

# Biodiversity unit: Buzzing bees

## Level 3 and 4

May 2022

### About this unit

This unit provides the opportunity to discover Australian bees and create a garden attractive to bees. Students learn about pollination, and the importance to Australian food. They explore what bees require in a habitat, assess their school garden, and plan bee habitat. Planting is the final step.

This unit focuses on native plant species and bee species.

### Students will learn

- The unique characteristics of bees
- The importance of bee and plant interactions and their impact on food production
- How to make observations, describe features and identify native plant species
- How to collect and represent data
- To consider a range of factors when planning and design a bee habitat

### Suggested sequence of activities

1. Finding out about bees
2. The buzz around our school garden
3. Data analysis
4. Planning a bee garden
5. Planting a buzzing bee garden

Developed by:

**Gould League for Cardinia Shire Council**



## Victorian Curriculum links

Domain	Content description
Design and Technologies / Technologies Contexts / Materials and technologies specialisations	Investigate the suitability of materials, systems, components, tools and equipment for a range of purposes ( <a href="#">VCDSTC027</a> )
Design and Technologies / Creating Designed Solutions / Producing	Select and use materials, components, tools and equipment using safe work practices to produce designed solutions ( <a href="#">VCDSCD030</a> )
Design and Technologies / Creating Designed Solutions / Evaluating	Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment and communities ( <a href="#">VCDSCD031</a> )
Geography / Geographical Concepts and Skills / Place, space and interconnection	Identify and explain the interconnections within places and between places ( <a href="#">VCGGC073</a> )
Geography / Geographical Knowledge / Diversity & significance of places and environments	Types of natural vegetation and the significance of vegetation to the environment, the importance of environments to animals and people, and different views on how they can be protected; the use and management of natural resources and waste, and different views on how to do this sustainably ( <a href="#">VCGGK082</a> )
Mathematics / Statistics and Probability / Data representation and interpretation	Select and trial methods for data collection, including survey questions and recording sheets ( <a href="#">VCMSP178</a> )
Science / Science Understanding / Science as a human endeavour	Science knowledge helps people to understand the effects of their actions ( <a href="#">VCSSU056</a> )
Science / Science Understanding / Biological sciences	Living things can be grouped on the basis of observable features and can be distinguished from non-living things ( <a href="#">VCSSU057</a> )
English Literacy / Interacting with others	Interpret ideas and information in spoken texts and listen for key points in order to carry out tasks and use information to share and extend ideas and use interaction skills ( <a href="#">VCELY307</a> )
Health and Physical Education / Personal, Social and Community Health / Contributing to healthy and active communities	Participate in outdoor games and activities to examine how participation promotes a connection between the community, natural and built environments, and health and wellbeing ( <a href="#">VCHPEP096</a> )
Science / Levels 3 and 4 / Science Understanding / Biological sciences	Different living things have different life cycles and depend on each other and the environment to survive ( <a href="#">VCSSU058</a> )
Design and Technologies / Technologies and Society	Recognise the role of people in design and technologies occupations and explore factors, including sustainability, that impact on the design of solutions to meet community needs ( <a href="#">VCDSTS023</a> )
Design and Technologies / Technologies Contexts / Food and fibre production	Investigate food and fibre production used in modern or traditional societies ( <a href="#">VCDSTC025</a> )

# Lesson 1: Finding out about bees

## Learning outcomes

Students will find out about local bees and their place in nature. They will develop an understanding of the importance of bees for growing food and pollination.

## Resources

- Butcher's paper for brainstorming and listing facts
- Video of the bee waggle dance [www.youtube.com/watch?v=1MX2WN-7Xzc](http://www.youtube.com/watch?v=1MX2WN-7Xzc)

## Instructions

Students will brainstorm what they know about Australian bees, writing or drawing answers onto butcher's paper.

