Beyond the Hive: What Varroa Means for Berry Industry Pollination

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For decades, Australian berry growers have benefited from an often-overlooked production input: an abundance of feral honey bees. Across much of the country, these unmanaged colonies have provided valuable pollination services at little or no direct cost to growers.

As *Varroa destructor* (Varroa mite) continues to spread across Australia, that 'free pollination service' is expected to decline significantly. While managed honey bee colonies will continue to play a vital role, the experience of countries that have lived with Varroa mite for many years suggests that pollination is likely to become a more actively managed component of berry production.

The good news is that overseas experience indicates Varroa mite is unlikely to cause a collapse in berry production.

Instead, the impacts are expected to be more gradual and largely economic, including increased hive rental costs, greater competition for pollination services and an increased focus on maintaining pollinator health and diversity.

The one thing that you can do now is to actively plan for pollination in the same way you do all your other critical crop inputs.

Not all berry crops are equal

One of the key lessons from international research is that different berry crops have very different pollination requirements.

Blueberries: A highly pollination-dependent berry crop

Blueberries are highly pollination-dependent, particularly for fruit set, berry size and yield. Although blueberry flowers are self-fertile to varying degrees depending on the cultivar, they benefit enormously from repeated insect visits. The flowers are pendant-shaped, their pollen is relatively difficult to transfer, and many varieties produce larger, more uniform fruit when pollen is moved between flowers by bees.

Research has consistently shown that adequate pollination improves:

- fruit set
- berry size
- uniformity
- firmness
- harvest timing
- overall yield

Growers are strongly encouraged to download the **Pollination Guide for the Australian Berry Industry** at bit.ly/BA-Pollination-Guide

Internationally, blueberries are considered one of the horticultural crops most vulnerable to reduced pollination services. As access to managed honey bee hives becomes more competitive, blueberry growers are expected to face the greatest pressure to secure reliable pollination.

Strawberries: Self-pollinating doesn't mean bees don't matter

Strawberries are often described as self-pollinating, but that description can be misleading. Each strawberry flower contains hundreds of individual ovaries.

Every ovary that is successfully fertilised develops into an achene (the tiny 'seeds' visible on the fruit surface).

These fertilised achenes release plant hormones that drive the expansion of the surrounding fruit tissue.

The result is simple: the more complete the pollination, the larger and more symmetrical the berry.

Without sufficient bee activity, strawberries will usually still produce fruit, but growers are more likely to see:

- misshapen fruit
- reduced berry size
- poorer firmness
- shorter shelf life
- lower Class 1 pack-out

For strawberries, the greatest risk associated with declining pollination is not reduced fruit set but reduced fruit quality.

Raspberries: Every drupelet counts

In Australia, where the crop is almost entirely grown in tunnel-based production systems, raspberries are particularly dependent on effective insect pollination to produce high yields of fully formed, marketable fruit, because each berry consists of many individual drupelets that must be successfully pollinated.

Where pollination is inadequate, growers may see:

- crumbly berries
- incomplete drupelet development
- reduced berry weight
- lower marketable yield

International studies generally report measurable improvements in fruit quality and berry weight when bees are active during flowering.

Blackberries: More resilient, but still benefiting from bees

Most commercial blackberry cultivars are self-fertile and capable of producing crops without extensive insect activity. However, bee visitation will dramatically improve overall marketable yield, berry size, drupelet fill and fruit uniformity.

While blackberries are expected to be slightly more resilient as pollination dynamics change, they should not be considered independent of pollinators.

What has happened overseas?

Perhaps surprisingly, countries such as the United States, Canada, New Zealand, and many European nations have not experienced widespread declines in berry production due to Varroa mite. Instead, growers have adapted.

Common responses include:

- increasing the use of managed honey bee hives
- booking pollination services earlier
- encouraging native and wild pollinators through habitat management
- integrating pollination planning into crop management

Rather than causing dramatic production losses, Varroa mite has shifted pollination from being an assumed service to a systematically planned production input.

Honeybees don't have the monopoly on pollination

Although honey bees remain the cornerstone of commercial pollination, they are only part of the picture. Research increasingly highlights the value of diverse pollinator communities, including native solitary bees, stingless bees in northern Australia, hoverflies and other beneficial insects.

A diverse pollinator population can improve pollination reliability, particularly during periods of poor weather or when honey bee activity is reduced. Maintaining flowering vegetation, shelterbelts and native habitat around farms can help support these beneficial insects while contributing to broader farm biodiversity.

