Varroa – what does it mean for pollination in Australia?

Honey bees are critical pollinators in agricultural systems in Australia. How will *Varroa destructor* (varroa) affect pollination in Australia, and what can we do to help bees, beekeepers and growers overcome the challenge?

Honey bees contribute to the national economy in two major ways: honey production and pollination services. Many major food crops rely on honey bees for pollination. As well as being important to agricultural systems, honey bees also play a role in pollination in many Australian ecosystems, despite being an introduced species. It is difficult to say for certain what impact varroa will have on these systems. However, based on what has happened in other countries, we can put in place strategies to reduce the impacts on honey bee and pollination-dependent industries.

Expected impacts of Varroa on agriculture & beekeeping

Feral bees

16-90% of feral bee colonies are expected to die several years after an area is affected. Populations may eventually start to recover once resistance evolves.

Beekeepers

50-60% of beekeepers can be expected to leave the industry, mostly recrational beekeepers.

Pollination

Loss of feral bees will increase demand for paid pollination. Loss of commercial colonies will make pollination services more expensive.

Commercial colonies

Small reduction (2-5%) in the number of commercial colonies after several years with acaracide use. Long-term growth in commercial colonies to meet pollination demand.

Costs

30% increase in cash costs to run a beekeeping business. Additional management costs of $35 per hive every year. Losses up to $1.25 billion to pollinator-reliant industries over 30 years.

Honey Production

Reduced honey production due to treatment needs. Potentially some increase in honey production due to loss of feral bee populations.

Learn more
www.agrifutures.com.au/honey-bee-pollination

AgriFutures® Honey Bee & Pollination

How will varroa affect pollination in Australia?

Colony losses in managed bees

When varroa enters a new area, significant colony losses in both managed and feral bees often follow. The impact is not felt immediately, as it can take 2-3 years for mite populations to build to a lethal level. Once this happens, colonies can collapse quickly. In California, 75% of managed honey bee colonies disappeared within three years of varroa's arrival. In New Zealand's North Island, varroa's arrival led to an initial loss of 16% of managed colonies. In South Africa and Brazil, almost no colony loss occurred. Bee populations vary in their ability to tolerate varroa, and it is difficult to predict how Australian bees will cope. At the upper extreme, losses of 80-90% are possible.

Colony losses in feral bees

Australia has some of the highest recorded densities of feral honey bees in the world. However, densities vary greatly, with estimates ranging from 0.1 colony per square kilometre to over 150. Much of Australia has not been surveyed, and we only have density estimates from parts of New South Wales, Victoria, and South Australia.

Many growers rely on feral bees to provide free pollination services. Feral colonies are often at the greatest risk from varroa as there is no management to mitigate the risks. Around the world, many feral bee populations declined drastically after the introduction of varroa.

The degree to which Australian industries rely on "free" pollination is not well understood, so it is difficult to say for certain what the impact of losing the feral population could be. However, if the feral population succumbs to varroa, growers can expect reduced quality and quantity of yields and an increased reliance on beekeepers to provide paid pollination services. There is no alternative pollinator that can provide pollination services at the same scale as honey bees.

In New Zealand some reports suggested that reductions in the feral population resulted in increased honey yields, though the situation was more complex than this. The arrival of varroa coincided with a boom in the manuka industry, and honey production had been steadily rising for two decades. This boom is now over, and increased honey yields due to feral bee losses cannot be seen as a path forward for sustaining the industry.

What will the economic impact be?

Varroa will incur economic costs to both beekeepers and pollinator-reliant industries. A decline in the feral population will mean more growers will need to pay for pollination services. Varroa also makes beekeeping businesses more expensive to run. The Department of Agriculture, Fisheries and Forestry predicted that varroa would increase the cash costs of running a beekeeping business by 30%.

More recent research from New Zealand shows that annual colony losses due to varroa have increased beekeeper costs by approximately AUD$35 per colony, per year. These increased costs account for 9% of the value of honey yields and 10-60% of the value of pollination contracts.

Varroa will make beekeeping more expensive and less profitable, which drives the price of pollination contracts up.

How can we help bees, beekeepers, and growers?

