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Fact Sheet on Neonicotinoids

The following Q & A is about neonicotinoids, their use in New Zealand.

What are neonicotinoids?

Neonicotinoids (neonics) are a group of modern insecticides noted for their excellent insect control but low toxicity in humans and other mammals. Neonics are systemic and, when applied to the seed or the roots (as a soil drench), protect the plant from insect attack. There are several neonic insecticides which can be used as foliar sprays, but their use is limited.

Neonics have been on the market in New Zealand for more than 25 years and been applied to protect many hundreds of thousands of hectares of crops and pasture.

What are the trade names of the main neonics available in New Zealand and on what crops are they used?

Foliar use:

- Actara (active ingredient: thiamethoxam) for kiwifruit, pipfruit and in-furrow application on potatoes.
- Calypso (active ingredient: thiacloprid) for avocados, kiwifruit, pipfruit and stonefruit.
- Confidor (active ingredient: imidacloprid) for application on onions and as transplant tray treatment of vegetable brassicas and lettuce.

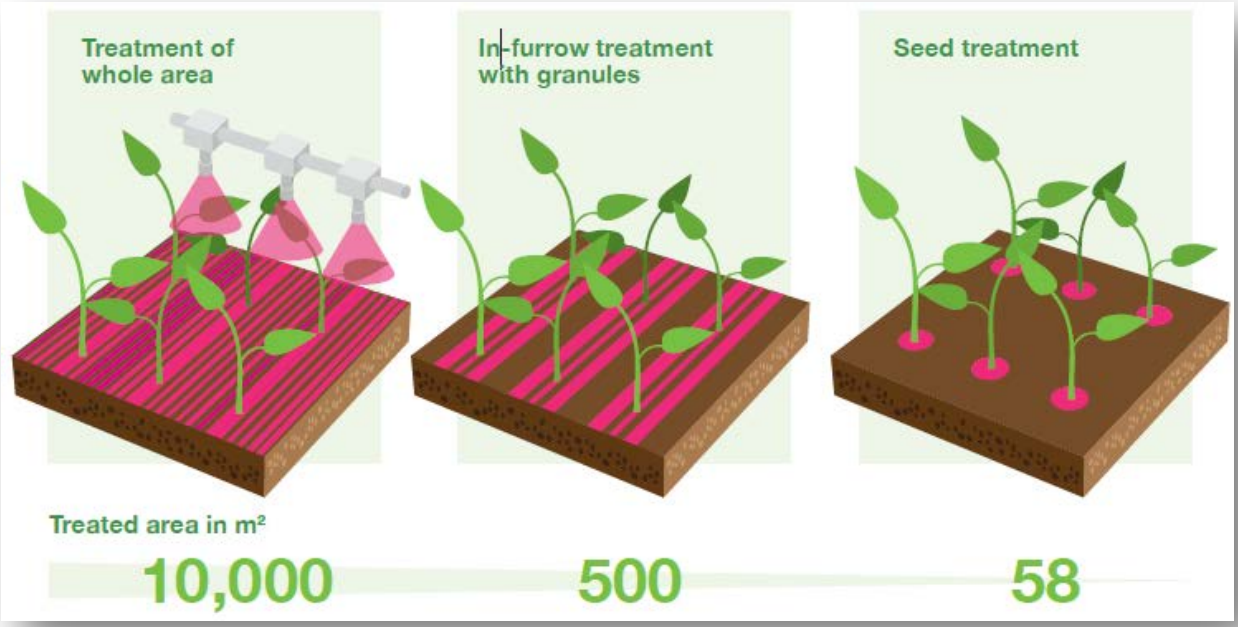
Seed treatment application:

- Cruiser (active ingredient: thiamethoxam) for maize/sweetcorn and forage brassicas.
- Gaucho (active ingredient: imidacloprid) for cereals, forage brassicas, grass seed, maize/sweetcorn, potatoes and winter squash/pumpkins.
- Poncho (active ingredient: clothianidin) for cereals, maize/sweetcorn, forage brassicas and grass seed.

This is not an exhaustive list of neonics available in New Zealand as there are a number of generic products based on some of the above active ingredients.

What are the benefits of using neonics?

Seed treatment application is highly targeted and is one of the most environmentally friendly means of crop protection product application. The seed treatment neonics have largely displaced older and less effective organophosphate insecticides which were more toxic to humans. Modern silage maize production in New Zealand would almost be impossible without neonics. One of the unique characteristics of neonics is that, when used as seed treatments, they can be applied at very low rates of active ingredient per hectare, reducing the number of insecticide applications in comparison to spray treatments. This is illustrated in the graphic below.



