Powerful pollinators

Encouraging insect pollinators in farm landscapes



Pollinators are an essential component of agricultural production and of healthy, biodiverse landscapes. Protecting and enhancing pollinator resources on farms will help support a diverse range of pollinators. This brochure provides an introduction to encouraging insect pollinators on farms, including a guide to choosing plants that will support diverse pollinators throughout the year.



The power of pollinators

Pollinators – mostly insects, but also birds and mammals – assist the formation of seeds and fruit in many plant species by visiting flowers in search of food (nectar and/or pollen). Whilst foraging they transfer pollen from one flower to another, facilitating fertilization, which results in fruits and seeds.

Honey bees, native bees and other native insects like hoverflies, wasps and butterflies provide essential pollination services for native plants, garden flowers, fruits and vegetables.



Native vegetation supports pollinators by providing food and nesting sites. Nearby crops and pastures will benefit from the increased abundance and diversity of pollinators in the landscape.

Pollinators and food security

Without insect pollinators, the quantity and diversity of food and flowers grown in backyard gardens would be severely restricted. Many of the foods we eat, from gardens and farms, benefit from pollination.

Pollinator-dependent foods include citrus, apples, stone-fruits, zucchini, pumpkins, strawberries and tomatoes, as well as plants grown for seed such as sunflowers, coriander and parsley.

The quantity and diversity of insect pollinators are key drivers of production as they influence both food yields and quality. Under-pollination results in smaller and misshapen fruit or seed that isn't viable to grow.

A diverse and healthy community of pollinators generally provides more effective and consistent pollination than relying on any single species.

Pollinators are essential to, and dependent upon, healthy ecosystems. A growing human population and increasing demand for food puts pressure on ecosystems, with potential negative impacts on biodiversity, the environment and food production.

Insect populations are in decline worldwide due to land clearing, intensive or monocultural agriculture, pesticide use, pollution, colony disease, increased urbanisation and climate change. Low pollinator numbers mean not all flowers are pollinated, leading to low fruit or seed set. This in turn reduces fruit and vegetable harvest yields, and decreases food supply.



Under-pollination results in smaller, misshapen fruit such as this strawberry.

Backyard biodiversity

Insect pollinators are a prime example of the importance of healthy ecosystems in urban gardens, parks and reserves. Insects are the 'canaries in the coal mine' of our urban and rural environments. Without our 'littlest creatures', we lack pollinators, natural beneficial pest control services, and critical food source for other insects, birds, amphibians, reptiles and mammals.

The presence of connected and widespread pollinator habitat is critical to support insect populations if we are to maintain sustainable cities and productive, healthy gardens and urban farms for food security and biodiversity.

Pollinators require habitat that contains year-round food sources, breeding resources and nesting sites. The presence of pollinator habitat adjacent to food crops has been shown to improve food production by enabling a greater variety and number of pollinators to persist year-round, providing pollination services when required.

Turn to the centre of this brochure for a guide to planting for pollinators.

Diapause or diet? Where are the insects?

Many insect pollinators undergo a diapause during colder winter months. Diapause is a period of suspended development during unfavourable environmental conditions, and during this period insect pollinators do not need flowers. Birds and other small mammals will continue to benefit from available pollen and nectar during this time.

If there are low numbers of insect pollinators in your local area, it is important to determine whether this is because of diapause, or because of an inadequate availability of nectar and pollen creating a 'food desert' where insect pollinators cannot survive.

There are still many unknowns about insect pollinators in Australia. Take part in Australian Pollinator Week or in the bi-annual Wild Pollinator Count to learn more about pollinators in your area — visit AustralianPollinatorWeek.org.au and WildPollinatorCount.com

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Encouraging pollinators in your garden

Create pollination reservoirs

Pollination reservoirs are areas that provide floral resources for pollinators. They can be gardens, new planting or existing habitat such as established trees, or even local bushland, parks or reserves. A high diversity of plant species is essential to provide nectar, pollen and nesting sites throughout the year. Pollination reservoirs need to be close enough to where pollinators live to ensure that they can fly easily to them

Improve on what you have

Enhance and improve your existing pollinator habitat where possible. Gardens that already contain established trees, rockeries, ponds, bare soil and organic matter, and a variety of flowering plants, are a valuable resource for beneficial insects and pollinators.

