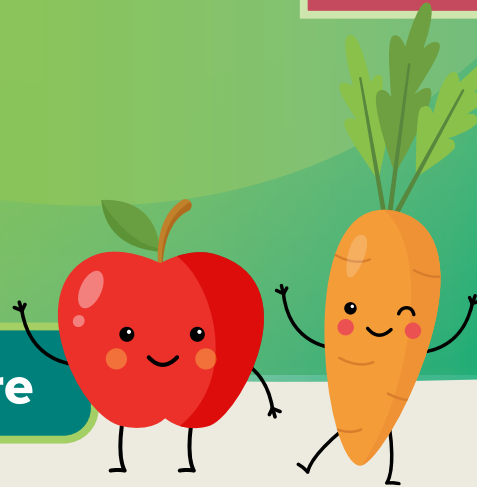




YEAR F-6

Powerful Pollinators

Hands-on Horticulture



In collaboration with Hort Innovation, Primary Industries Education Foundation Australia (PIEFA) has developed a series of practical scientific investigations exploring Australian grown fruit and vegetables.

The **Hands-on Horticulture** resources have been designed to engage students in hands-on Australian Curriculum aligned investigations that explore Australian grown fruit and vegetables. The resources incorporate science understanding and science inquiry skills to provide meaningful learning experiences for primary-aged students. Each resource contains guidance for a teacher-led lesson to be completed in the classroom, along with a **'Take me Home!'** extension activity for students to consolidate their scientific investigation and explore the production of fruits and vegetables.

During this practical activity students will explore the role of bees as pollinators in Australia's horticulture industry.



This resource has been developed by:

Background information

Pollination is the process by which pollen from the male part of a flower (the anther) is transferred to the female part of the flower (the stigma). This process is crucial for fertilisation and the subsequent development of seeds and fruit.

Bees are significant to Australia's horticulture industry because they help flowering plants to reproduce by moving pollen from one part of a flower to another. This process is called **pollination**. Many crops, like fruits, nuts, and vegetables, depend on bees to pollinate them so they can produce the foods we eat. Without bees, many of the foods we enjoy would be much harder to grow and could become more expensive and less available. In Australia, bees play a key role in pollinating crops such as apples, almonds, and avocados, making them essential for a healthy and thriving horticulture industry.

Challenges to bee populations include loss of habitat and biodiversity as well as threats from diseases or pests such as the **varroa mite** (an introduced pest that feeds on bees, weakening them and making them susceptible to diseases).

On some Australian farms, producers hire beekeepers to bring bees each year to pollinate fruit trees and plants, while on other farms, producers rely on native bees that are local to the area to pollinate and fertilise their plants so they can begin to fruit.

The ability to transport bees between farms, states or regions for pollination, is significantly threatened by pests such as the varroa mite, as biosecurity measures are implemented to manage its spread. This has the capacity to impact the availability of fruits, nuts and vegetables.

By protecting native habitats, adhering to biosecurity measures and providing nesting and sheltering spaces for solitary bees and other beneficial insects we can contribute to the conservation of these important pollinators and support Australia's horticulture industry.

ATTRIBUTION, CREDIT & SHARING



Primary Industries Education Foundation Australia's resources support and facilitate effective teaching and learning about Australia's food and food industries. We are grateful for the support of our industry and member organisations for assisting in our research efforts and providing industry-specific information and imagery to benefit the development and accuracy of this educational resource.



While reasonable efforts have been made to ensure that the contents of this educational resource are factually correct, PIEFA and Hort Innovation do not accept responsibility for the accuracy or completeness of the contents and shall not be liable for any loss or damage that may be occasioned directly or indirectly from using, or reliance on, the contents of this educational resource.



Schools and users of this resource are responsible for generating their own risk assessments and for their own compliance, procedures and reporting related to the use of animals, equipment and other materials for educational purposes.

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LESSON

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LESSON OBJECTIVE

Students will learn about the significance of pollinators in Australia's horticulture industry.

SUCCESS CRITERIA

Students will understand the role of bees in pollinating plants for fruit and vegetable production. Students will design and build a model 'bee hotel'.

