POD TO PLATE PROGRAM

vegepod®

Grow Your Food

SproutHIGH

SproutHigh

POD TO PLATE PROGRAM

Contents

Pod to Plate Program

Pod to Plate Program for Vegepod

Stage 4 | Technology

Vegepod's SproutHigh learning unit has been co-designed and developed in partnership with Brianna Callum, NSW Agriculture teacher.

Summary of program

The focus of this program targets technology and sustainability in the agriculture and food production sphere. This will be achieved by utilising the 'Vegepod' garden design system.

This program can be adjusted to suit each school's needs in terms of duration and timing. It addresses several outcomes across Agriculture Technologies, Food Technologies and Material Technologies.

Students will use the Vegepod system to grow a variety of foods that they will then use to create a meal that is either culturally relevant or meets the nutritional needs of growing adolescents.

Duration of program

This program has been designed to allow flexibility in terms of delivery.

Depending on the structure of the school's whole technology program, it can be taught across either one or two terms.

Outcomes to be achieved

TECHNOLOGY K-10

- TE4 1DP designs, communicates and evaluates innovative ideas and creative solutions to authentic problems or opportunities
- TE4 2DP plans and manages the production of designed solutions
- TE4 3DP selects and safely applies a broad range of tools, materials and processes in the production of quality projects
- TE4 5AG investigates how food and fibre are produced in managed environments
- TE4 6FO explains how the characteristics and properties of food determine preparation techniques for healthy eating
- TE4 10TS explains how people in technology-related professions contribute to society now and into the future

Vegepod's Sprout High learning unit has been co-designed and developed in partnership with Brianna Callum, NSW Agriculture teacher.

PART ONE

Content (NESA)

STAGE 4 - Agriculture and Food Technologies

Identifying and defining

- investigate the importance of food and fibre production for Australia's food security and economy including Asia's imports and exports (ACTDEK029)

Researching and planning

- investigate ideal conditions for growth and development of an agricultural plant or animal (ACTDEK032)
- acquire and interpret data, for example: (ACTDIP025, ACTDIP026)
  - › local environmental and/or physical conditions, eg rainfall, temperature
- research legal and ethical requirements associated with agricultural production, eg biosecurity

Classroom, learning and assessment

What are the requirements of Plants?

Students will learn about the key requirements of plants. Plants are unique in that they produce their own food through the process of photosynthesis.

When growing plants for food consumption, students need to consider:

- availability of water
- availability and amount of sunlight
- growing medium
- nutrient access and availability
- climate.

The local area - Identifying climate and plant varieties specific to climate:

Students will need to investigate their local climate to determine what plants they will be able to grow in their system.

Students will research their local area to determine the climatic conditions they will experience at school.

Optional activity:

Students could collect data such as wind speed, sunlight availablility, humidity, rainfall, temperature. They can then comapre their data with what they have researched and determine similarities and differences from previous years.

Importance of food and fibre in Australia

Students will learn about what products Australia exports overseas, where they are exported to and the importance of our exported fruits and vegetables to our overall economy. Students will also learn about the importance of biosecurity and the associated legal requirements.

Teaching resources

What are the requirements of plants?

Requirements of Plants Teacher Notes + Activities.

The local area - Identifying climate and plant varieties specific to climate:

Local Climate Worksheet.

Importance of food and fibre in Australia

Exports and Imports of Australia Worksheet.

Biosecurity Worksheet.

PART TWO

Content (NESA)

STAGE 4 - Agriculture and Food Technologies

Producing and implementing

- produce and implement an agricultural project and/or produce nutritious food (ACTDEP039)
- select, justify and use a range of appropriate tools and techniques in an agricultural project and/or food preparation (ACTDEK037)
- identify and apply safe and ethical work practices, for example:
  - › correct use of tools and equipment

Classroom, learning and assessment

Vegepod set up and design:

Students will use the instructions provided to build and set up their Vegepod system in teams.

