Post-excursion resource

Keeping it Fresh

Level 3 – Level 6

Year

Grade 3 – Grade 6

Level

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Activity description

Students learn about the benefits of innovative cold storage facilities in the horticulture industry. They investigate the impacts that changing temperatures and environment have on the freshness of apples and pears. In small groups, students design an investigation method to test their scientific theories. They make predictions, conduct the investigation, collect data, analyse and interpret their results, and evaluate their findings.

Key Topics

- Cold storage
- Scientific investigation

Materials required

- 4 pieces of fruit per group (apples or pears)
- Writing materials
- Thermometer
- Mobile phone or camera for photos
- Access to 4 different environments, e.g. fridge, freezer, classroom, outdoors
- Worksheet: Cold Storage Investigation
- Worksheet: Investigation Report

Instructions

1. Discuss the following with the students:

   Apple and pear trees produce one crop per year, with picking times ranging from January through to May for apples, and January through to April for pears, depending on the variety.

   Australian growers store fruit once it's picked to ensure they maintain maximum sweetness and crispness. Once picked, it is very important to get fruit out of the heat quickly so it doesn't over-ripen. This ensures consumers get a perfectly ripe piece of fruit when they come to buy and eat it.

   Apple and pear storage facilities in Australia provide an environment where fruit can "rest" until required. Oxygen, carbon dioxide, temperature and humidity are regulated during storage so fruit can go to "sleep" to stop or slow down the ageing process.

   This enables the industry to provide quality fruit to consumers, year-round. Further information can be found in the background information.

2. Watch the YouTube clip to give students an overview of apple storage: https://youtu.be/B702UbvAauQ.

3. **THE TASK:**

   Students are to investigate the effect that different environments and temperature have on the freshness of produce. In groups of 4, they are provided with 4 apples or pears.

4. Students are to form a method of investigation that will measure the change in freshness of the apples/pears. They must place the apples/pears in 4 different environments and measure the temperature of these environments as frequently as possible.

5. Students can also take photos of the apples/pears throughout the investigation. After 4 weeks they will be able to cut their fruit up and make further analysis of the texture, taste, appearance of skin etc.

6. Using the Cold Storage Investigation and Investigation Report worksheets, students conduct their own experiments. They make predictions, record their findings, collect data and analyse their results.

7. After 4 weeks students draw conclusions, evaluate their work and can present their findings to peers.

Worksheet: Cold Storage Investigation

Student name:

Other members of your team:

Allocated tasks for each group member:

1.

2.

3.

4.

What is to be investigated?

Write it as a question.

What do you predict will happen? Explain why. Remember to use scientific language.

Apples in a cold storage facility. Photo: APAL

To make the test fair, what things (variables) are you going to:

Change	Measure or observe	Keep the same

Worksheet: Investigation Report

Describe how you will set up and conduct the investigation. Use drawings to label and explain the steps.

Use dot points to outline the equipment will you need.

Write, draw and/or take photos of your observations as you conduct the investigation over the 4 weeks.

Results

Write a statement to summarise your findings.

Why do you think this happened?

Graph your results.

Did the results match your predictions? Why/why not?

Evaluation

What challenges did you face when undertaking the investigation?

What would you change if you were doing it again?

Suggestions for assessment

Completion of the Cold Storage Investigation and Investigation Report worksheets. Ability to contribute to the group as outlined in the allocated tasks.

Curriculum links

The Victorian Curriculum

Level 3–4

Design and Technologies

Investigate food and fibre production used in modern or traditional societies (VCDSTC025).

Maths

Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values (VCMSP179).

Evaluate the effectiveness of different displays in illustrating data features including variability (VCMSP180).

Level 5–6

Design and Technologies

Investigate how and why food and fibre are produced in managed environments (VCDSTC035).

Maths

Compare observed frequencies across experiments with expected frequencies (VCMSP234).

Pose and refine questions to collect categorical or numerical data by observation or survey (VCMSP237).

Background information

Apple storage in history

Historically, one of the reasons apples have become such an important and loved fruit is because they can be kept for long periods of time before consumption.

In Europe, it was typical to keep apples in the cellar over winter where it was cool and dry so apples could be eaten all year round. Under these conditions they would retain much of their texture and flavour and not rot.

With a modern understanding of how fruit ripens we can improve upon these traditional practices and knowledge to keep our fruit perfectly ripe and ready to eat all year round.

Apple picking and storage

Apple and pear trees produce one crop per year, with picking times ranging from January through to May for apples, and January through to April for pears, depending on the variety.

With some apples, like Pink Lady, the flavour can even improve after a few months of storage because the natural acid composition changes, making them slightly sweeter.

Apple storage in Australia

Storage facilities resemble big refrigerators or coolrooms. Each individual room can be monitored depending on the type of storage control used and the variety of fruit housed there. Many types of fruit, including apples and pears, are kept in storage before consumption to keep them in good condition.

There are three ways growers store apples in Australia:

- cold storage or regular atmosphere storage (RA)
- controlled atmosphere storage (CA)
- SmartFresh™.

Cold storage

Cold storage, also known as regular atmosphere (RA) storage, is used to store fruit for short periods of time once it's picked. Bins of picked fruit come in from the orchard and are put straight into the coolroom to maintain fruit temperature at approximately 1°C and humidity at around 85 per cent.

Controlled atmosphere storage

Controlled atmosphere (CA) storage uses the same temperature and humidity systems as cold storage. It also adjusts the oxygen and carbon dioxide levels in the room to slow the fruit ripening process. Fruit can be stored in controlled atmosphere facilities for a short, medium or long-term period of up to 12 months.

SmartFresh

SmartFresh is a product that fruit growers can put inside coolrooms – both regular atmosphere and controlled atmosphere – to maintain the ideal conditions to control ripening. SmartFresh contains the ingredient 1-MCP, which is similar in structure to ethylene – a natural compound that is involved in fruit ripening. When SmartFresh is applied in the coolroom, it naturally slows the production of ethylene by the fruit until it is taken out of cold storage. Once the fruit is removed from cold storage, regular ripening continues. SmartFresh biodegrades naturally and there is no residue left in or on the fruit.

SmartFresh also helps to slow down the decline in vitamin C that starts to occur after an apple is harvested, therefore helping to maintain better vitamin C content in apples.

"Fresh" apples?

The term "fresh" is used in many different ways to describe fruit.

To some, fresh fruit means a piece of fruit that has been picked straight from the tree and eaten very shortly after. To others, a fresh piece of fruit is one that has not been processed – for example it is not dried or preserved – and is instead a whole piece of fruit as it was when picked. Fresh can also denote the nature or quality of a piece of fruit, so that if an apple is crispy, juicy and tasty, some people would say it is fresh.

This can be confusing because when one person says fresh to describe a piece of fruit – it can mean something very different to another person.

Consumer guide to buying apples

If you want to eat apples when they are in season, then you need to keep an eye out for when different varieties of apples are picked, because you are most likely to find an in-season apple in shops soon after it has been harvested.

If you love eating delicious, crisp and tasty Australian-grown apples all year around then just look for the Aussie Apples sticker on your apples to ensure they are Australian grown. You can buy Aussie apples any time of the year – although some apples go out of stock because they are so popular and there are none left in storage so you have to wait until the next season!

The best place to keep your apples after you buy them is in the fridge – this keeps them cool so they stay juicy, crisp and fresher for longer.

Compared to other snack foods, apples are very healthy and nutritious and contain no artificial flavours or preservatives.

Reference: https://apal.org.au/storing-apples/