ACTIVITY LENGTH

60 minutes



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➤ **Materials (Whole class)**

- A variety of fresh, Australian-grown fruits that rely on pollination from bees
- [World Bee Day—Behind the News](#) (3:24)
- [Pollinator Audio](#) (0:16)

➤ **Materials (Activity one – Busy Bees)**

- **Worksheet 1.1a – Making a Bee**
- Scissors
- Large yellow icy pole sticks
- Black pipe cleaners
- White paper
- Black marker
- **Worksheet 1.1b – Busy Bees** (printed A3, back to back and cut out)
- Glitter

➤ **Materials (Activity two – Bee Hotels)**

- **Stimulus 1 – Bee Hotels**
- Assorted craft materials for design (e.g. straws, paper cups, cardboard rolls, pipe cleaners, cardboard boxes, paper, etc.)
- **Worksheet 1.2a – Design a Bee Hotel**

➤ **Instructions**

1. Present students with a variety of fresh, Australian-grown fruits that rely on pollination from bees (e.g. apples, pears, passionfruit, avocados, strawberries, blueberries, capsicums, squash, pumpkins, zucchinis, etc.). Facilitate a discussion to discern what students know about Australian fruit and vegetable production and the role of fruits and vegetables in a healthy diet. Ask the questions:
 - Who produces fruit and vegetables in Australia?
 - Where are different fruits and vegetables grown?
 - What is the difference between a fruit and a vegetable?
 - Why are fruits and vegetables important in a balanced diet?

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➤ Instructions (cont'd)

2. Explain that vegetables give us vitamins, minerals, and fibre. They help to keep us healthy and to keep our bodies working the way they should. Fruits are full of vitamins, natural sugars, and fibre. We should consume two servings of fruit and five servings of vegetables daily to give our bodies what they need to function and stay healthy. Remind students that although capsicums, pumpkins, zucchinis, etc., are often referred to as vegetables (due to how they are used during cooking), they are technically a fruit (as they come from the flowering part of a plant, and each contain seeds).
3. Play the audio [Pollinator Audio](#) (0:16). Invite students to turn and talk to a partner to share what they heard and what all three sounds might have in common. Explain that each of the sounds comes from a pollinator. Pollinators, particularly bees, play an important role in fruit production in Australia. Highlight that each of the fruits presented at the beginning of the lesson relies on bees for successful pollination and fertilisation. On some farms, producers hire beekeepers to bring bees each year to pollinate the fruit trees and flowering plants, while on other farms, producers rely on native bees that are local to the area to pollinate and fertilise their plants so they can be fertilised and begin to fruit.
4. Watch the video [World Bee Day—Behind the News](#) (3:24) to learn about the role of bees in pollination. After watching the video, ask students the following questions:
 - Why are bees important?
 - What happens when bees pollinate flowers?
 - What are some of the problems causing harm to bees?
 - What are some of the actions we can take to help care for bees?

Explain that since this video was filmed, the Varroa mite has made its way to Australia, and is causing challenges for the horticulture industry. Australia's biosecurity measures are helping to control the spread of this pest to ensure farmers are still able to produce the fruits, nuts, and vegetables we love to eat.

5. Gather all of the required materials for [Worksheet 1.1a – Making a Bee](#).
6. Demonstrate creating a bee model, following the steps on [Worksheet 1.1a – Making a Bee](#).
or
Allow students to collect the required materials and follow the steps on [Worksheet 1.1a – Making a Bee](#) to create a bee model independently.

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7. Reconvene as a class and present students with the blue flowers (printed double-sided on A3 paper and cut out) from **Worksheet 1.1b – Busy Bees**.
8. Place glitter on top of one blue flower and explain that this represents the flower's pollen. As bees move between flowers, they transport pollen one part of a flower to another, resulting in pollination. The pollen then grows down the female part of the flower to fertilise the ovule in the flower's ovary. This is fertilisation and causes the flower to produce seeds and the ovary to swell to produce fruit.
9. Demonstrate dipping the feet of a model bee into the glitter on a blue flower and transporting it to another flower. Flip the flower images over to reveal the fruit produced through fertilisation of the flower.
10. Gather the required materials and allocate students into groups of three to four to complete **Worksheet 1.2a – Design a Bee Hotel**.
11. Project the bee hotel stimulus images from **Stimulus 1 – Bee Hotels**.
12. Explain that each of these images shows an example of a 'bee hotel'. Bee hotels, which often consist of holes drilled into blocks of wood, bamboo tubes, or other small cavities, provide important habitats for some types of bees. Explain that not all bees live in colonies. Some bees (particularly bees native to Australia) live on their own, burrowing or nesting rather than building a hive. These bees are helpful pollinators for gardens, crops, and wild plants. By providing nesting sites for these bees, bee hotels can help support the pollination of plants, which is important for food production and maintaining biodiversity.
13. Distribute pages 1 and 2 of **Worksheet 1.2a – Design a Bee Hotel** as well as design materials to each group.
14. Students collaborate with their groups to answer the questions on the worksheet before constructing a model of their bee hotel design.
15. Reconvene as a class and allow each group to present their bee hotel, explaining their design choices. Discuss the types of materials they might use if they were building their design to scale, and where they might place their bee hotels to attract bees (e.g., in a school garden, near flowering plants, etc.). Highlight the importance of taking action to support pollinators and how small efforts like building a bee hotel can make a difference to Australia's horticulture industry.



