

# Factsheet

Building resistance to Varroa Mite incursion in WA orchards





#### The incursion of Varroa mite into Western Australia is likely to have a significant effect on apple-flower pollination.

Fruit orchards in South West WA rely heavily on 'wild' European honey bees for crop pollination. Wild honey bees are those that nest in native trees, as opposed to 'managed' honey bees that live in hives managed by beekeepers. The abundance of native trees around South West orchards means wild honey bees are plentiful, and beekeepers are not commonly used. However, it is the wild honey bees that are most prone to Varroa mite incursion because their hives cannot be treated and cared for by beekeepers when Varroa mite invades.

The likely scenario with an incursion of Varroa mite in WA is that demand for managed bees will outstrip supply, resulting in many growers experiencing a significant reduction in yield.

Honey bees are by far the most common insect visitor to apple flowers. However, research in the Adelaide Hills found that other insects can make up to 40% of insect visits.

Native bees, including furrow bees (Lasioglossum) and slender furrow bees (Homalictus) were the most abundant apple– flower visitors after honey bees. Other native bees recorded at apple flowers include blue– banded bees (Amegilla), silk bees (Leioproctus) and reed bees (Exoneura). Flies, particularly hoverflies, were occasional visitors, as were flower wasps. Native bees are NOT thought to be susceptible to Varroa mite. While their impact on fruit production in SW WA is unknown, the species' above occur in the region and are known pollinators. Observations by SW WA orchardists suggest that native insects may provide a significant contribution to crop pollination.

Researchers have also found that native bees can improve fruit symmetry, which is related to even seed-set in all carpels. Flower visits by native bees were associated with a reduction in empty carpels, whereas this was not the case with honey bees, despite their higher visitation.

These results suggest that orchardists can mitigate the impact of a potential Varroa mite incursion on wild honey bees and improve fruit quality by supporting native insect pollinators through supportive landscapes and sustainable production practices.

To demonstrate how native pollinators can be supported, South West NRM has taken an innovative approach to revegetation that provides improved food sources for beneficial insects and pollinators and has shown orchardists how pests can be managed more sustainably.

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### Sustainable Production (IPM)

A key aspect of sustainable production that supports diverse pollinator communities is the use of Integrated Pest Management (IPM).

IPM does not mean that pesticides cannot be used. It simply tries to reduce the potential impact of pesticides by first considering:

1. If any beneficial insects can help to control the target pest,

2. How orchard management can support these beneficials and deter pests, and

3. What chemicals are effective on the pest without impacting beneficials that may be controlling this and other pests?

Advantages of using IPM include minimising pesticide costs, better control of pesticideresistant pests and delayed development of resistance.

As part of its Pollinator Project, South West NRM engaged IPM Technologies to hold a workshop with South West orchardists to discuss how they could integrate biological, cultural and chemical options to manage pests. For each pest, the IPM facilitators Dr Paul Horne and Jessica Page identified beneficial insects that can provide pest control, cultural (management) controls to support beneficials and deter pests, and classified chemical options according to how much they disturb the beneficial insects.

Scientific Name	Common Name	Flowers	Comments
Banksia sphaerocarpa	Round-fruit Banksia	Jan – July	Shrub to 4m. Sand, sandy loam, gravel laterite.
Thryptomene saxicola	Rock Thryptomene	Feb – Nov	Shrub to 1.5m. Sandy or loamy soils, granite outcrops.
Corymbia calophylla	Marri	Feb – April	Tree to 40 (60) m
Hakea lissocarpha	Honey Bush	May – Sept	Shrub to 1.5 (3)m. Sand, sandy loam, granitic soils, laterite.
Acacia pulchella	Prickly Moses	May – Oct	Shrub to 3m. Sandy, clay loam over laterite. Low-lying areas.
Calothamnus quadrifidus	One Sided Bottlebrush	May – Jan	Found in low-lying areas, swamps.
Hypocalymma angustifolium	White Myrtle	June – Oct	Shrub to 1.5m. Sand, peaty and sandy clay flats and swamps.
Adenanthos meisneri	Flooded Gum	July-Sept	Shrub to 2m. Donnybrook, sands, gravels.
Eucalyptus rudis	Prickly hakea	Aug-Oct	Tree to 20m. Sandy or loamy soils, wetter parts.
Acacis saligna	Orange Wattle	July-Sept	Shrub or tree to 6 (9)m. Variety of habitats.
Hakea amplexicaulis	Prickly hakea	Aug-Oct	Shrub to 3m. Clay, loam, gravel, laterite.
Banksia grandis	Bull banksia	Sept – Jan	Tree or shrub to 10m. White or grey sand, laterite.