Nature–strips, verges, laneways, vegetable gardens, orchards, nature reserves, and riverbanks and creeks can all be important pollinator–attracting areas. Protect and enhance native pollinator plants in your garden and surrounds for the future.

Plant trees, shrubs and groundcovers

Planting a variety of species of groundcovers, shrubs and trees to in your garden will further attract pollinators to your patch. Initial watering and protection will improve the success rate of young plants. Some species such as wildflowers or native pea species are excellent pollinator attractors and reward careful attention by keen gardeners.

Be a citizen scientist and do some detective work to discover local pollinators in your patch. Visit **inaturalist.ala.org.au** to be involved.

Construct insect real estate

Insect hotels, which are both functional and attractive, are a great way to add to habitat and nesting places for pollinators and insects in your backyard or garden. The hotels are easily moved to be close to flowering plants and those needing pollination, especially if you have a new garden that is still growing. Include lots of different sized holes, cracks and crevices to provide homes for various solitary insect pollinators.

Plant for the future

When establishing pollinator habitat, consider including species that are indigenous to your area but can tolerate increasingly drier and warmer conditions, to create resilient habitat for climate change. Rehabilitate weedy areas into managed pollination reservoirs by introducing lots of flowering plant diversity. Be careful not to plant invasive or listed weeds, and look for suitable replacements.

Amplify the flower signal

Plants have evolved large flowers or clusters of smaller flowers because they attract more pollinator visits.
Large, colourful and diverse plantings attract more pollinators. Ideally, plant in groups that contain different vegetation layers — combine a species—rich mixture of wildflowers, ground—covers, herbs, lilies, rushes, climbers, shrubs and trees.

Connectivity counts

Insect pollinators benefit from greater connectivity of habitat in a landscape, which allows them to forage over a wider radius and increase in numbers in a local area. Encourage friends and neighbours to plant for pollinators and create connections in your community.

Get to know your local flora

Your local government area has distinct populations of insects, depending on the local flora and environment.

Knowing your local insect species will help you develop better plantings.

The plants growing in nearby nature reserves or bushland will be suited to your climate and soils. Local environment groups and specialist native nurseries can provide information about local plants.

Grow a bumper crop

Pollinator-attracting plants include many fruits and vegetables grown in backyards, community and market gardens, and orchards. Pollinators ensure good yields of crops such as apples, beans, avocado, and almonds, and bush foods such as yam daisy.

Reduce chemical use

Insecticides, fungicides and herbicides, even 'natural' products, all affect pollinator health. Herbicides can reduce or eradicate the availability and diversity of flowers, and plants that support insect life. Most insecticides are non-specific, killing both beneficial insects and pests.

There are other means of protecting plants, such as with approved netting, and pest-repellent plants like marigolds and lavender.

When pollinators are allowed to flourish, they help control pest insects. Consider wildflowers instead of lawn, or let dandelions flower instead of mowing or spraying.

If chemical usage is unavoidable, choose low impact, non-systemic products, and apply when pollinators are less active. Always follow directions.

Safeguard the bees? The best way to 'save the bees' and protect our pollinators is to create an abundance of diverse habitat — from the ground up! There is much interest in keeping a bee hive to promote pollinators, but there are serious legal and biosecurity responsibilities that must be considered, and that the introduction of a bee hive does not displace existing native pollinators and insects. Be a friend of pollinators and say it with flowers!

A guide to planting for pollinators for Bilpin, Blue Mountains



Healthy populations of insect pollinators are important for sustainable and resilient farms, orchards, gardens, and native flora.

This Guide will help you select plant species to attract and sustain pollinators For each species, the planting Guide lists: in agricultural areas and gardens throughout the year.

The Bilpin region, in the Blue Mountains bioregion of New South Wales, is defined by sedimentary soils and sandstone plateaux, and undulating topography, punctuated by rocky gorges and outcrops. Climate is cool to cold (occasional frosts and snowfall at altitude) in winter, with mild to warm summers. Vegetation communities include open woodlands and heathland, as well as escarpment and riparian (streamside) communities, open forest and rainforest.