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➤ **LEARNING AREA**

Science (Foundation-Year 2)

➤ **AUSTRALIAN CURRICULUM CONTENT**

Identify the basic needs of plants and animals, including air, water, food or shelter, and describe how the places they live meet those needs ([AC9S1U01](#))

Explore how food can be selected and prepared for healthy eating ([AC9TDE2K04](#))

Generate, communicate and evaluate design ideas, and use materials, equipment and steps to safely make a solution for a purpose ([AC9TDEFP01](#))

Identify how familiar products, services and environments are designed and produced by people to meet personal or local community needs and sustainability ([AC9TDE2K01](#))

Explore how plants and animals are grown for food, clothing and shelter ([AC9TDE2K03](#))

➤ **LEARNING AREA**

Science (Year 3-4)

➤ **AUSTRALIAN CURRICULUM CONTENT**

Explain the roles and interactions of consumers, producers and decomposers within a habitat and how food chains represent feeding relationships ([AC9S4U01](#))

Describe the ways food can be selected and prepared for healthy eating ([AC9TDE4K04](#))

Explore needs or opportunities for designing, and test materials, components, tools, equipment and processes needed to create designed solutions ([AC9TDE4P01](#))

Generate and communicate design ideas and decisions using appropriate attributions, technical terms and graphical representation techniques, including using digital tools ([AC9TDE4P02](#))

Describe the ways of producing food and fibre ([AC9TDE4K03](#))

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> LEARNING AREA

Science (Year 5–6)

> AUSTRALIAN CURRICULUM CONTENT

Investigate the physical conditions of a habitat and analyse how the growth and survival of living things is affected by changing physical conditions (**AC9S6U01**)

Explain how the characteristics of foods influence selection and preparation for healthy eating (**AC9TDE6K04**)

Investigate needs or opportunities for designing, and the materials, components, tools, equipment and processes needed to create designed solutions (**AC9TDE6P01**)

Generate, iterate and communicate design ideas, decisions and processes using technical terms and graphical representation techniques, including using digital tools (**AC9TDE6P02**)

Explain how and why food and fibre are produced in managed environments (**AC9TDE6K03**)

> References

Behind the News. (2021). *World Bee Day - Behind the News*. In YouTube.
<https://www.youtube.com/watch?v=cQr1NPwBTFQ>

Primary Industries Education Foundation Australia. (2024, May 20). Pollinator Audio. YouTube.
<https://www.youtube.com/watch?v=GCdNVIJnUgQ>



Making a Bee



EQUIPMENT

Collect these materials before you start the activity:



Three pipe cleaners
(2 x black and 1 x yellow)



One large icy pole stick



Scissors



White paper



INSTRUCTIONS

1. Wrap one black and one yellow pipe cleaner around your finger to create a two intertwined spirals.
2. Take the remaining black pipe cleaner and cut it in half using scissors.
3. Wrap one half of the pipe cleaner around the front end of the spiral to create antenna for your bee.
4. Cut wings out of the white paper and place them on top of the spiral.
5. Fold the other half of the pipe cleaner over the top of the wings and around the bottom of the spiral to create legs. (Bend the ends of this pipe cleaner to make feet for your bee).
6. Place the icy pole stick inside the spiral and use it to hold your bee as it moves from flower to flower, transporting pollen.



