YEAR 3–4

Propagation Investigation

Hands-on Horticulture

Take Me Home!

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.

Students will learn how to propagate vegetables from scraps and explore the life cycle of plants.

This resource has been developed by:

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Background information

Asexual or vegetative propagation is a type of plant reproduction that doesn't involve seeds or pollination. Instead, new plants are grown from different parts of the parent plant, such as stems, roots, or leaves. This method is useful in producing offspring that are genetically identical to the parent plant, which is helpful in the horticulture industry for quickly reproducing plants with desirable traits, consistent fruits and vegetables (e.g. apples that consistently grow to be a similar size, colour and taste) and disease-resistant plants. This process also accelerates the growth process, enhancing productivity.

Vegetative propagation allows growers to produce crops faster and more efficiently by bypassing the seed and germination stages of the life cycle. Asexual reproduction in plants leads to little to no genetic variation since it produces clones of the parent plant. In contrast, sexual reproduction in plants and animals promotes genetic diversity.

LESSON

Propagation Investigation

RISK ASSESSMENTS

Note: Schools are responsible for generating their own risk assessments for activities. Risk assessments should address the potential hazards associated with using fruits and vegetables in the classroom, including food-borne illnesses, allergies, slips/falls, and cross-contamination, and propose control measures such as proper cooking, allergy awareness, accident prevention, and hygiene practices to ensure a safe learning environment for students.

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Propagation Investigation

LEARNING AREA

Science (Year 3–4)

Design and Technologies (Year 3–4)

AUSTRALIAN CURRICULUM CONTENT

Compare characteristics of living and non-living things and examine the differences between the life cycles of plants and animals (**AC9S3U01**)

Pose questions to explore observed patterns and relationships and make predictions based on observations (**AC9S3I01**, **AC9S4I01**)

Use provided scaffolds to plan and conduct investigations to answer questions or test predictions, including identifying the elements of fair tests, and considering the safe use of materials and equipment (**AC9S3I02**, **AC9S4I02**)

Follow procedures to make and record observations, including making formal measurements using familiar scaled instruments and using digital tools as appropriate (**AC9S3I03**, **AC9S4I03**)

Construct and use representations, including tables, simple column graphs and visual or physical models, to organise data and information, show simple relationships and identify patterns (**AC9S3I04**, **AC9S4I04**)

Compare findings with those of others, consider if investigations were fair, identify questions for further investigation and draw conclusions (**AC9S3I05**, **AC9S4I05**)

Write and create texts to communicate findings and ideas for identified purposes and audiences, using scientific vocabulary and digital tools as appropriate (**AC9S3I06**, **AC9S4I06**)

Describe the ways of producing food and fibre (**AC9TDE4K03**)

References

Junior Landcare. (2021, August 16). Food Production | Propagating Food Scraps. www.youtube.com. https://www.youtube.com/watch?v=65XLATv-MeQ

Propagation Investigation

AIM

To observe and measure the growth of a propagated plant.

EQUIPMENT

Collect these materials before you start the experiment:

Kitchen scissors

Water

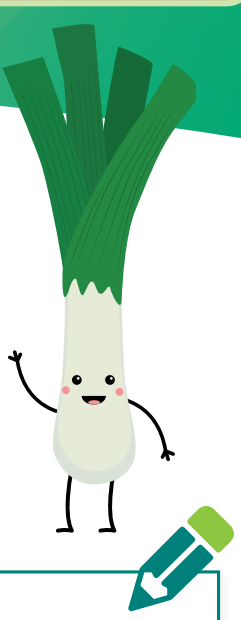
A clear container or jar

A spring onion

INSTRUCTIONS

1. View the video Food Production | Propagating Food Scraps (5:01) to learn about the propagation process
2. Use kitchen scissors to cut the leaves and the top of the stalk off the spring onion.
3. Trim the length of the roots so they will be able to sit upright in the container.
4. Set the base of the spring onion in a shallow container or jar filled with approximately 1.5cm of water. Ensure the water covers the roots without covering the entire stalk.
5. Place the container in a light area, but avoid direct sunlight, as this may be too harsh for the growing plant.
6. Change the water in the container every 1–2 days to keep it clean.
7. Observe the growth of your spring onion for 10 days. Record your observations and measurements on the following pages of the **Propagation Investigation** student worksheet.