The plants listed in this Guide will help supply rewards to pollinators, with an emphasis on species that are indigenous and suited to local climates.

Garden centres sell many common pollinator-attracting ornamental flowers later flowering. and herbs labelled as 'bee-friendly'.

The eucalypt species in this Guide are mostly large trees, and not suitable for all Most of the plant species listed are gardens, but have been included for their value as good nectar producing species. nurseries or native plant growers, and Most eucalypts do not flower every year, local environment groups. If you can't so choosing diverse species will help create continuously flowering habitat.



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The pollinator plant list

To create pollinator-attracting plantings, use the Guide to choose a selection of plants with a variety of flower colours, different growth habits and a range of flowering seasons.

- life-form/'habit' (climber, herb, shrub or tree) and height (m).
- the vegetation type in which they naturally occur
- flower colour and flowering season
- growth requirements (sun/shade,
- insect groups that may visit each plant and the floral reward (pollen and/or nectar).

The coloured bars indicate the flowering months for each species. Darker shading denotes the peak flowering period, with a lighter shading for non-peak flowering months. Flowering dates may differ between regions and seasons, particularly for non-peak times, if your local climate is consistently warmer or cooler than average, with earlier or

Sourcing plants

available from retail or wholesale source these plants at your local garden centre, or indigenous nursery, ask them to contact the local wholesale nursery suppliers and plant growers listed online. See the reverse of the Guide for details.

