

Where have all the bees gone?

In the current climate situation, water shortage is the biggest problem facing Australian agriculture. Surprisingly, current research shows that our second-biggest problem is the threat to bee populations. SARAH WOOLDRAGE reports.

THE USE OF BEE POLLINATION IN Australia is under severe pressure, with a shortage of honeybees becoming a growing concern. The shortage is due to several factors: drought, the lack of overall government funding support for research and, most importantly, the overuse of pesticides.

Warren Jones, president of the Australian Crop Pollination Association (CPA), says Australia does not have a firm hold on the use of pesticides. "In Australia we work to an MRL (maximum allowed pesticide residue level) that is based only on human health and does not factor in animals, let alone those as sensitive as bees.

"The neonicotinoid (insecticide) known as Clothianidin is highly toxic to bees on an acute basis (LD 50 > 0.0439mg/bee). Documented sub-lethal effects of neonicotinoids include physiological effects that affect enzyme activity leading to impairment of olfaction memory.

"Some of these chemicals are used on 120-140 crops and are quite legally registered for use in their own right – however, there are no estimations of their individual effects on honeybee pollination or their effects when mixed with other chemicals," says Warren.

Warren explains that in Australia there have been systemic insecticides to watch out for when pollinating a crop; however, nothing has been more harmful to bees than the group of chemicals known as neonicotinoids.

"Neonicotinoids attack the nervous system of bees, upset their ability to navigate and damage their enzyme activity, leading to impairment of their memory and brain metabolism," says Warren.

As well as the immediate effect that neonicotinoids have on bees, it is also their 'after-effect' that is causing major concern.

"Farmers need to understand that when a chemical like neonicotinoid is applied today, its residue will still cause trouble for insects in 12 months time. Neonicotinoids have the ability to travel to the furthest regions of the plant, accumulating at higher concentrations within the plant than levels originally sprayed," says Warren.



Worker bee pollinating sunflower.

The use of neonicotinoids has recently been banned by UK supermarket The Co-op, which has prohibited the usage of eight neonicotinoid pesticides after they were linked to the deaths of billions of honeybees worldwide.

The Co-op is prohibiting suppliers of its own brand of fresh produce from using the eight pesticides that have been connected to honeybee colony collapse disorder (CCD).

The Co-op has more than 28,328 hectares of land under cultivation in England and Scotland, making it the largest farming operation in the UK.

The loss of bees is a major threat in the UK, with a third of the UK's hives having been lost last year, according to the British Bee Keepers Association (BBKA).

The use of neonicotinoids has also been banned in several parts of the EU, with Germany conducting an emergency review calling for the pesticide to be banned across all of Europe.

The review occurred after the German Federal Office of Consumer Protection and Food Safety (BVL) suspended the registration of eight pesticide seed treatment products that were being used in rapeseed and sweet corn production. The



Trucks moving bees to pollination, NSW.

pesticides were blamed for the death of millions of honeybees.

In 1999 France also banned another neonicotinoid pesticide harmful to bees – Imidacloprid – which was being used as a seed dressing for sunflowers. The pesticide had killed off a third of French honeybees. Five years later France imposed another ban on Imidacloprid for its use in sweet corn.

The use of Imidacloprid is residual and systemic, showing up in most other growing parts of plants and pollen.

The US has also suffered problems with the use of Imidacloprid. In 1995 a group of beekeepers from North Dakota lost a third of their honeybees during a period when oilseed rape in the area was being treated with Imidacloprid. An investigation into colony collapse disorder in honeybee colonies in the US has found neonicotinoids to be strongly suspected.

Warren explains that compared to other countries Australia is lagging in its approach to tackling the problem of bee pollination, creating problems for industries such as almonds and Australian kiwi fruit, which are almost solely reliant on bees for pollination. The almond industry is particularly under threat as the majority of available pollinating bees (bees supplied through specialised

pollinators) are being used for stone or pome fruit.

However, there is some light at the end of the tunnel for bees: an increase in organic and biological production. Dr Andrew Monk, BFA director and standards committee convenor, says the Australian Organic Standard does not permit any synthetic pesticides, miticides or other synthetics such as antibiotics in the production process, nor are synthetic products allowable in the foraging areas – which for bees can be extensive.

“Organic honey production goes a further step, following a natural process from the bee-caring through to the processing of the honey.

“Every time a consumer buys organic honey they are not only buying a product which is in the purest state it can be; they are helping to assist the environment, farmers caring for the land and the health of bees and themselves.”

“Currently in Australia the demand has never been higher for bee pollination but until more control on the use of neonicotinoids is established available bee numbers are unlikely to improve.

“To be a successful crop pollinator you have to have full knowledge of how the chemicals being used in a crop could harm the pollinating bees. We have to use either our own personal experience or overseas studies as there is no current Australian research available,” says Warren. ☺

Scant information

THERE IS CURRENTLY LITTLE information available from synthesised insecticide manufacturers on the safe application levels of products, apart from human MRL levels. Manufacturers are not liable for the death of bees even if the residue level is below the MRL set.

It's not only neonicotinoid chemicals that require further research. A study completed by a PhD student, Marwan Mohammed Keshlaf, who studied at the University of Western Sydney (UWS), conducted trials to assess the

toxicity of Fipronil – a widely used agricultural chemical – under lab and field conditions. Marwan's work has indicated that this chemical is highly toxic to honeybees and a withholding period of 28 days after application is required before honeybees can be placed on a crop to be pollinated. As Fipronil is part of many integrated pest management programs (IPMs) it also shows that Australia needs to re-assess IPMs and that current MRL levels set are not the answer to protecting the bees or the environment.