



BUMBLEBOX™

SUPPORTING EFFECTIVE, CONSISTENT
POLLINATION OF CROPS WITH LESS WORRY



Reducing reliance on honey bees alone for pollination services allows growers more reliable, efficient pollination of crops. Introducing bumble bee colonies to orchards and fields has significant advantages compared to using honey bees on their own, including:

- improved pollination in marginal weather conditions, as bumble bees work in colder, wetter, cloudier and windier weather than honey bees
- complementarity in foraging behaviours that lead to an overall improved pollination service, such as extended activity periods (honey bees are most active in the middle of the day, while bumble bees are more active in the morning and afternoon)
- effective pollination under nets, with bumble bee colonies improving in strength rather than declining

The BumbleBox™ system

Plant & Food Research has developed BumbleBox™ – a new system for rearing bumble bees as pollinators for open and netted crops. With this system, bumble bees can be provided to crop growers as an economically viable option for pollination in orchards and farms. Target crops include kiwifruit, avocados, berries, summer fruit, and vegetable seeds.

From 2020 onwards the BumbleBox™ system will be provided to selected beekeepers and pollination service providers to use for rearing bumble bees. The resulting bumble bee colonies will then be rented to crop growers using a model similar to honey bee hive rentals. Rental costs for bumble bee colonies have not been finalised, but the aim is for an equivalent or lower price compared to honey bees in return for an equivalent or better level of pollination.



How do they perform?

In a trial in a netted G3 block in 2018, we were able to determine that bumble bees were capable of fully pollinating a kiwifruit orchard on their own, performing the same level of service as hand-spraying individual flowers with a wet pollen mix (Figure 1).

As with honey bees, it is important to check flowering of males when female flowers open to confirm that sufficient male pollen is available for bumble bees to move, and apply artificial dry pollen application if supply of male pollen appears to be a limiting factor in your orchard.

Individual bumble bees are more effective at pollinating than individual honey bees, as a result, many fewer individuals are required to do the same amount of work.

Although bumble bee colonies only contain 100s of workers while honey bee colonies 10,000s of workers, we have calculated that four bumble bee colonies will do the same work as one honey bee colony.

In practice this means that one of the big differences you will see is an apparent lack of bumble bees on flowers, even when they are fully pollinating your crop. We recommend walking around until you find a bumble bee and then following it to watch it work, as this will provide a better impression of the work they are doing than counting the number per bay (the standard method used for honey bees).

To ensure you are getting the right level of service from your colonies, you can conduct 10-minute counts of bumble bees entering and exiting from their hives. So long as the average number of entries + exits of bumble bees in a 10 minute period is greater than 6 across your colonies, you will have sufficient activity for pollination.

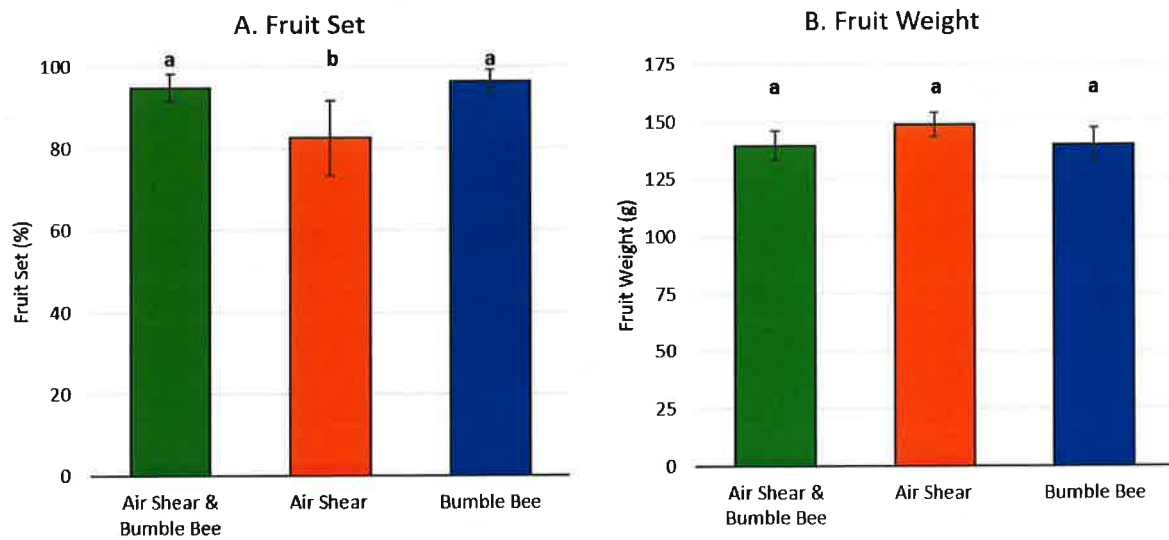


Figure 1. Results from the 2018 pollination trial assessing bumble bee (*Bombus terrestris*) pollination in a fully-netted Zespri® SunGold Kiwifruit (*Actinidia chinensis* var. *chinensis* 'Zesy002') orchard. Mean percentage fruit set (A) and mean fruit weight (B) of open “Air Shear & Bumble Bee” (pollinated by both bumble bees and artificial pollination, “Air Shear” (artificially pollinated with wet mix using Air Shear sprayers), and “Bumble Bee” (pollinated by bumble bees only at mid flowering) flowers. Error bars indicate 95% confidence intervals and differing lowercase letters indicate significant differences between treatments.

This research was originally reported in New Zealand Kiwifruit Journal:

Pattmore DE, van Noort T, Mortensen AN, Nathan T, Buxton M, McBrydie H 2019. The use of bumble bees to fully pollinate covered kiwifruit crops. *Kiwifruit Journal*, August/September 2019:17-19.

Interested?

We want to hear from growers that are interested in trialling BumbleBox™ bumble bees for pollination. Or would you be interested in raising bumble bees?
Help us to help your crops!

Email bumblebox@plantandfood.co.nz for more information or to register your interest.