Lifeform	Common name	Scientific name	Family	Vegetation type	Height	Flower colour		Flower Jan Feb Mar Apr May Jun		Oct Nov Dec	Aspect	Soil moisture	Pollinator Pollen		ative bees	Honey bees		o <mark>n by pol</mark> l Wasps		Moths J	Beetles	Flies
Bilpin								Jan 100 mai 761 may Jan	jai riag cop	oci nov bec			1 011011	riceral II	anve bees	Honey Bees	11010111100	Маоро	Barrermes	74101110	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1 1100
Climber	Purple Twining Pea	Hardenbergia violacea	Fabaceae	Woodland, Forest	> 3 m	Mauve					Sun	Well drained	•	•	•	•						
Climber	Dusky Coral Pea	Kennedia rubicunda	Fabaceae	Woodland, Forest	> 3 m	Red	•				Part sun	Well drained	•	•	•							
Forb	Toothed Lobelia	Lobelia dentata	Lobeliaceae	Woodland, Forest	0.4 m	Blue Purple					Semi-shade	Well drained	•	•			•					
Forb	Leafy Purple Flag	Patersonia glabrata	Iridaceae	Heath, Woodland	0.5 m	Pale Violet	•				Sun to semi-shade	Well drained to moist	•	•			•				•	
Forb	Yellow Paper Daisy / Golden Everlasting	Xerochrysum bracteatum	Asteraceae	Forests	0.2-0.7 m	Yellow					Sun	Well drained	•	•			•	•	•	•	•	•
Herb	Blueberry Lily / Blue Flax Lily	Dianella revoluta var. revoluta	Liliaceae	Forest, Woodland	0.7 m	Blue-violet, Stamens Yellow					Semi-shade	Moist well drained	•	•	•							
Herb	Vanilla Plant / Rush Lily	Sowerbaea juncea	Asparagaceae	Heath	0.45 m	Purple, Yellow	•				Sun to semi-shade	Wet, intermittently waterlogged	•	•	•				•	•	•	
Shrub / Small	Blue Dampiera	Dampiera stricta	Goodeniaceae	Open forest, Heath	0.5 m	Blue, Purple					Sun to semi-shade	Well drained	•	•	•		•				•	•
Shrub / Small	Rough Guinea Flower	Hibbertia aspera	Dilleniaceae	Forest, Woodland, Heath	0.6 m	Yellow					Sun to semi-shade	Well drained to moist	•	•			•				•	•
Shrub / Small	Trailing Guinea Glower	Hibbertia empetrifolia	Dilleniaceae	Open forest, Heath	0.4 m	Yellow					Sun	Well drained	•	•			•				•	•
Shrub / Medium	Prickly Moses	Acacia ulicifolia	Fabaceae	Open forest, Woodland	2 m	Yellow					Sun	Well drained	•		•	•	•	•	•	•	•	•
Shrub / Medium	Hairpin Banksia	Banksia spinulosa	Proteaceae	Woodland	2 m	Yellow, Hooks Dark Red/black					Sun	Well drained	•	•	•	•	•	•	•	•	•	•
Shrub / Medium	Dogwood / Dollybush	Cassinia aculeata	Asteraceae	Forest, Woodland, Heath	2 m	White	0				Sun to semi-shade	Moist well drained	•	•			•		•	•	•	•
Shrub / Medium	Parrot Pea (eggs & bacon)	Dillwynia elegans	Fabaceae	Woodland, Dry heath	1.5 m	Yellow & Red					Sun	Well drained	•	•	•	•	•	•	•	•	•	•
Shrub / Medium	Wallum Heath	Epacris pulchella	Ericaceae	Woodland, Heath	1 m	White to Pink					Semi-shade	Moist well drained	•	•	_		_		•	•	•	•
Shrub / Medium	Broad-leaf Wedge Pea	Gompholobium latifolium	Fabaceae	Woodland, Forest	2 m	Yellow					Sun	Well drained	•	•	•	•	•	•	•	•	•	
Shrub / Medium Shrub / Medium	Hop Goodenia Silky Grevillea	Goodenia ovata Grevillea sericea	Goodeniaceae Proteaceae	Forest Woodland, Forest	1 m	Yellow Pink					Sun to semi-shade	Well drained Well drained	•		•	•			•		•	•
Shrub / Medium Shrub / Medium	Grey Spider Flower	Grevillea sericea Grevillea sphacelata	Profeaceae	Woodland, Forest	2 m	Light Pink					Sun	Well drained		•	•		•		•		•	
Shrub / Medium	Native Indigo	Indigofera australis	Fabaceae	Woodland	1.5 m	Mauve					Semi-shade	Well drained			•				•			•
	White Beard / Lance-leaf	J.										to moist Well drained				•	•					
Shrub / Medium Shrub / Medium	Beard Heath Narrow-leaved Geebung	Leucopogon lanceolatus Persoonia linearis	Ericaceae Proteaceae	Forest, Rainforest margins Forest, Woodland	2 m	White Yellow					Semi-shade Sun to semi-shade	to moist	•	•			•	•	•	•	•	•
												Well drained					_					
Shrub / Medium	Slender Rice Flower	Pimelea linifolia subsp. linoidea	Thymelaeaceae		2 m	White					Sun to semi-shade	to moist	•	•			•				•	•
Shrub / Medium	Rough Bush Pea	Pultenaea scabra	Fabaceae	Open forest	1 m	Yellow & Red					Sun	Well drained	•	•	•	•	•	•	•	•	•	•
Shrub / Medium	Pill Flower / Ball Everlasting / White Dogwood	Ozothamnus diosmifolius	Asteraceae	Open forest	2 m	White	0				Sun to semi-shade	Moist well drained	•	•			•		•	•	•	•
Shrub / Large	Sydney Golden Wattle	Acacia longifolia	Fabaceae	Open forest	2–5 m	Yellow	0				Sun	Well drained	•		•	•	•	•		•	•	•
