Supporting pollinators: looking beyond flowers and bees for enhanced berry production

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- Pollinators depend on diverse habitats, including nesting and breeding sites, to support their life cycle
- Integrating habitat features such as floral strips and nesting sites can promote pollinator populations
- Strategic habitat management that fosters a diverse community of pollinators and natural enemies can enhance ecosystem services and boost overall farm productivity and resilience

Hoverfly *(Austalis copiosa)* inside the hothouse structure at Tasmanian Berries. Photo credit: Jane Richter

Pollinators require more than just the one type of crop flower they help pollinate; they depend on a variety of flowers for nectar and pollen, as well as places to nest and reproduce. However, intensively managed agricultural landscapes often lack natural vegetation, leaving fewer resources for vital beneficial insects.

Wild insect flower visitors, such as bees and flies, are important contributors to berry crop pollination, but their specific habitat needs within cropping systems are not fully understood. Different insect species require distinct resources throughout their life cycles, particularly during their larval stages. By providing both nesting and breeding spaces for these beneficial insects, growers can enhance pollination services, support crop yields and promote biodiversity.

In high-intensity horticultural systems, integrating both floral and non-floral habitat features into the landscape offers a cost-effective approach to support pollinators at every stage of their development.

Optimising pollination with interrow floral strips

One strategy gaining traction is the use of interrow floral strips – planting flowering species between crop rows to provide food and habitat for beneficial insects. By carefully selecting plant species, growers can attract a diverse range of pollinators and pest-controlling insects, potentially improving fruit set, quality and overall farm biodiversity.

While the benefits of floral strips have been studied in cooler climates, their effects in Australia's warm, humid berry-growing region on the NSW Mid North Coast are still being explored. A current study is testing how different interrow plant mixes influence both insect populations and blueberry production. After the first season, early results show that:

- The sown plant mixes established well and tolerated mowing
- More insect flower visitors, including pollinators and beneficial natural enemies, were observed in interrows with the sown plant mixes (treatment sites), compared to control interrows managed with standard practices such as grass
- Blueberry fruit weight and seed counts varied across treatments, with further data collection underway to assess long-term effects

With a second season of monitoring in progress, this research is providing valuable insights into the potential co-benefits of floral plantings for biodiversity and crop production.

Creating targeted nesting and breeding habitats

Another approach to support pollinators is by providing supplementary nesting substrates. 'Bee hotels' have been widely used in Europe and North America to offer nesting sites for solitary bees, which do not form hives like honeybees but instead nest in hollow stems, wood, or soil. However, different species have varying preferences for nesting.

A study on the Coffs Coast, NSW, is testing different nesting substrates for native bees:

- Wooden stalks attract carpenter bees
- Mud bricks provide shelter for leafcutter bees, wasps and flies – some of which also deliver pest control services
- Bundled Rubus canes, known to support native bees in other Rubus systems, appear to be more commonly used by spiders on the Coffs Coast

These findings highlight the importance of tailoring supplementary nesting resources to suit local bee and other insect species and environmental conditions to maximise their conservation value and ecosystem service benefits in agricultural landscapes.

Recognising the role of flies in pollination

While bees are traditionally regarded as the primary pollinators, flies also play a critical role in pollination. Hoverflies, for example, visit berry flowers and can complement the pollination work of bees. Preliminary research trials have indicated that some species are suitable as managed pollinators, such as Eristalis tenax. This species appears to perform well on Rubus crops on the NSW Mid North Coast and in Tasmania. However, flies have different habitat needs to bees, particularly during their larval stages. To explore ways to support fly populations in horticultural settings, habitat pools – small water sources containing plant material – were tested as breeding sites in the Coffs Harbour region:

- Australian native fly species *Eristalinus punctulatus* and *Austalis copiosa*, along with the European drone fly *Eristalis tenax*, used the pools for egg-laying
- Independently of the oviposition observations, adults of the same species were recorded foraging on blackberry and raspberry flowers, suggesting their role in pollination

These findings underscore the importance of considering the full life cycle of pollinators, including habitat features that support larval development, to enhance fly populations and their pollination services in agricultural systems.

Integrating sustainable habitat management into agricultural practices

A low-cost, effective approach to enhancing pollination services is by utilising existing natural resources to create habitat on farms. Organic byproducts from pruning, weeding and harvesting can be repurposed to support pollinators and other beneficial insects. While trials are proving promising, we still need to better understand and mitigate any possible risks of plant or other pathogen transfer if plant material is retained. This work is still in progress:

Eristalinus punctulatus **fly laying eggs in discarded plant material**

Peacock carpenter bee entering provided nesting substrate on farm

Flowering plants sown in the interrow space of blueberries

Photos credit: Lena Schmidt

- Woody material and soil can serve as nesting sites for bees
- Organic waste and vegetation pools provide egg-laying sites for flies
- Designated habitat patches can help maintain diverse wild insect populations while complementing managed honeybee pollination

A resilient future for berries

For growers, this all points to a simple but powerful idea: by taking a holistic approach to pollinator management – considering the diverse needs of bees, flies and other beneficial insects – you can build stronger, more productive and environmentally sustainable agroecosystems.

Many of the same habitat features that support pollinators, such as floral strips, nesting resources and habitat pools, also provide valuable resources for a broader range of beneficial insects, including predators and parasitoids that aid in natural pest control. By fostering both pollinator and natural enemy diversity, such strategies can enhance integrated pest and pollinator management (IPPM), reducing reliance on chemical pest control. These measures not only improve farm productivity but also boost biodiversity and resilience, promoting more sustainable and robust berry production systems.

Acknowledgements

This research is part of the *Expansion of Flies as Berry* and *Cucurbit Crop Pollinators* (MT22007) project. This project has been funded by Hort Innovation, using the raspberry, blackberry, blueberry and vegetable research and development levies, and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture. Further funding was awarded as part of Australian Research Council Future Fellowships to Romina Rader (FT210100851) and Ayesha Tulloch (FT210100655). The research is additionally supported by Future Food Systems CRC, Holsworth Research Endowment, Jill Landsberg Applied Ecology Award and the Conservation and Wildlife Research Trust.

We thank the berry growers who allowed us to use their crops for this research. We acknowledge the Gumbaynggirr people as the traditional owners of the land this research was conducted on and pay respect to Gumbaynggirr Elders past, present and future.

Extra reading

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