Propagation Investigation (cont'd)



DAY 1

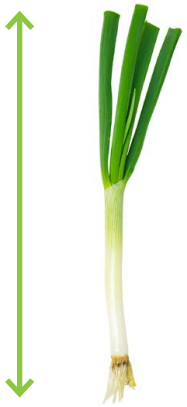
1. **Draw and label a diagram of your spring onion.**

Propagation Investigation (cont'd)

2. **Use a ruler to measure the length of the spring onion from its roots to the top of the propagated vegetable.**

Record the total length (cm).

_____



3. **Make a prediction about the length (cm) of the spring onion after ten days of growth.**

I predict the spring onion will be _____ cm after ten days of growth.

4. **Tick the boxes to show which factors could influence how much the spring onion will grow (✔).**

- ☐ Amount of sunlight
- ☐ Size of the glass/jar
- ☐ Temperature
- ☐ How often the water is changed
- ☐ Variety of spring onion
- ☐ Type of soil

5. **a)** **Measure the growth of your spring onion every day for ten days. Record the amount of growth you observe each day on the line graph on the next page.**

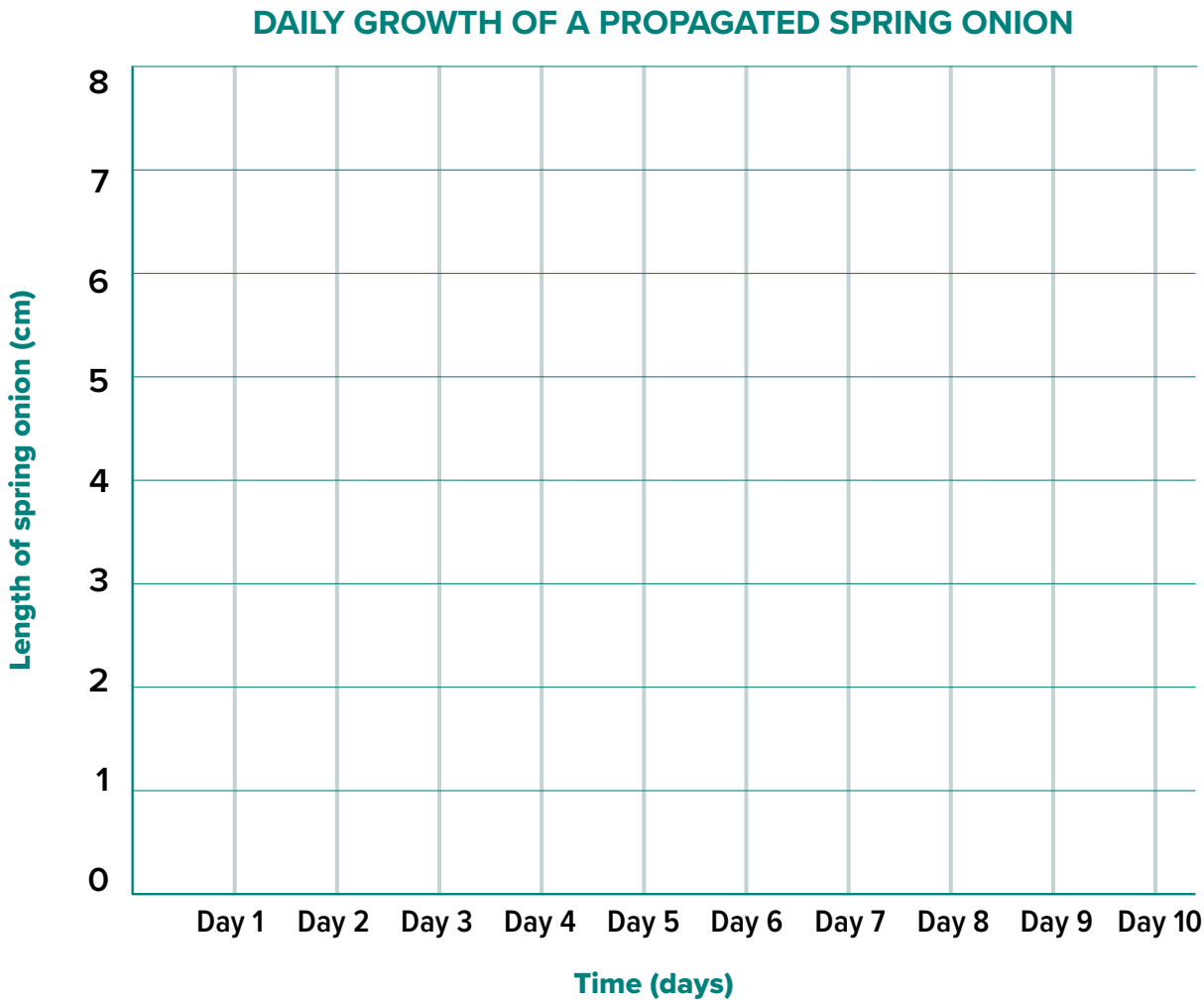
Propagation Investigation (cont'd)