This resource has been developed by:



WORKSHEET 1.1b
(PAGE 1 OF 3)

Busy Bees



EQUIPMENT

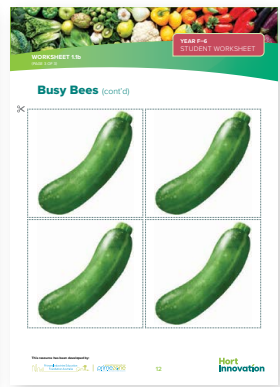
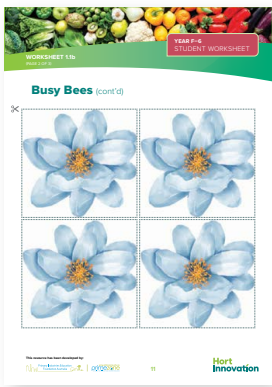
Collect these materials before you start the activity:



Scissors



Glitter



**Pages 2 and 3 of Worksheet 1.1b
(printed double-sided A3)**



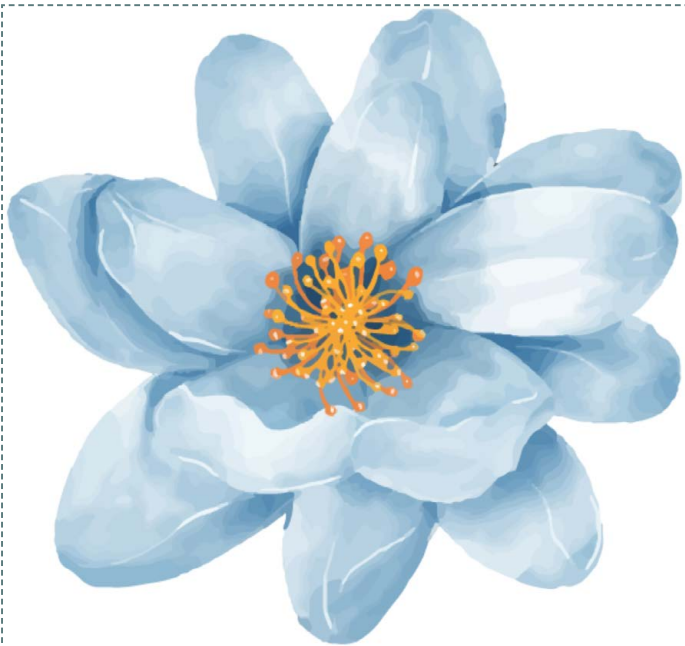
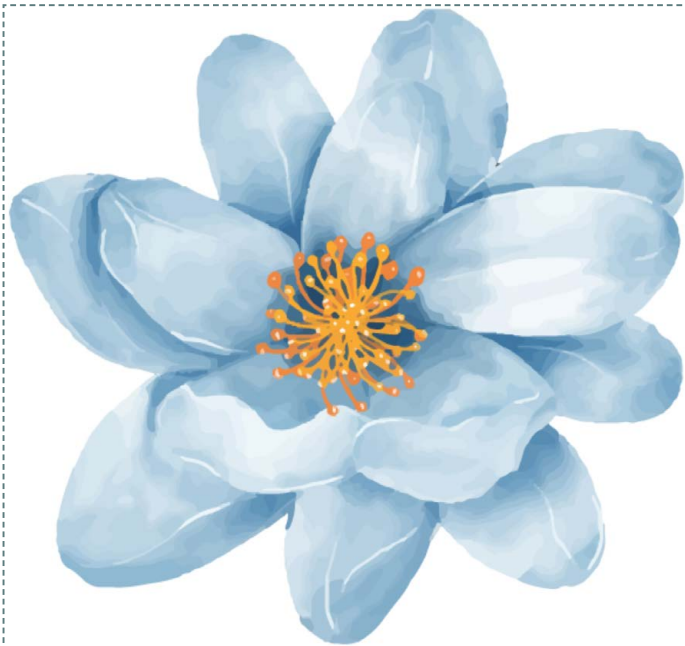
INSTRUCTIONS

1. Print the images on the following pages (double sided) onto A3 paper.
2. Cut out each flower to create a flip card with a hidden fruit.
3. Place a small amount of glitter (to represent pollen) on one of the blue flowers.
4. Demonstrate how bees pollinate the flowers by landing in the pollen (glitter) one of the blue flowers before landing on another flower, transporting the pollen (glitter).
5. When the flowers have been pollinated, flip the cards to reveal the hidden fruit they have produced.