The EU imposed restrictions on some neonics, what are they?

The European Commission imposed use restrictions on three neonicotinoid compounds (imidacloprid, clothianidin and thiamethoxam) for applications (seed treatment, granular, foliar) in cereals and bee-attractive crops, including sunflowers, oilseed rape, maize, and soybean, with the exception of foliar sprays in greenhouses and after flowering.

Restrictions were not placed on applications in winter cereals, sugar beet and potatoes. The restrictions applied for two years from December 2013, while the European Food Safety Authority (EFSA) reviewed new scientific information. While the data review was still ongoing, the Commission in March 2017 proposed further, broader restrictions of the three already restricted substances with the exception of use in permanent greenhouses.

What was the basis of the EU Commission's decision?

The Commission based its decision on a risk assessment conducted by EFSA using a draft Bee Guidance Document. EFSA acknowledged that the Guidance Document was still under development at the time, and asked for further review. The EFSA report did not call for a ban on the compounds reviewed. Seed treatment and granular applications were the only methods covered by the review. Spray and drench applications were not evaluated. Nevertheless, the Commission proceeded to restrict the three neonicotinoids. As of December 2017, the draft Bee Guidance Document had still not

been adopted by EU Member States.

The majority of pesticides on the market today, including those used in organic agriculture, would be banned if they were to be evaluated using the draft Bee Guidance Document in its current form. Back in 2013, the European Commission, EFSA and Member States actually agreed that "*a full and immediate implementation* [of the bee guidance document] *is not possible at this stage."* Since then, Member States and the crop protection industry have asked for the Guidance Document to be reviewed and approved, taking into account the scientific progress made on bee risk assessment over the last few years.

The key problems of the Bee Guidance Document are that it is based on extremely conservative assumptions, its study requirements lack clarity and are not workable, and guidelines for a number of studies are unavailable or not validated. For example:

- Its protection goals are so high that most compounds, even those which are not toxic to bees, would need to be tested in complex studies in the field.
- The area for a single field study under the Guidance Document would require almost three times the size of Brussels.
- It sets a maximum acceptable wintering loss of 7 percent for hives used in studies. The normal overwintering loss for colonies is about 15 percent.

Europe may soon face additional, much broader restrictions of some neonicotinoids based on further proposals by the Commission. In March 2017 the Commission presented proposals for broad restrictions of the three already restricted neonicotinoids, imidacloprid, clothianidin, and thiamethoxam. The proposals would ban the planting of seeds treated with these products in the European Union, with the exception of those seeds to be planted in permanent greenhouses.

What effect did the ban have on European agriculture?

The restrictions in place in the EU have already brought considerable costs to European farmers and significant environmental implications.

1. Banning additional neonicotinoid uses would entail even more cost for European farmers and will make it more difficult to grow high-quality, affordable food in Europe.

2. A study published by HFFA Research GmbH[1] showed that for European oilseed rape farming alone, the existing neonicotinoid ban costs almost € 900 million a year:
   i. € 350 million market revenue losses.
   ii. € 50 million revenue losses due to lower quality.
   iii. € 120 million additional production costs.

3. In the EU, additional foliar insecticide applications add greenhouse gas emissions of estimated 0.03 million tons CO_2 equivalents and 1.4 million m^3 additional water consumption annually.

4. The findings of a study undertaken by the European Commission's Joint Research Centre on the impact of the restrictions on neonicotinoid and fipronil on pest management in maize, oilseed rape and sunflower in 8 EU regions[2] confirm several of the findings from the HFFA study. The study concludes that farmers generally relied on alternative seed treatments (unrestricted neonicotinoids or pyrethroids) or more soil/foliar treatments in the first growing season after the restriction.

5. JRC also found that farmers generally perceived that time, cost and insecticide requirements of crop protection have increased due to the restrictions: this perception was stronger in the case where no alternative seed treatments were available. Farmers also perceived alternative seed

[1] Noleppa, S. (2017): Banning neonicotinoids in the European Union: An ex-post assessment of economic and environmental costs. Research Paper 01/2017. This research paper was financed by Bayer Division Crop Science and Syngenta.