Shrub / Large	Flax Wattle	Acacia linifolia	Fabaceae	Open forest	2–4 m	Yellow					Sun	Well drained	•		•	•	•	•	•	•	•	•
Shrub / Large	Graceful Bush Pea Parramatta Wattle /	Pultenaea flexilis	Fabaceae	Open forest	3 m	Yellow					Sun	Well drained	•	•	•	•	•	•	•	•	•	•
Tree / Small	Sydney Green Wattle	Acacia parramattensis	Fabaceae	Open forest , Woodland	1.2 m	Yellow					Sun	Well drained	•		•	•	•	•	•	•	•	•
Tree / Small	Sweet Pittosporum	Pittosporum undulatum	Pittosporaceae	Shaded forest, Rainforest	1.5 m	Creamy White	<u> </u>				Sun to semi-shade			•	•	•	•	•	•	•	•	•
Tree / Medium	Turpentine	Syncarpia glomulifera	Myrtaceae	Forest, Rainforest	15 m	Cream					Sun to semi-shade			•	•	•	•	•	•	•	•	•
Tree / Large Tree / Large	Yellow Bloodwood Blue Mountains Ash	Corymbia eximia	Myrtaceae	Sandstone woodlands Woodland	20 m 40 m	Yellow, Cream White, Cream					Sun to semi-shade Sun to semi-shade		•	•	•	•	•	•	•	•	•	•
Tree / Large	Brown Stringybark	Eucalyptus oreades Eucalyptus blaxlandii	Myrtaceae Myrtaceae	Forest	30 m	White, Cream					Sun to semi-shade		•	•	•				•	•		
Broader Blue Mo		Eucury prus biaxiarian	Myriaccac	Toresi	30 111	Willie, Crediti					our to serrir strade	well didilied										
Herb	Flannel Flower	Actinotus helianthi	Apiaceae	Forest, Heath	0.5–1.5 m	White, Cream	00				Sun to semi-shade	Well drained	•	•					•	•	•	•
Shrub / Prostrate	Laurel Leaf Grevillia	Grevillea laurifolia	Proteaceae	Open forest, Woodland	0.3 m	Red					Sun	Well drained	•	•	•	•	•	•	•	•	•	•
Shrub / Small	Heathy Mirbelia	Mirbelia rubiifolia	Fabaceae	Heath, Open woodland	0.5 m	Pink-lilac					Semi-shade	Moist well drained	•	•	•	•	•	•	•	•	•	
Shrub / Medium	Pale Pink Boronia	Boronia floribunda	Rutaceae	Open forest, Heath	1 m	Pale Pink					Sun	Well drained	•	•	•	•	•	•	•	•	•	•
Shrub / Medium Shrub / Medium	Sydney Boronia / Ledum Boronia	Boronia ledifolia	Rutaceae	· ·	0.3–1 m 1 m	Pink Yellow & Red					Sun to semi-shade	Well drained Well drained	•	•	•	•	•	•	•	•	•	•
Shrub / Medium	Variable Bossiaea Hop Bitter Pea	Bossiaea heterophylla Daviesia latifolia	Fabaceae Fabaceae	Open forest, Woodland Open forest	1 m	Yellow & Red					Sun to semi-shade	Well drained	•	•	•	•	•	•	•	•	•	•
Shrub / Medium	Gorse Bitter Pea	Daviesia ulicifolia	Fabaceae	Open forest	1 m	Yellow & Red					Sun to semi-shade	to moist	•	•	•		-		•	-	•	
Shrub / Medium Shrub / Medium	Sandstone Parrot Pea	Dillwynia brunioides	Fabaceae	Upen forest Heath, Forest	1 m	Yellow & Red					Sun to semi-shade	Well drained	•	•	•				•	•	•	•
Shrub / Medium	Mountain Devil / Honey Flower	Lambertia formosa	Proteaceae	Open forest, Heath, Scrub	2 m	Red					Sun	Well drained	•	•			_		•	•		
Shrub / Medium	Large-fruited Tea Tree	Leptospermum macrocarpum	Myrtaceae	Forest, Heath	1–2 m	Pink, Red, Lemon-yellow					Sun to shade	Well drained	•	•	•	•	•	•	•	•	•	•
Shrub / Medium	Hillock Bush	Melaleuca hypericifolia	Myrtaceae	Woodland, Heath	2–4 m	Orange, Red					Sun to semi-shade	Well drained	•	•	•	•	•	•	•	•	•	•
Shrub / Large	Heath Banksia	Banksia ericifolia	Proteaceae	Scrub, Heath	6 m	Red-orange					Sun to semi-shade		•	•	•	•	•	•	•	•	•	•
Shrub / Large	Crimson Bottlebrush	Callistemon citrinus	Proteaceae	Swamp	1–2 m	Red					Sun	Well drained	•	•	•	•	•	•	•	•	•	•
Shrub / Large	Dagger Hakea	Hakea teretifolia	Proteaceae	Heath, Woodland	3 m	White	0				Sun	Well darined to moist	•	•	•	•	•	•	•	•	•	•
Shrub / Large	Tick Bush	Kunzea ambigua	Myrtaceae	Heath, Woodland, Open forest		White	0				Sun to semi-shade		•	•	•	•	•	•	•	•	•	•
Shrub / Large	Pink Tea Tree	Leptospermum squarrosum	Myrtaceae	Woodland, Shrubland, Heath	3–4 m	White to Pink	0				Sun	Well drained	•	•	•	•	•	•	•	•	•	•
Shrub / Large	Pine-Leaf Geebung	Persoonia pinifolia	Proteaceae	Forest	4 m	Yellow					Sun to semi-shade		•	•	•	•	•	•	•	•	•	
Tree / Large Tree / Large	Sydney Peppermint Narrow Leaf Peppermint	Eucalyptus piperita subsp. piperita Eucalyptus radiata	Myrtaceae Myrtaceae	Woodland Woodland	25 m 30 m	White, Cream White, Cream					Sun to semi-shade Sun to semi-shade		•	•	•	•			•	•	•	
Tree / Large	Blue Mountains Mallee Ash	Eucalyptus stricta	Myrtaceae	Woodland	50 m	White					Sun to semi-shade		•	•	•	•	•	•	•	•		
	22	223,72.32 37.63	,			=					Jan 19 don in diade		-	-		-	-	-		-		