This resource has been developed by:



Busy Bees (cont'd)

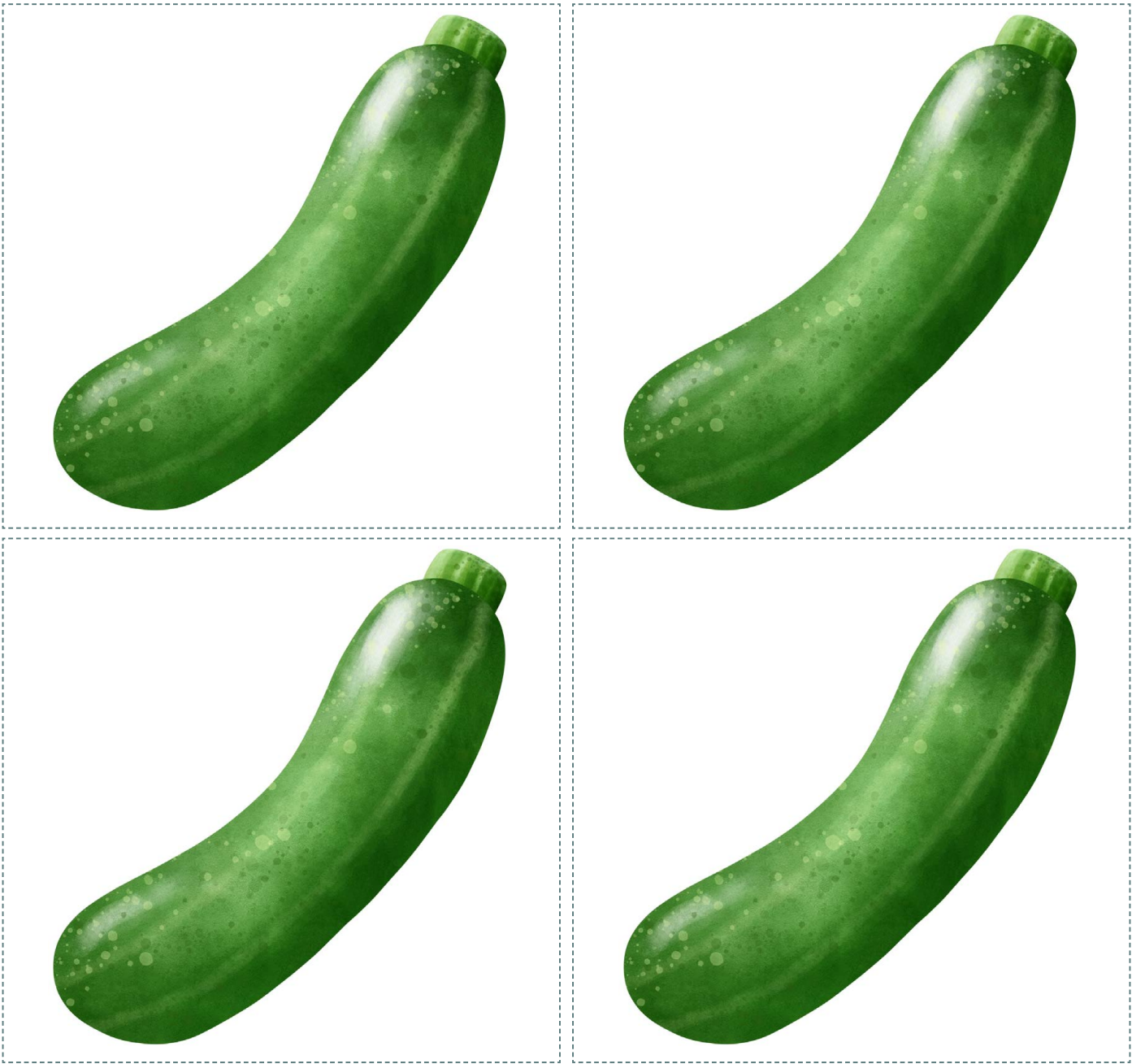


This resource has been developed by:





Busy Bees (cont'd)



This resource has been developed by:



Stimulus 1
(PAGE 1 OF 1)

Bee Hotels



This resource has been developed by:



Design a Bee Hotel



1.

Draw or list the fruits that need bees for pollination.

2.

What makes a good bee hotel?

3.

Describe the materials you will use in your design.