[2] Kathage, J., Castañera, P., Alonso-Prados, J. L., Gómez-Barbero, M. and Rodríguez-Cerezo, E. (2017): The impact of restrictions on neonicotinoid and fipronil insecticides on pest management in maize, oilseed rape and sunflower in eight European Union regions. Pest. Manag. Sci. doi:10.1002/ps.4715; Zhang H, Breeze T, Bailey A, Garth Waite D, Harrington R, Potts SG (2017): Arthropod Pest Control for UK Oilseed Rape – Comparing Insecticide Efficacies, Side Effects and Alternatives. PLoS ONE 12(1): e0169475; Market Probe (2015): Pan European Study on The Impact of Neonicotinoid Suspension on Farming. This study was funded by Syngenta. http://www.neonicotinoid-study.com.

treatments as less effective, and that there was an increase in pest pressure after the restrictions.

6. So far, the neonicotinoid restrictions (in the EU) have not led to any measureable improvements in bee health:
   a. Based on publicly available data, the neonicotinoid restrictions in the EU have not led to any measurable improvements in bee health in Europe:
      i. An indicator for honey bee health is the level of overwintering colony losses. So far, data from several sources on winter losses does not indicate any positive change of trends[3];
      ii. Where bee poisoning incidents (i.e. the cases in which honey bees are reportedly intoxicated by a pesticide) have been surveyed systematically (UK and Germany), incidents have been rare for many years and this has not changed since the restrictions came into force.

Is it true that neonics are contributing to declining bee population and bee health?

No. Some groups have claimed that neonics are responsible for Colony Collapse Disorder (CCD), reported in the United States, and severe winter colony losses in Europe. However independent scientific research has concluded that the varroa mite is the main cause, amongst others, for these losses.

Honey bee hive numbers in Europe have been increasing for years. The European Commission's own data3[4] shows a steady evolution of the number of beehives in the European Union from 11.6 million in 2004-2006 to 15.7 million in 2014-2016. The same upward trend is also visible in the FAO data for Europe4[5]. In fact, managed honey bee colony numbers across the globe have been continuously increasing on most continents, even in regions with an intensive use of neonicotinoids.

In Australia, neonics have been used for around 25 years but, because it has no varroa, it is said to have the healthiest bees in the world.

In New Zealand neonics have been used since 1992, well before the varroa mite was first identified in 2000. The varroa mite has since decimated feral honeybees., It is now widely accepted that honeybees cannot survive in New Zealand without human intervention because of the impact of this mite.

Meanwhile, the number of managed beehives in New Zealand has increased astronomically from 300,000 in the year 2000 to more than 800,000 by 2017, despite the ongoing use of neonicotinoids in since 1992.

Do neonic seed treatments pose a particular risk to bees?

The neonics used for seed treatment are intrinsically very toxic to honey bees. So it is important to keep bees away from neonics. However, neonics used as a seed treatment limits the routes of honey bee exposure.

There are only three potential routes of exposure to seed treatments:

1. Dust off during the drilling/planting process.
   This is managed by the use of film coats (stickers) which assist with adhesion of the seed treatment to the seed, reducing dust.

2. Systemic residues in pollen/nectar.
   Applied at labelled rates, neonic residues are either non-existent or well below the no observable adverse effect level.

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[3] COLOSS, EPILOBEE, DeBiMo – German Bee Monitoring and Mayen Bee Institute Monitoring.

[4] European Commission Report (2016) on the implementation of the measures concerning the apiculture sector of Regulation (EU) No 1308/2013 of the European Parliament and of the Council establishing a common organisation of the markets in agricultural products. COM (2016) 776 final.

[5] FAO Statistics, 2017: http://www.fao.org/faostat/en/#search/Beehives.

3. Residues of neonics in guttation fluid.
   Although residue levels in guttation fluid may be toxic to bees, guttation and collection of guttation fluid by honey bees are very rare and therefore not considered as an unacceptable risk to bee colonies.

The media frequently refers to sub-lethal effects caused by neonics, what does this mean and is it important?

Sub-lethal effects are effects which do not directly cause mortality but which may impair normal functioning by affecting foraging activity, orientation and homing behaviour, etc. Some studies claim to have found sub-lethal effects. However most have been done in laboratory studies or using otherwise artificial design conditions, the relevance of which is questionable. When alleged effects have been tested under realistic field conditions, they could no longer be found as a factor posing any damage to bee colonies. For these reasons sub-lethal effects are not considered an important determinant on bee health.

What effect did the EU Commission ban on neonics have on their use in New Zealand?

There is no scientific basis to support a ban of neonicotinoids in New Zealand (or to justify the European decision).

The regulatory authority, the Environmental Protection Authority (EPA), operates under a robust science and evidence-based risk assessment system.

Neonic products have been widely used in New Zealand for over 25 years and there is no evidence that they have any adverse impacts on the health of our bee populations.