

# BioResources inter-row project

Dr Christopher Carr, Dr Abigail Makim and Mr Richard Llewellyn, BioResources Pty Ltd

## Background

This project proposes that reduced mowing in the macadamia inter-row could improve the plant diversity and create an environment more favourable in supporting an insectary. This could then increase the number of beneficial arthropods in the orchard. More broadly, we may see more complex food webs and better orchard self-regulation of economic pests. Furthermore, this enhanced nutritional food web will benefit birds and micro-bats, which also have roles in pollination and pest suppression. It is estimated that beneficial insects provide 5–10 times the pest control in agricultural ecosystems compared to chemical applications (Pimentel et al. 1992), as these processes are occurring all the time. By encouraging more diverse ecosystems within the orchard, the likelihood and/or intensity of pest outbreaks decreases.

BioResources Pty Ltd worked with growers to consider practical options for reduced mowing that are compatible with the seasonal demands of orchard management. It then sought to provide information on any relationship between reduced mowing and the potential for any increased rat, invasive weed and/or arthropod pest presence. Finally, the trial sought to monitor the association between changes in inter-row vegetation management and changes in orchard beneficial/pest arthropod ecology.

## Outcomes

The project ran reduced mowing trials on 11 working farms in all major growing regions for 2.25 years. Early results suggest that reduced mowing is achievable on many macadamia farms.

The project found that an inter-row insectary can be incorporated into existing orchard inter-row management, and with basic monitoring and management, will not lead to other problems with rats, weeds or arthropod pest reservoirs.

The project field tested several options for reduced mowing, including mohawk (Figure 18), alternate row mowing (Figure 19), and tree-to-tree no mow. It also considered seeding and cover cropping for insectaries in these reduced mow areas (Figure 20).

The project provides recommendations and guidelines for selecting and managing each of these options for growers, as suits specific farm, season and site conditions. These recommendations and guidelines are available from [Hort Innovation](#).

## Case study

The following case study provides a snapshot of some of the project's results. The annual average results for inter-row insectary indicators for one farm in northern New South Wales trialling the mohawk system are presented in Figure 22. Plant species diversity, floral resources (nectar and pollen) for food for beneficial arthropods, and reduced habitat disturbance and increased habitat complexity were evaluated. For this farm (Figure 18), the mohawk inter-row treatment significantly improved the value of the inter-row in terms of an insectary when compared to the control (industry standard, complete close mow). Specifically, for each assessment year:

- the count of plant species in the mohawk was around double that of the control
- the percentage of biomass as floral resources was much higher in the mohawk compared with the control (zero)
- when habitat was evaluated by height (cm), it was 5 times greater for the mohawk than the control.

By classifying all arthropods sampled as prey and then separating nectarivores (potential pollinators), predators and parasitoids, we get four broad categories. This allows us to compare treatments in proportions. Using combined tree and inter-row abundance counts revealed a greater proportion of prey (57%), predators and parasitoids (63%) and nectivores (pollinators) (55%) in the mohawk compared with the complete close mow block (Figure 21).

Furthermore, there was no increase in any macadamia pests in the mohawk and there was greater species richness in terms of arthropod families represented both in the inter-row and trees.

There was a three-fold increase in thrips, which can be a secondary pest in macadamias, in the complete close mow block compared to the mohawk block over the season sampling period in the macadamia trees. While thrips were not reported as an issue on this trial site, it is likely that increased predators and parasitoids in the mohawk could have reduced their overall numbers. The economic benefit of increased beneficial arthropods for pest suppression and pollination could be measured in future studies.





Figure 18. A reduced mow mohawk in 10 m rows, northern New South Wales, May 2017.



Figure 19. An alternate row mowing system (mown on the left, unmown on the right), Bundaberg, April 2019.





Figure 20. A mohawk with seeding, Central NSW coast, October 2018.

It is worth noting that this case study is based on only 2.25 years of data, and if these practices continue it is likely arthropod diversity will increase further. Increases are also likely with the incorporation of seeding and/or cover cropping in the inter-row. This is reported on in greater detail in the project's final report, which can be found at the [Hort Innovation](#) website.