Table 1: Examples of native plants for use in revegetation to attract pollinators.

## Sustainable Production (IPM)

An effective strategy would incorporate as many biological and cultural options as possible and eliminate as many detrimental pesticides as possible.

For more IPM information, visit - horticulture.com.au

An important cultural control is to establish nectar sources throughout the year to promote beneficial insects. This strategy will also provide supportive landscapes for pollinators.

Pest	Beneficial	Cultural	Pesticide Impacts
2-Spotted Mite	Persimilis and other predatory mites Stethorus Ladybird Predatory Thrips	Decrease dust Increase humidity Inter-row mgmt. Nectar sources for beneficials	Omite Paramite Acrimite Neem Sorcerer
Western Flower Thrip	Predatory mites/thrips Predatory bugs (Orius)	Same as above	Mavrik
Wooly Apple Aphid	Aphelinus mali (wasp)	Nectar source for beneficials Orchard hygiene Variety	Pirimor (will disrupt beneficial wasp unless wasp is inside host)
Scale	Parasitic wasps Ladybirds	Rotation Kale as a trap crop Orchard hygiene	Oil
Mealybugs	Green lacewings Parasitic wasps	Pruning Nectar sources for beneficials	Tokuthion
Loopers / Heliothis	Parasitic wasps Predatory bugs Green lacewings	Nil	<mark>Dipel</mark> Avatar

Table 2: IPM options for South West orchards, developed between growers and IPM Technologies in 2021. Chemicals in red are detrimental to beneficials. Chemicals in blue can have some impact, and chemicals in green have least or no impact. Note: Chemical options and registrations can change over time and may have changed since 2021, so must be checked prior to use.



#### Supportive Landscapes: Revegetation and Cover Crops

To support native pollinator insects, we need to establish a diversity of native flowering plants outside of the crop flowering period, ideally all year round but particularly from late winter to late autumn.

Competing sources of nectar and/or pollen during apple blossom could lead to reduced fruitflower visitation. Therefore, it may be desirable to plant more species that flower before or after the crop to reduce competition.

To help landowners select plants for this purpose, South West NRM, in collaboration with Blackwood Environment Society, has developed a flowering calendar with a range of plants local to the SW fruit-growing region. The calendar includes each plant's flowering times and a range of other traits including whether they are beepollinated and where they grow in the landscape. The resource can be used to select species that flower at different times of the year so pollinators have a constant supply of nectar (energy) and pollen (protein).

Another way to provide flowers at different times of the year, as trialled by South West NRM at three avocado farms in Manjimup, is the use of inter-row mixed species cover crops. These trials used a species mix that included clovers (which flower from October to December) common vetch (September to October), field peas (August to September), and chicory (January to May). Management needs to ensure that the cover crop is not too bulky, potentially promoting pests or shading out other flowering plants.

Cover crops can also have soil health benefits such as nutrient cycling and reducing dust that is detrimental to beneficial species.

Nesting opportunities for native bees are also important. The main apple-flower visitors nest in open soil or areas with low ground cover. This can be provided beneath orchard trees where the soil is often bare. Alternatively, bee hotels, where wood or soil packed into objects such as besser blocks are stacked vertically, and 2–12 mm wide holes drilled for nesting, is also an effective strategy.

By supporting native beneficial insects and pollinators with Integrated Pest Management, year-round nectar and pollen sources and nesting sites, orchardists can be more resilient to Varroa mite incursion.

For more information and to access the flowering calendar, visit - <u>southwestnrm.org.au</u>

Reference: Hogendoorn, K et al (2021) Securing Pollination for more Productive Agriculture: Guidelines for effective pollinator management and stakeholder adoption. Final Report. Horticulture Innovation Australia, North Sydney. https://www.horticulture.com.au/growers/help-yourbusiness-grow/research-reports-publications-factsheets-and-more/ph16004/





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