Fortunately, there is a lot we can do to mitigate the impacts of varroa and make sure both the honey bee industry and the pollination-dependent industries supported by beekeeping can continue to be productive.

The role of pollinator-reliant industries in bee health

The first step is to understand that pollinator-reliant industries play a role in bee health. If growers take steps to maximise bee health on their properties, the colonies that are pollinating their crops will perform better, and be better placed to withstand varroa.

Growers should practise integrated pest management to reduce the amount of pesticides used on their properties. Crop spraying often leads to honey bee colonies nearby being exposed to and weakened by pesticides, which makes them more susceptible to both varroa as well as previously established pests and diseases. Growers can provide additional floral resources for bees to ensure they receive adequate nutrition, provide bee sites that are sheltered from wind and sun, and ensure the bees have readily available sources of water. These measures will keep the honey bee colonies pollinating their crops strong, healthy, more efficient at pollinating, and better able to cope with varroa.

Supporting beekeepers

Beekeepers must be supported to adapt their businesses to varroa. There is no doubt that beekeeping will be more difficult. Beekeepers will need to make time for varroa management and so, a knowledge of the cost versus return of any activity (eg. honey production or pollination contracts) will enable beekeepers to allocate their time to their best income streams . Currently, honey production subsidises pollination; few beekeepers solely engage in pollination. Promotion of Australian honey will be essential for business sustainability, as will access to high quality nutrition resources to keep bees healthy.

The importance of communication and education

Beekeepers and growers need to work together to understand the relationships between their industries and how they can support each other through the challenges posed by varroa. To do this, they need to know what the challenges are and what their industries need from each other to overcome them. Education and communication are critical.

For example, growers should inform the beekeepers providing their hives of their planned applications of pesticides, so that they can ensure spraying occurs when bees are not present or that a pesticide less hazardous to bees is used. Education resources on integrated pest management, beekeeper best practice for varroa, and on how growers can improve bee health on their properties should be developed. This will also have the effect of strengthening the beekeeping community, better positioning it to overcome future challenges. Education programs can be highly effective. In the United Kingdom, roadshows held by the Healthy Bees Plan led to practise changes by 75% of the beekeepers that attended them.

Conclusion

The honey bee and pollinator reliant industries are facing an uncertain future due to the threat of varroa. While the impacts are difficult to predict for now, these industries can begin working together immediately to understand the threat and plan strategies to bolster honey bee health. In this way, we can ensure these industries stay resilient in the face of varroa.

References

Chapman *et al.* (2023) *The final frontier: ecological and evolutionary dynamics of a global parasite invasion.* Biology Letters 19: 20220589

Holmes *et al.* (2023) *Resilient beekeeping in the face of varroa. AgriFutures Australia*, Wagga Wagga

Clark & Le Feuvre (2021) *Size and scope of the Australian honey bee and pollination industry - a snapshot.* Agrifutures Australia, Wagga Wagga

Cunningham *et al.* (2002) The future of pollinators for Australian agriculture. *Australian Journal of Agricultural Research* 53: 893-900

DAFF (2011) *A honey bee industry and pollination continuity strategy should varroa become established in Australia.* Department of Agriculture, Fisheries and Forestry

Hafi *et al.* (2012) *A benefit-cost framework for responding to an incursion of varroa destructor.* Department of Agriculture, Fisheries and Forestry

Phiri *et al.* (2023) A four-decade profile of apicultural demographics and production in New Zealand, 1980-2020. *Journal of Economic Entomology* 116: 342-351

Somerville (2008) A study of New Zealand beekeeping - *Lessons for Australia. RIRDC*, Barton

Stahlmann-Brown *et al.* (2023) Valuing over-winter colony losses for New Zealand's commercial beekeepers. *New Zealand Economic Papers* 57: 184-190

Varroa support

This fact sheet is the third of a series to support beekeepers to manage varroa. Other tools will also be made available, including webinars and podcasts. You can find all these tools online at AHBIC and AgriFutures Honey Bee & Pollination Program. AgriFutures Australia is working to support beekeepers in conjunction with industry.

Contacts

honeybees@agrifutures.com.au

For industry and strategic issues and inquiries:

Amanda Olthof
Senior Manager, Levied & Emerging Industries
amanda.olthof@agrifutures.com.au
0499 384 037