Know your pollinators



European honey bees have two pairs of wings and long, segmented antennae. They are daytime-flying and feed on nectar and pollen. They are generalist pollinators and provide the bulk of pollination services for horticulture and crop plants. Honey bees and native bees are both essential to functioning ecosystems and food security in Australia.

Honey bees have become an important part of the Australian landscape. Honey bees live as colonies, and have a long history of coexistence with humans, including in domestic gardens.



Australian native bees comprise more than 2000 species, which provide essential pollination services. Native bees are generally solitary and live in nests in the ground or in hollow stems, old borer holes and other cracks and crevices, and some have evolved to pollinate particular native flowers through 'buzz pollination'. Although many Australian native bees are generalist foragers, some species have co-evolved with native plants and adapted to be the most effective pollinators of their flowers. Many native plant species, such as Dianella and Grevillea require specially adapted insects to access their nectar and enable the transfer of pollen to the stigma. Most native bees are solitary, but some species found in northern Australia (Tetragonula sp. and Austroplebia sp.) are social bees and are used for commercial pollination of crops like macadamia nuts.



Fly species number up to 30,000 in Australia, and can be identified by having only one pair of flight wings. A second set of wings are modified into club-shaped paddles that allow flies to hover and stabilise their flight. Unlike bees and wasps, they have very small, clubbed antennae at the front of their head. Flies, including blowflies, are often attracted to flowers that small like carrion; they generally have hairy bodies that easily collect pollen while they are feeding. Flies provide a range of services in the garden, including pollination, decomposition and predation.



Hoverflies are a type of fly, distinguishable by their large eyes, short antennae, bright black and yellow abdomen and their hovering flight behaviour. Adult hoverflies are nectar and pollen feeders. Hoverfly larvae feed on pests such as aphids, thrips and leafhoppers and are useful biocontrol agents.



Beetles have hard outer wings that form their distinctive beetle shape. Their outer wings form a T-shape where they join at the top, unlike bugs where the outer wings make an X- or Y-shape. Beetles feed on nectar and pollen, usually by crawling over flower surfaces. There are around 30,000 species of beetles in Australia, with many yet to be formally described.



Butterflies have wings covered in tiny scales. They have clubbed antennae and hold their wings upright when at rest. They are day-flying and have long tongues that they can use to feed on nectar in flowers with deep tubes. Butterflies are usually brightly coloured, with approximately 600 species found in Australia.



Moths also have wings covered in tiny scales and tend to be subtle in colour. They have antennae without clubs and hold their wings flat when at rest. They are generally dusk- and night-flying but there are some exceptions: the grapevine moth is a commonly seen day-flying moth. Moths feed on nectar. Australia has a high diversity of moth species, with up to 22,000 species thought to exist across the continent.