A *Calliphora albifrontalis* fly about to feed on a blueberry flower Photo credit: Dr Sue Jaggar

A managed honeybee visiting strawberry flowers in Stanthorpe Photo credit: Glenda Riley

A native Reed bee on Rubus
Photo credit: Alison Hoelzer

A native hoverfly visiting a blackberry flower in Tasmania Photo credit: Jane Richter

Pollination is not just a numbers game

While the spread of Varroa mite is already changing the availability of honey bees, it is important to remember that successful pollination depends on more than just bee numbers alone.

A range of factors influence how effectively flowers are pollinated, including:

- weather conditions during flowering, particularly rain, wind and cool temperatures that reduce bee activity
- hive strength and colony health
- the timing of hive placement within the crop
- flowering intensity and duration
- competition from surrounding flowering plants
- crop nutrition and plant health
- cultivar characteristics and flowering biology

For this reason, seeing bees in the crop does not necessarily mean pollination has been optimised. Likewise, a poor pollination outcome is not always the result of too few bees.

As Australian growers adapt to life with Varroa mite, the focus needs to shift from simply asking *"Are there enough bees?"* to the broader question of *"Are we creating the best possible conditions for effective pollination?"* Integrating pollination into overall crop management will help growers maximise fruit quality and make the most of every bee visit.

Start now to prepare for the future

Australia's berry industry has an opportunity to prepare now before the full impacts of Varroa mite are felt.

Growers can begin by considering several practical questions:

- Do I understand the pollination requirements of my crop and cultivars?
- How dependent is my business on feral honey bees?
- If managed hives become more expensive or harder to source, what is my contingency plan?
- Could on-farm habitat support a more diverse pollinator community?
- Am I monitoring fruit quality in a way that could identify pollination issues early?

These questions are likely to become increasingly important as pollination becomes a more actively managed part of berry production. The spread of Varroa represents a significant change for Australian horticulture, but it does not signal a crisis for the berry industry. Instead, it marks the beginning of a transition.

Ultimately, the future of pollination in Australia's berry industry will rely not only on managed honeybees but on recognising the value of all pollinators and managing farms in ways that support them.

The lesson from overseas is clear: successful growers are not simply managing crops, they are managing pollination. Building resilient pollination systems through strong partnerships with beekeepers, supporting diverse pollinator communities and understanding the pollination needs of individual crops will help ensure Australian berry businesses continue to produce the high-quality fruit consumers expect in the post-Varroa era.

BLUEBERRIES & RUBUS

ensuring reliable pollination will remain essential to achieving premium yields

STRAWBERRIES

maintaining fruit quality will be the key challenge

Lessons from New Zealand: Living with Varroa mite

LESSON 1: DON'T RELY ON FERAL BEES

Before Varroa mite, wild honey bee colonies contributed significantly to crop pollination. As the mite spread, feral populations declined dramatically, and growers who had previously relied on 'free' pollination found they needed to source managed hives.

→ **Don't assume adequate bee numbers will be present during flowering. Pollination should be planned like irrigation or fertiliser.**

LESSON 2: BOOK HIVES EARLY

As demand for commercial pollination increased, competition for healthy colonies also grew. Growers who established long-term relationships with local beekeepers were generally better positioned to secure quality hives during peak flowering periods.

→ **Develop relationships with beekeepers well before flowering and communicate expected bloom dates as accurately as possible.**

LESSON 3: POLLINATION IS ABOUT QUALITY AS MUCH AS YIELD

Many berry growers discovered that inadequate pollination did not necessarily reduce the number of berries harvested, it reduced the proportion of premium fruit. Smaller berries, uneven fruit development and reduced firmness all affected marketable yield and pack-out.

→ **Pollination influences profitability, not just production.**

LESSON 4: HEALTHY LANDSCAPES SUPPORT HEALTHY POLLINATION

With fewer feral honey bees available, greater attention has been given to maintaining habitat for native pollinators and ensuring floral resources are available before and after crop flowering. While wild pollinators are unlikely to replace managed honey bees entirely, they can improve pollination resilience and complement commercial hive services.

→ **Pollinator-friendly farms are often more resilient farms.**

LESSON 5: POLLINATION BECAME PART OF CROP MANAGEMENT

Perhaps the biggest change has been cultural. Pollination is no longer viewed as something that simply happens. Successful growers monitor flowering, assess bee activity, evaluate fruit quality and work closely with their beekeepers to optimise outcomes.

→ **The most successful businesses actively manage pollination as an essential production input.**

The New Zealand experience demonstrates that berry production can continue to thrive in the presence of Varroa mite but only when growers adapt. Planning ahead, valuing pollination and investing in strong partnerships with beekeepers have become key ingredients for success.