5. **OR**

b) **Use the sample data in the table below to create a line graph showing the growth of a propagated spring onion over time.**

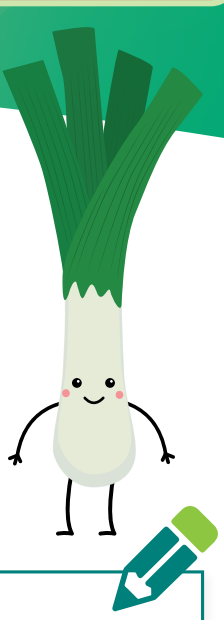
Sample data: Daily growth of a propagated spring onion

Time (days)	1	2	3	4	5	6	7	8	9	10
Length of spring onion (cm)	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5



Propagation Investigation (cont'd)

DAY 10



6. **Draw and label a diagram of your propagated spring onion.**

Propagation Investigation (cont'd)

7. **Use a ruler to measure the length of the spring onion from its roots to the top of the propagated vegetable.**

Record the total length (cm).

_____

8. **What was the total length of growth (cm) of the spring onion from day one to day ten of the experiment?**

_____

9. **What are some of the factors that might have influenced how much the spring onion grew?**

_____

_____

_____

_____

_____

_____

Propagation Investigation (cont'd)

Propagating vegetables from their scraps (cuttings) is an example of vegetative propagation. A new plant is grown using a part of another plant without starting the life cycle from a seed. A life cycle is how a plant or animal grows and changes during the time that it is alive.

10. Read the information below to learn about the life cycle of a spring onion plant (from seed).

Seed: The life cycle of a spring onion begins with a seed. Seeds have a structure inside them (called the endosperm) that contains all the nutrients they need to germinate and begin to grow. They do not need soil or sunlight to start growing, but they require warmth and moisture to germinate. During germination, the seed starts to sprout roots and a shoot.

Seedling: After germination, the spring onion enters the seedling stage. The young plants develop their first set of leaves during this phase and establish their root systems. Seedlings require consistent moisture and mild temperatures to grow successfully.

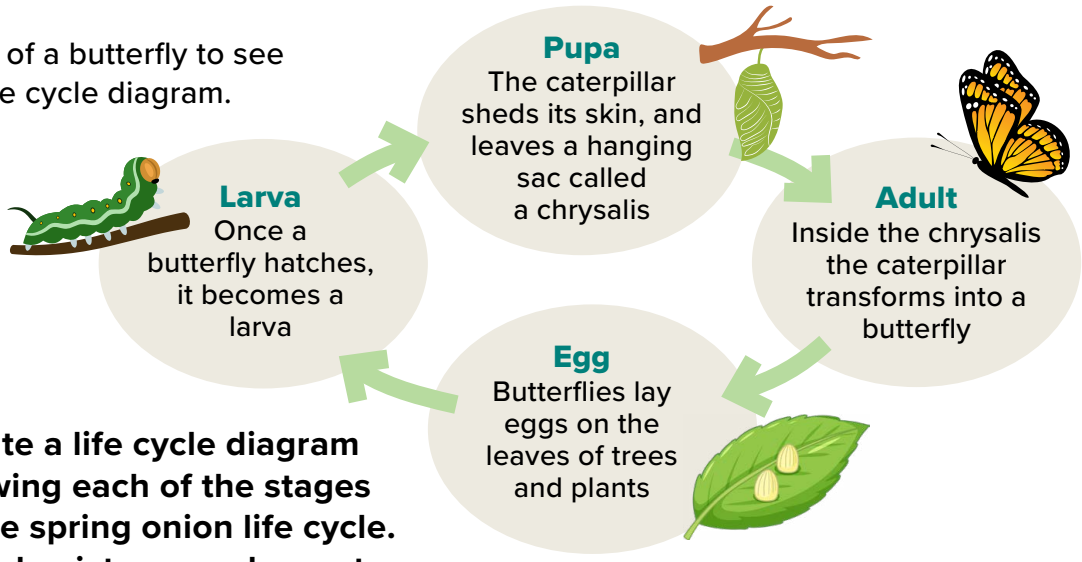
Growth: As the seedlings mature, they enter the growth stage. The plant continues to grow bigger and produce more leaves. On farms or in gardens, spring onions are usually ready to be harvested around 60 days after planting, as they have reached the best size and flavour for consumption.