1. Divide students into small groups and provide each group with butcher's paper.
2. Give students 10-15 minutes to write down or draw everything they know about bees.
3. Explore what students wrote/drew about bees by sharing with the class. Draw out discussion with the following points:
  - When bees collect pollen, they spread it around other plants, which helps plants become fertile and release seeds, helping more flowers and fruits to grow.
  - Honey bees use a type of sign language to communicate to others when they have found a great flower patch. Buzzing about to get everyone's attention, a worker bee will wriggle her abdomen. The waggle dance communicates to the watching bees two things about a flower patch's location: the direction from the hive and the distance away. Scientists believe that each wiggle of the butt represents a roughly 50 metre distance from the hive!
  - A lot of native bees are stingless bees. They are also different to honeybees as many native bee types live alone, rather than in hives. Some dig burrows for their nests in the ground whilst others use stems or narrow holes in wood.
  - Our native bees come in different colours too – some are small and black, while neon cuckoo bees have bright blue spots, or you may see blue banded bees around Melbourne too. There are posters online that show native bee patterns and colours.
  - Blue banded bees perform a special pollination called 'buzz pollination'. Flapping their wings by the flower shakes out the hidden pollen.
4. Give students the opportunity to add any facts they learnt from their peers onto their group's butcher's paper.
5. Show the video of the bee waggle dance [www.youtube.com/watch?v=1MX2WN-7Xzc](http://www.youtube.com/watch?v=1MX2WN-7Xzc) and give the students an opportunity to try it out! There is a waggle dance challenge associated with World Bee Day on May 20 and Australian Pollinator Week in November, but you can have fun following the instructional video on performing a waggle dance anytime!  
<https://youtu.be/dnGcKjt9gT8>



**Extension:** Students can participate in the waggle dance challenge and see other school's waggle dances [www.australianpollinatorweek.org.au/about/waggle-dance-challenge/](http://www.australianpollinatorweek.org.au/about/waggle-dance-challenge/)



6. Discuss the importance of bees. Bees provide people with more than just honey. Without bees, there would be hardly any fruits and vegetables.
  - Bees are the original farmers. Pollen is moved by bees visiting different flowers, enabling pollination.
  - Stingless bees have been shown to be valuable pollinators of crops such as macadamias, mangos, watermelons and lychees. They may also benefit strawberries, citrus, avocados and many others.
  - Make a list on the whiteboard.
7. Have fun with some menu planning – with or without bees.



In Australia, honeybees somewhat or completely pollinate all the following: almonds, macadamias, blueberries, apples, cucumber, apricots, kiwi fruit, avocados, pumpkins, cherries, watermelon, lemons and limes, beans, mandarin, broccoli, mangos, carrots, pears, celery, plums, onions, soybeans, sunflower, canola and strawberries.

- As a class, put these foods into lists of breakfast, lunch and dinner, and dessert.
- See if students can plan a whole day's meals using two or more foods from the list in each meal.
- Now try planning a day's menu without any!



## Activity 2: The buzz around our school garden

### Learning outcomes

Students will explore the plant species and habitat shelters for bees already present in the school garden, drawing links between environment and species, as a first step to creating bee habitat.

### Resources

- Buzzing bees native plant species clues and buzzing bees school garden habitat audit sheet photocopy one per pair (Appendix 1 and 2)
- Pencils and clipboards for outside data collection
- Bee-attracting native plant species list (Appendix 1)
- Cardinia Shire's gardens for wildlife fact sheets: nectar plants and native insects and bees [www.cardinia.vic.gov.au/gardensforwildlife](http://www.cardinia.vic.gov.au/gardensforwildlife)

### Instructions

#### Part one - observation

Before you start, discuss what attracts bees to the garden. Explain that bees are attracted to the nectar in flowers. Native bees also need shelter, such as rotting logs or timber with holes, and water that bees can drink without drowning.



Would bees visit plants in our school garden? Have the students guess at what might be bringing bees or what could help attract them.

Discuss the importance of observation in creating a successful garden.

1. Bring students outdoors for a focusing technique: ask students to have 1 minute silent focusing on the garden and what they perceive with their senses.
2. Ask students to list what they heard, saw, whether they picked up any fragrances, etc. Make a note of all things observed, heard, smelt or felt during the minute of silence.



3. Discuss why bird sounds were or were not heard – Where do birds live? Why might they choose a tree or a bush at different times (shelter, to obtain food). Do they mean bees?
4. Were any other insects heard? Why might that be?
5. Ask what plants, colours, and fragrances were noticed.

### **Part Two – bee detectives**

Students will move from being quiet observers to being detectives using clues to look for bee habitats.



#### **Teacher note**

Define the garden space and check out the plant species there before the lesson. Take the bee-friendly species clues provided and see which of these occur in your garden.

To encourage native bees to our garden, we could provide native and nectar plants – see the Buzzing Bees Native Plant Species List for clues on what they look like. Does our garden have any places for bees already?

1. Give buzzing bees native species clues to each pair, and discuss each – Bottlebrush, gum trees, grevilleas, and tea trees. Let the students know it's not about getting it right but starting to notice what is habitat in the school garden.
2. Give a clipboard and pencil to each small group.
3. Discuss the boxes in the Buzzing Bees Habitat table.
4. Instruct students to see what plants they can find. Record the number of these plants and habitat spots in the garden. They can also note the number of flowering plants.