Flower forms



Generalist flowers can be pollinated by many different insects and animals. They are typically saucer shaped with many stamens and have a surface that insects can walk on. *Eucalyptus* flowers and daisy flowers are generalist flowers — they can be pollinated by bees, flies, beetles and butterflies.



Specialist flowers have modifications to their shape and size that only let certain pollinators access the nectar and pollen. These flowers might have deep flower tubes or narrow entry points so that only a select group of pollinators can access them. The advantage of specialisation is that pollination is very targeted and efficient, with accurate pollen placement made possible by co-evolution between flowers and insects. The disadvantage is that if the correct pollinator isn't there, the flowers aren't pollinated. Often, nectar is produced at the base of the flower, forcing pollinators to enter the flower fully and in the process, become covered in pollen.

Pollinator rewards

Nectar is a sugary solution, rich in carbohydrates, vitamins and minerals, produced by flowers and sometimes by glands on leaves or stems (called extra-floral nectaries). Nectar is attractive to insects, and provides an immediate energy source needed for tasks such as hunting pest insects, laying eggs in decomposing organic matter, collecting pollen, or parasitising other insects.

Carbohydrates alone don't support everything needed for health and growth, so insects also need pollen.

Pollen is rich in protein, fats and nutrients. Bees are vegetarian, and need to collect pollen to feed their offspring.

Buzz pollination

Some flowers do not produce any nectar; they specifically target pollencollecting bees, and only offer pollen rewards. To limit pollen loss and ensure effective pollination, some plants produce flowers with specialised, tubular anthers, that only open at the tip. To extract pollen, bees use vibrations to 'buzz' the pollen grains out of the pores of these anthers. Many crops are buzz pollinated, including tomatoes, potatoes, eggplants, capsicum, chillies, tomatillo and cranberries.

European honey bees are unable to buzz pollinate flowers, but several native bees, such as the blue-banded bee, and teddy bear bee (Amegilla sp.) and carpenter bee (Xylocopa sp.) are exceptionally good large buzz pollinators, and have evolved to pollinate native plants such as flax lilies (Dianella sp.). Many of our smaller, ground nesting bees utilise vibration to help them excavate their burrows, and they also

use that skill to buzz pollen from the anthers of native plants.

Planting buzz-pollinated species will encourage populations of buzz pollinators for successful pollination of food crops and ensure seed set in native plants. Many small ground nesting bees also buzz pollinate native flowers.

Nectar feeding

Grevillea flowers and other tubular flowers are often adapted to be successfully pollinated by birds. Pollen is 'presented' on a floral stigma that extends outside the flower. When birds feed on the nectar, pollen is deposited on their beaks or heads. Bees, also attracted to the sugary nectar, crawl into the side of the flower and feed on the nectar without encountering the pollen-laden stigma. The plant doesn't receive the pollination benefit from the insect, but flowers such Grevillea species can be a very useful source of nectar for insects in the cooler months.





Wholesale Nurseries

Most of the plants shown in the planting guide will be available at nurseries that have a good stock of native plants. But if your local nursery doesn't stock the plant you're after, ask them to order it in. For a list of wholesale nurseries that stock all the plants shown in the planting guide, plus other useful resources, visit the Wheen Bee



WheenBeeFoundation.ora.au/our-work/powerful-pollinators

Wheen Bee Foundation

Foundation website

or scan the QR code.

Powerful Pollinators Planting Guides are produced by Wheen Bee Foundation. We fund vital strategic research and education initiatives that strengthen bees, improve pollination efficiency, and protect our food security and ecosystem health. Visit the website for more information.

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Far left: The spreading flax lily, Dianella revoluta, is buzz pollinated.

Left: This European honey bee is 'side-working': feeding on the nectar-rich flowers without coming into contact with the plant's pollen.

Front cover:

1. Australian native bee, *Tetragonula* carbonaria foraging on apple blossom (Malus domestica). (Photo: Lisa Vella)

2. View from Govetts Leap, Blackheath, looking into the Grose Valley. (Photo: Amy-Marie Gilpin)

3. European honey bees, Apis mellifera. (Photo: Kirrily Hughes)

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