Bulb formation: Unlike other types of onions, spring onions do not form large bulbs. However, they may develop small bulb-like structures at the base of the stem during the later stages of growth.

Reproduction: If left in the ground for an extended period, spring onions may enter the reproductive stage, where they produce white or purple flowers. Spring onions are able to self-pollinate, (can fertilise their flowers with their own pollen) however, they may also be pollinated by insects such as bees, which can facilitate cross-pollination between different plants. If the flowers of a spring onion plant are pollinated, they will produce seeds, which can start the spring onion life cycle again.

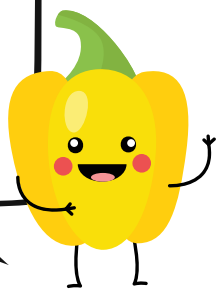
Propagation Investigation (cont'd)

View the life cycle of a butterfly to see an example of a life cycle diagram.



11. **Create a life cycle diagram showing each of the stages of the spring onion life cycle. Include pictures and a sentence describing each stage in your diagram.**

Did you know that life cycles play an important role in fruit and vegetable production because the needs of plants change as they grow from seeds (or propagated plants) into mature plants that produce fruit and vegetables? Farmers perform different jobs (operations) to care for their crops at different stages of growth.



Propagation Investigation
(cont'd)

12. Match each of the jobs citrus fruit farmers need to perform to the different stages of the orange tree life cycle.

Picking: After the flowers on the orange trees have been pollinated, they start to produce fruit. When the fruit is ripe (it has the best taste and nutritional value), farmers need to harvest it. Navel oranges are usually picked during winter in Australia, while Valencia oranges are picked in the summer months.

Pollination: Some citrus farms use bees to pollinate their orange trees so that fruit will grow. Farmers can bring bee hives onto their farms when the trees start flowering to help pollinate the trees.

Grafting: Grafting is a type of propagation used to grow new plants by joining a small branch or bud from one tree to another. Citrus farmers use grafting to attach new branches onto orange trees, which helps produce more fruit. This is more efficient than growing citrus trees from seeds because the grafted branches grow faster and produce more fruit.

Growing

Fruiting (reproduction)

Pollinating (reproduction)

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Propagation Investigation (cont'd)

Grafting is a type of propagation used to grow new plants by joining a small branch or bud (scion) from one tree to another tree (a rootstock).

Special grafting tape (a bit like a band-aid) is used to keep the branch or bud in place until the tree heals and the rootstock and scion start to grow together.

Propagation techniques, such as grafting or taking cuttings, help Australian farmers to grow plants more efficiently so they can produce greater amounts of high-quality fruits or vegetables.

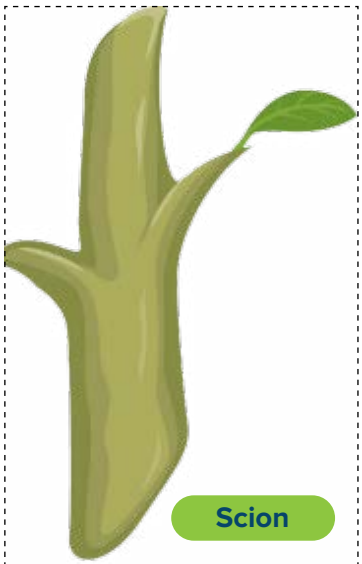
13. Cut out each of the pictures and follow the steps to graft the tree together.

a. Make a cut at the top of the rootstock where you would like the scion to grow.

b. Place the scion onto the rootstock.

c. Use grafting tape to hold the scion and the rootstock together.

d. When the rootstock and the scion have healed and started to grow together, remove the tape.



Scion

Rootstock

Grafting tape