

Update on Best Practice Pollinator Management for the Rubus Industry (RB23002)

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Raspberry and blackberry growers have invested their research and development levy through Hort Innovation into the 'Best Practice Pollinator Management for the Rubus Industry' project being delivered by the University of Melbourne. The main aim of this project is to provide Rubus growers around the country with information about which insects, other than Honeybees, are likely pollinating Rubus and what can be done to support different wild insect pollinators on-farm. We are one year into the project, so it is time for an update.

Our team's first task was to bring together existing knowledge about Rubus pollinators in Australia, their known effectiveness as Rubus pollinators, and information about where they are commonly found pollinating Rubus crops. This literature review is available from the Berries Australia Resource Library – visit bit.ly/BA-RL and search 'RB23002'.

European Honeybees are currently the most common Rubus flower visitor in Australia, though there are a range of native insect species that also visit and pollinate Rubus. These insects supplement honeybee pollination and may be more important in the future if Varroa mite continues to spread and negatively impact honeybees.

In Northern growing regions, native stingless bees are a promising alternative to honeybees, but in the southern growing regions where stingless bees are not found, there is a wide diversity of mainly solitary bee species that visit Rubus, along with flies. Given that no one wild insect species is evidently dominating Rubus pollination in the south, an important conclusion of our review is that there is a need for new management techniques that target the success of a diverse suite of pollinating insects to support Rubus pollination even when honeybees are absent.

Two southern species of pollinating insects, drone flies (*Eristalis tenax*) Figure 1 and reed bees (*Exoneura spp.*) Figure 2 are excellent candidates for Rubus farmers to support in-field. This is because these less well-known species are known to effectively pollinate Rubus flowers and have life history and nesting practices that are compatible with farm management.

Field surveys to-date

In the spring of 2024, we focused our field efforts on Tasmanian Rubus farms. We collected insects from the flowers of raspberries, blackberries, other berry crops, native plants, and weeds on berry farms and nature reserves in the northern and southern growing regions of Tasmania. Across the field season we surveyed Rubus floral visitors on four farms, with each farm's flowers surveyed on three–four days.

The most commonly observed visitors of raspberry and blackberry flowers across farms was the European honeybee, which was the only managed pollinator. Exotic bumblebees (*Bombus terrestris*) Figure 3, which are only found in Tasmania, were infrequent Rubus visitors across sites, despite this species being a known Rubus pollinator in the northern hemisphere.



Figure 1. Drone fly (*Eristalis tenax*) on a blueberry flower
Photo credit: Abby Davis



Figure 2. Native reed bee (*Exoneura* spp) on a Rubus flower
Photo credit: Alison Hoelzer



Figure 3. Exotic bumblebee (*Bombus terrestris*) Photo credit: Whitney Cranshaw, Colorado State University, Bugwood.org

Native insect species observed visiting raspberry and blackberry flowers varied among farms, but overall, the most common native pollinators were furrow bees (*Lasioglossum* spp.) and hoverflies (Syrphidae). Reed bees (*Exoneura* spp.) were recorded at two farms, and plasterer bees (*Leioproctus* spp.) at one farm. *Lasioglossum* and *Leioproctus* are solitary bee species that would need to be attracted in large numbers to extensively impact *Rubus* production. That said, all of these insect taxa observed visiting flowers, apart from plasterer bees, are known to pollinate raspberries and/or blackberries.

The diversity of bee species visiting raspberry and blackberry flowers varied between Tasmanian farms, being highest at Westerway Raspberry Farm. This farm is managed with minimal insecticide use, which may be why the number of insect pollinators was higher here than at the other farms, though we did not test this directly.

Other factors that likely promote native pollinators on this farm are high abundances of on-farm bee nesting resources such as untilled bare ground and pithy-stemmed vegetation. This farm was also situated near a patch of native forest (~5km away), which is known to

support higher diversity and abundances of native bees in other farming systems around the world.

In addition to having the highest *Rubus* visiting bee diversity, Westerway Farm was also the only Tasmanian farm we surveyed that was actively supporting native reed bees. We observed these key species visiting raspberry, blackberry, and silvanberry flowers on this farm, as well as nesting within raspberry rows inside the long cane stubs that are left in place for several years (Figure 4), giving Reed bees the opportunity to complete their life-cycle.

To further investigate why this group of bees was present on this farm, we looked for and found Reed bees nesting in dead branches of native *Olearia lirata* in the native forest near the farm. We also observed Reed bees visiting flowers of native *Hakeas* and *Acacias* in the nearby native forest. All of these observations suggest that the planting of native plants around Tasmanian *Rubus* fields may be useful for increasing the number of native bee pollinators on-farm. That said, the benefits of planting these species around *Rubus* farms should be tested more thoroughly to be sure of how



Native reed bee nests entrance in cultivated raspberry canes Photo credit: Julian Brown

reliably effective this approach would be. With data coming from a single farm, care should be taken in progressing with such plantings.

We also collected insects from raspberry and other flowers on two farms in Western Australia. Here we found only Honeybees and hoverflies (*Eristalis sp.*) visiting raspberry flowers.

IPM and pollination

We also started collaborating with the Hort Innovation IPM project 'Integrated pest management approaches to address pest challenges in raspberry and blackberry' (RB21000) research team to facilitate integration of *Rubus* pollinator and pest management. RB21000 is also based in Tasmania. As part of this collaboration, we surveyed one Tasmanian raspberry farm where the IPM team has planted Calendulas and other plants which they hypothesise will attract natural enemies of *Rubus* pests between polytunnels.

We found that native furrow bees (*Lasioglossum spp.*) visited Calendula and *Rubus* flowers in this farm. Though more studies are needed to see if the presence of Calendula between polytunnels increases the number of native bees visiting *Rubus* flowers, our initial observations indicate that the same bees are attracted to both types of flowers on farm. It is thus worth further studies to assess optimal planting densities and floral diversity for dual IPM and pollination goals.

Next steps

The next steps for this project are conducting pollinator surveys in Victoria, NSW, and Queensland. We are also running a few supplemental studies to complement survey data. Notably, in Victoria, we have placed different native bee nesting substrates on four farms and will be assessing which type of nesting boxes attract the most native bees to Victorian *Rubus* farms. In Queensland, we will also be using commercial stingless bee hives during winter to see if these northern species can improve pollination during the winter bloom. All of these data and analyses will be compiled into a best practice guide for supporting *Rubus* pollinators by the end of our study period in 2027.



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