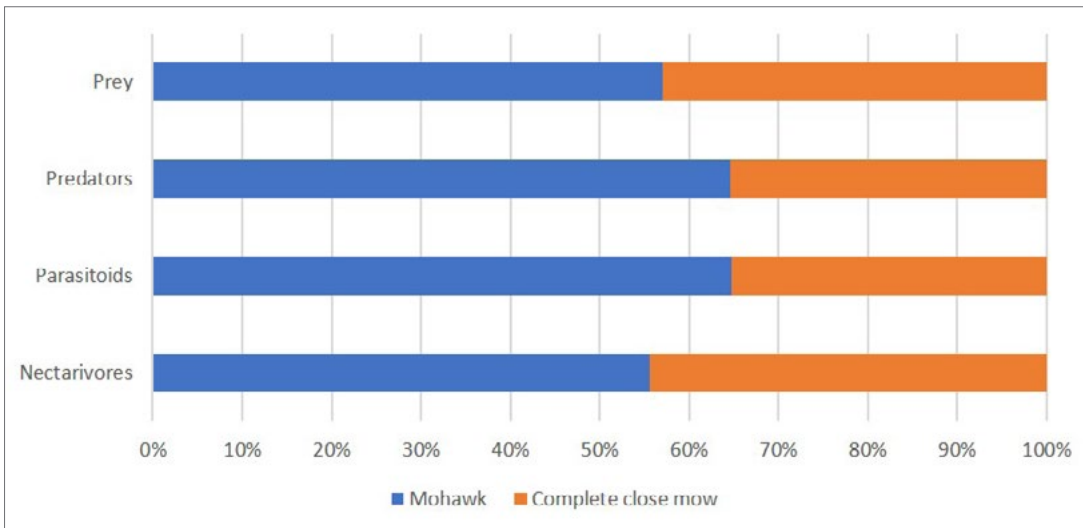


Figure 21. A comparison of the four categories of arthropods from tree and inter-row counts.

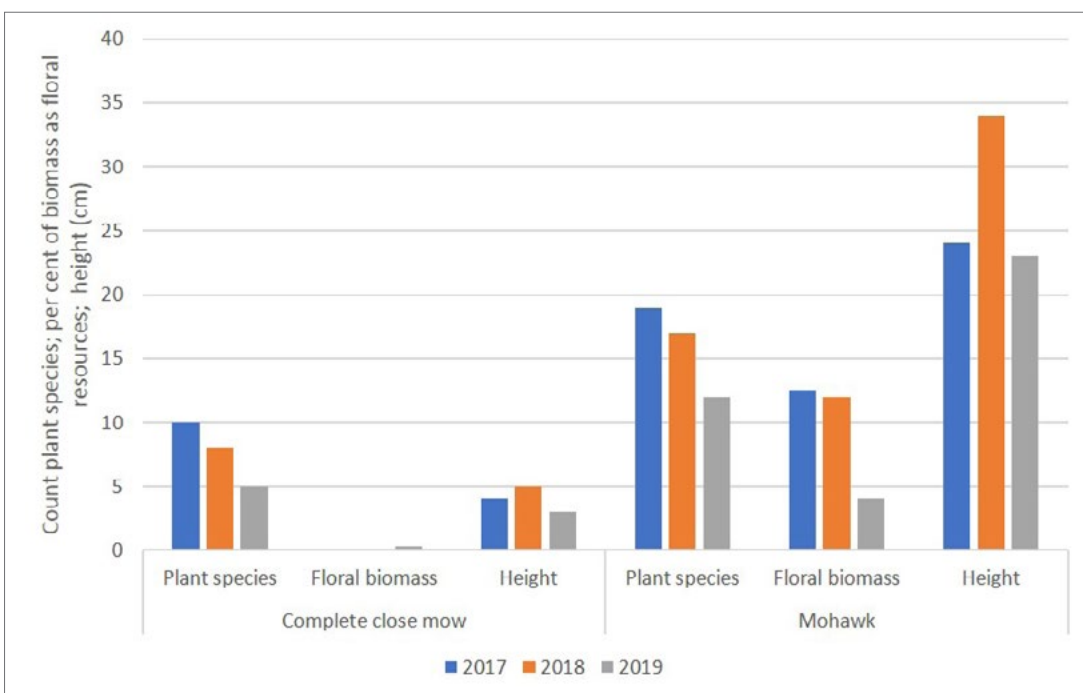


Figure 22. The annual average of insectary measures by treatment: count of plant species, the percentage of biomass as floral resources, and the height of vegetation (cm).

## Reference

Pimentel D, Stachow U, Takacs DA, Brubaker HW, Dumas AR, Meaney JJ, Onsi DE and Corzilius DB. 1992. Conserving biological diversity in agricultural/forestry systems. *BioScience*, 42: 354–362.

## Hot Innovation links

Insectaries literature review <https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/insectaries-literature-review/>

Integrated pest management program for the Australian macadamia industry (various projects from MC16004 to MC16008) <https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/mc16004-to-mc16008/>

**Hort Innovation** | **MACADAMIA FUND**  
Strategic levy investment

This project has been funded by Hort Innovation using the macadamia research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit [horticulture.com.au](https://horticulture.com.au)