection. There is also a developing situation of pyrethroid resistance in cereal aphids which means, again, that autumn sown cereals will rely heavily on neonicotinoid seed treatments for virus control.

Q. What will Government do to support farmers in comprehensive uptake of IPM?

A. Pesticide users will be required to follow Integrated Pest Management from 1 January 2014. All pesticide users are required, or soon will be required, to be trained. Training includes integrated approaches.

Many farmers and growers are already familiar with IPM approaches. Assured Food Standards schemes require growers to adopt practices which are consistent with the general principles of IPM. Specific standards are set for individual crops. Work is underway with industry to develop an IPM self-assessment tool for farmers to encourage the

use of IPM techniques such as decision support systems and pest and disease monitoring system.

Defra also supports research which underpins the development of IPM.

Q What about biopesticides?

A. Biopesticides include pheromones, plant extracts and micro-organisms. Defra has encouraged the development and implementation of biopesticides through research and development and a Biopesticide scheme to support applications for authorisation. Although the number of biopesticides available continues to rise, their numbers are small in comparison with conventional pesticides.

Biopesticides have established uses in protected crops. They are much less useful for outdoor crops. This is because their effectiveness is highly variable in an unpredictable climate. There are also difficulties in maintaining viability when biopesticides are applied at field scale.

Defra co-funds, alongside industry partners, the SCEPTRE project. The aim is to identify materials (including bio-pesticides) to fill gaps in crop protection and to develop integrated pest, disease and weed management programmes.