## Activity 3: Data analysis

### Learning outcomes

Students will collate data and use a range of methods to identify the most suitable habitat areas for bees.

### Resources

- Graph paper
- Call to action sheet (Appendix 4)

### Instructions

1. Refer to the previous activity where students gathered information, have a discussion in the classroom about what was found.
  - Did you find any gum trees? How many did each pair find?
  - How about bottlebrushes or grevilleas? Did you know these were good for providing bee nectar?
  - Did you see a tree that might be tea-tree? How could you tell?
  - Did anyone notice anything alive in or near these plants?
  - What features of these plants could help bees hide from bee-eating birds?
  - Did we all find the exact same number for each type? How do we estimate?
2. Average the class data for each species to get an estimate of what is accurate. You can then graph the data or map out the best habitat areas in an extension activity.
  - Follow up questions may include:
    - How many bee-friendly plants would we say we have in our school garden?
    - How many logs or stems might be habitat shelters?

Students can write their own pledge or promise (Appendix 4)

- We have been learning about bees. I found out that (something they have learned)
- We can help make the environment better for bees by planting... (one way they can help provide bee habitat).



## **Additional resources**

The waggle dance and how honey is made (US)

<https://beespotter.org/topics/honey/?fbclid=IwAR0QGfKny4NowrTChibrmN8pYPJdj2W97K4WKViuyINLy7DSxn41cd6pyY>

No Legs or Many–Spineless and Wild booklet [www.cardinia.vic.gov.au/insectsandbugs](http://www.cardinia.vic.gov.au/insectsandbugs)

Backyard Buddies <https://backyardbuddies.org.au/backyard-buddies/native-bees/>

Aussie Bees - 10 Favourite flowers loved by Bees and MUCH MORE

[www.aussiebee.com.au/flowerslovedbybees.html](http://www.aussiebee.com.au/flowerslovedbybees.html)

Aussie Bees – Bees in your area [www.aussiebee.com.au/beesinyourarea.html](http://www.aussiebee.com.au/beesinyourarea.html)

Australian Guide to Garden Wildlife, by Bob Winters, Gould League

[www.gould.org.au/product/australian-guide-to-garden-wildlife/](http://www.gould.org.au/product/australian-guide-to-garden-wildlife/)

## Activity 4: Planning a bee garden

### Learning outcomes

Learn about the importance of native plants, and native bee species.

### Resources

- The buzz about bees fact sheet for students
- Plan of the schoolground.
- Paper and markers for students to use to design their own bee habitat.
- Buzzing bees native plant species clues (Appendix 3)
- Cardinia Shire's gardens for wildlife fact sheets: nectar plants and native insects and bees [www.cardinia.vic.gov.au/gardensforwildlife](http://www.cardinia.vic.gov.au/gardensforwildlife)
- Cardinia Shire has indigenous plant nurseries that can help your school with plants and advice for a bee attracting garden [www.cardinia.vic.gov.au/gardensforwildlife](http://www.cardinia.vic.gov.au/gardensforwildlife)

### Instructions

This lesson gives students the opportunity to consider what is required in a bee friendly habitat and to help map a potential site in the schoolground, considering plant requirements. Students will draw on the previous discussion about the importance of honeybees and native bees in helping grow food.

Native bees work perfectly in Victoria's ecosystem. Some native plants can only be pollinated by native bees! Meaning everything that depends on that plant, also needs the native bees for survival.

To bring bees to our garden and give them more habitat, you will need to plant flowers that bees love.



1. If you are going to design an area in the schoolground that bees might like to live in, what do you need to provide for them?
  - Make a list of all the important elements that would need to be available in a habitat suitable for bees.
  - Note the 5 aspects of habitat are: water, air, shelter, food and friends/mates.
  - Ask the students for suggestions about the position of the garden and what new plants might be needed.

### Discussion points

- The plant types for the garden
  - Sunlight and watering needs
  - Ideal location.
2. Give students a map of the garden area showing areas of full and partial sun, and letting them sketch out plans for the design of the garden. They may want to use both words and pictures to describe their ideas and to show what they understand about bee habitats.
  3. Students are invited to share their designs, and to explain the choices they have made in their design. Compare and discuss their ideas.
  4. Make a display of the student's designs in the classroom.





## Activity 5: Planting a buzzing bee garden

### Learning outcomes

Plant and maintain a garden that provides biodiversity.

### Instructions

- Inform the students of the proposed planting site, and why it was chosen.
- Run through the expectations of the planting activity, such as staying within boundaries, taking turns with equipment, and being gentle with the plants.
- Give instructions on digging a hole slightly bigger than the plant, and gently teasing roots first.
- Students can plant in groups of two, so that one person can dig and the other can water it in.
- Students can also place the habitat logs and set up bee-friendly water bowls, with some pebbles and branches to help the bees in and out without drowning.
- If mulch is available, students can place mulch after plants have been watered in.
- Take photos before and after so they can see the difference.

### Follow up

Visit the planting site. Check the plants are watered regularly according to their needs, but not overwatered. The class may like to compare to their original datasheets to the number of plants now in the garden.



Students can track the progress of plants and bee life, as well as observations of bird and butterfly species.

Discuss 'biodiversity', and how providing different plants helped invite and protect different bee species, including native bees.



Publish 'before' and 'after' photos in the school newsletter to show achievements.

In warmer months, you can check water is available for bees in the water bowls.

Find out if there is a local Landcare Group or a "Friends of" group of a local park or wetland area nearby. These groups often have great expertise and enthusiast volunteers who might possibly be an ongoing source of advice for maintenance and problem-solving needs that might arise too.

### Teacher note

Planning the garden

- In offering potential sites, consider if the proposed space is too close to a playground or early years play area.
- Refer to *How to plant a bee-friendly garden* [www.aussiebee.com.au/bee-friendly-garden.html](http://www.aussiebee.com.au/bee-friendly-garden.html)
- Grevilleas and bottlebrush are considered fast growers. Consider asking for fast growing flowers, shrubs and grasses from the local indigenous nursery. [www.abc.net.au/everyday/native-australian-plants-for-your-garden/11589742](http://www.abc.net.au/everyday/native-australian-plants-for-your-garden/11589742)
- Designate areas for plant species, planting according to needs for sun and shade.

### Organising planting day

- Choose a dry day for planting, but water the plants the day before.
- Plan for extra supervision on planting day by inviting members of your local Landcare or 'Friends of ...' groups. Some may even be able to lend gloves or trowels. Otherwise, parent helpers may like to guide students in planting
- Think of an appropriate role for each student, giving extra supervision to planters where helpful
- Take 'before' and 'after' photos of the bee garden – use in school newsletter, etc



### Other considerations

- **Bees can cause anaphylaxis.** Ensure no students are allergic to bees before starting bee activities.
- **Know first aid for bee stings, insect bites and anaphylaxis.**
- Keep (or make) plant name tags to help identify as the plants grow.
- Consider communications to the school newsletter, leadership and school gardeners regarding no pesticides near the bee garden.

### Additional resources

Give native bees a home in your garden with these easy DIY bee hotels | Gardening Australia  
[www.youtube.com/watch?v=EbFAKiP09s0](http://www.youtube.com/watch?v=EbFAKiP09s0)

Indigenous wildflowers of Casey and Cardinia [www.casey.vic.gov.au/sites/default/files/user-files/Indigenous%20Plant%20Guide%20Casey%20and%20Cardinia.pdf](http://www.casey.vic.gov.au/sites/default/files/user-files/Indigenous%20Plant%20Guide%20Casey%20and%20Cardinia.pdf)

List of local indigenous plant nurseries

[www.cardinia.vic.gov.au/downloads/download/359/local\\_indigenous\\_plant\\_nurseries\\_-\\_cardinia\\_shire\\_council](http://www.cardinia.vic.gov.au/downloads/download/359/local_indigenous_plant_nurseries_-_cardinia_shire_council)

Cardinia Shire's gardens for wildlife fact sheets:

[www.cardinia.vic.gov.au/downloads/download/606/gardens\\_for\\_wildlife\\_fact\\_sheets\\_-\\_cardinia\\_shire\\_council](http://www.cardinia.vic.gov.au/downloads/download/606/gardens_for_wildlife_fact_sheets_-_cardinia_shire_council)

## Appendix 1: Bees attractive species list

Common name	Species name
River Red Gum	<i>Eucalyptus camaldulensis</i>
Mealy Stringybark	<i>Eucalyptus cephalocarpa</i>
Messmate	<i>Eucalyptus obliqua</i>
Swamp Gum	<i>Eucalyptus ovata</i> var. <i>ovata</i>
Gippsland Manna Gum	<i>Eucalyptus viminalis</i> subsp. <i>pryoriana</i>
Manna Gum	<i>Eucalyptus viminalis</i> subsp. <i>viminalis</i>
Myrtle Wattle	<i>Acacia myrtifolia</i>
Sweet Wattle	<i>Acacia suaveolens</i>
Silver Banksia	<i>Banksia marginata</i>
Hairpin Banksia	<i>Banksia spinulosa</i> var. <i>cunninghamii</i>
Common Correa	<i>Correa reflexa</i> var. <i>reflexa</i>
Furze Hakea	<i>Hakea ulicina</i>
Purple Coral-pea	<i>Hardenbergia violacea</i>

Images and details on these bee loving trees can be found in Council's online indigenous plant guide [www.cardinia.vic.gov.au/indigenousplantguide](http://www.cardinia.vic.gov.au/indigenousplantguide)

Other bee loving species can be found at [www.aussiebee.com.au/flowerslovedbybees.html](http://www.aussiebee.com.au/flowerslovedbybees.html)

## Appendix 2: Buzzing bees school habitat audit sheet

Best to be used in conjunction with Council's online indigenous plant list  
[www.cardinia.vic.gov.au/indigenousplantguide](http://www.cardinia.vic.gov.au/indigenousplantguide)

Native plant	No.	Flowering plant	No.	Shelter for homes	No.
Bottlebrush		Clover		Log with holes	
Eucalyptus		Daisy bush		Timber with holes	
Grevillea		Sage		Plant with hollow stems	
Tea tree		Lavender			
Melaleuca		Mint			
Other:		Other:			

## Appendix 3: Native plant species clues



*Callistemon Citrinus Kings Park Special*

**Bottlebrush.** With their familiar red flower-spikes, Callistemons are often known as bottle brushes because of their cylindrical, brush like flowers resembling a traditional bottle brush. There are 40 species found in Australia



*Grevillea* – Source: Aussie Tree Solutions

**Grevilleas** have brightly coloured, petal-less long flowers that bees and bird just love due to its ability to produce high amounts of pollen over long periods of time. A hallmark of all grevilleas, however, is that they all need well-drained soil in order to flourish. There are over 350 species which are endemic to Australia.



*Yellow Box Eucalyptus Meliodora*

**Eucalyptus GUM TREES.** There are over 700 species. Look for trees or shrubs with gum leaves and gumnuts. Yellow Box is one of the more popular Eucalyptus gum trees that bees love.

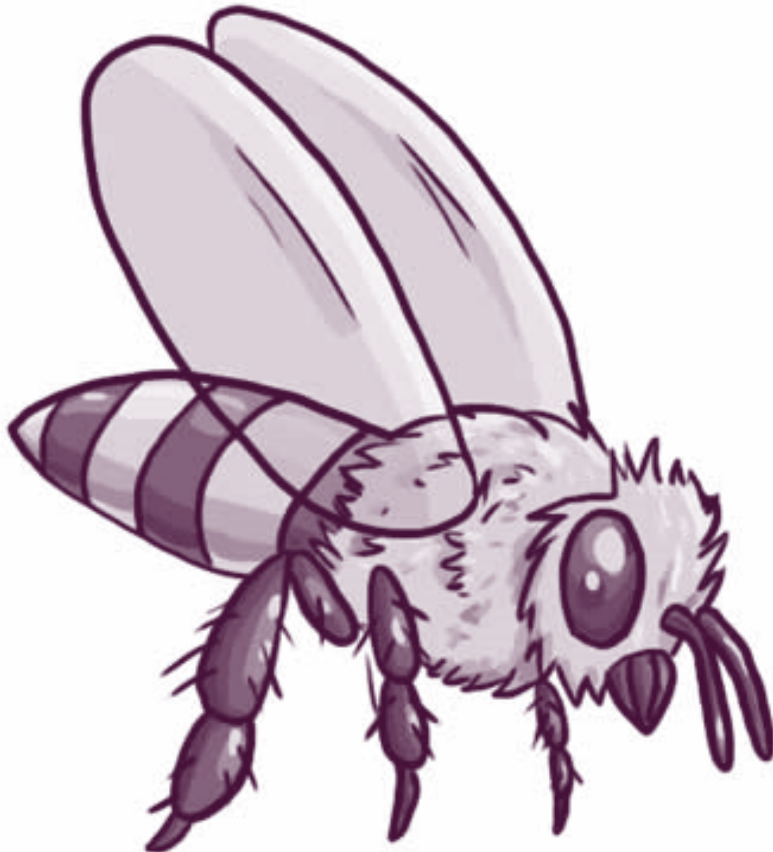


*Leptospermum 'Prickly Tea Tree'*

**Tea Tree.** Native bees as well as many other wild pollinators will flock to the cup-shaped flowers of tea trees (a member of the Melaleuca family). With papery layered bark, tea trees range in size from small trees to prostrate shrubs. Melaleuca is a genus of nearly 300 species of plants in the myrtle family.

## Appendix 4: Call to action

We have been learning about bees. I found out that...



I will help make the environment safer for bees by...