Students can be assessed practically and given awards for:

- Ability to work in a group.
- Ability to think critically and problem solve.
- Most efficient build.

Teacher note:

If schools do not wish to pull apart the Vegepod systems term to term or semester to semester, one system could be used as a demonstration pod each term/semester, to meet structural and design requirements.

Alternatively students could learn about tools and techiniques used by different types of food production systems including topics such as identification, selection and safety.

Teaching resources

Vegepod set up and design:

Vegepod Assembly Guides

Vegepod Video: Vegepod Installation

Vegepod Certificate for Students

PART THREE

Content (NESA)

STAGE 4 - Agriculture and Food Technologies

Identifying and defining

- investigate the characteristics and properties of a variety of nutritious foods, for example:
  - › high in fibre, eg fruits and vegetables
  - › high in protein, eg meat and meat alternatives
- explore the nutritional needs of a group of people, eg. adolescents, toddlers

Researching and planning

- plan nutritious dish(es) to suit a group within society, for example:
  - › high calcium and iron for adolescents
  - › food for cultural celebrations
- identify a range of food preparation techniques and analyse the impact on nutrient value (ACTDEK033)
- investigate and communicate how a recipe can be improved to enhance nutritional value, and justify the recipe adjustment, for example: (ACTDEP039)
  - › using wholemeal flour instead of white flour for increased dietary fibre

Classroom, learning and assessment

Designing the Pod Plate:

Before students start to plant their plot they need to think about what they are going to grow and how they are going to achieve this. This will form their Design Portfolio for Agriculture and Food Technologies.

Students will create a list of plants to grow that are:

1. Appropriate for the Season.
2. Appropriate for the Climate.

Once students have come up with their list, they will need to learn about competition, companion planting and garden bed design.

Students will then need to either create their own recipe or select from one of the seasonal recipes provided in Part Five. If students decide to create their own recipe, they should be able to produce some of the food and create a meal that is culturally and seasonally relevant. If they use one of the recipes provided, a number of seasonal products have been selected to help students achieve their design brief.

Students will need to consider:

1. Why are vegetables an important part of their diet?
2. How will their recipe meet their dietary requirements? If it doesn't, what adjustments could be made so that it does?
3. Will the nutritional value of their recipe be impacted based on the preparation techniques they will need to use to prepare the recipe. If so, what adjustments could they make?

Teaching resources

Designing the pod plate:

Teacher note:

Design Portfolio.

Recipe cards: Summer, Autumn, Winter, Spring.

PART FOUR

Content (NESA)

STAGE 4 - Agriculture and Food Technologies

Identifying and defining

- investigate how food and fibre production is managed in environments as a system and how sustainability can be improved, for example: (ACTDEK032)
  - › plants and/or animal species grown in managed environments
  - › boundaries, inputs, outputs, processes and feedback occuring in a managed environment
  - › land management by Aboriginal and/or Torres Strait Islander Peoples
- Develop criteria to evaluate design ideas, processes and solutions, the functionality, aesthetics and a range of constraints, eg accessibility, cultural, economic, resources, safety, social, sustainability, technical (ACTDEP038, ACTDIP027, ACTDIP031)

Researching and planning

- design and plan a product associated with agricultural production (ACTDEP036)
- investigate ideal conditions for growth and development of an agricultural plant or animal (ACTDEK032)
- develop a schedule or calendar for ongoing care of a plant or animal species associated with an agricultural project (ACTDEP039)

Classroom, learning and assessment

Selecting Produce and Getting Started:

Students will plant the seeds/seedlings of the vegetables they have selected.

Once planted, students will need to organise a calendar of operations. Students will need to record when specific activities need to be done such as watering and harvesting. Additional activities that will need to be undertaken throughout the unit such as pest identification, fertilising and weeding should also be recorded.

Students will also learn about:

1. Parts of a vegetable and how they are identified.
2. Properties of soil.
3. Nutrients and compost.
4. Types of irrigation.
5. Pests and diseases of vegetables.
6. Indigenous Food Production.

Student Evaluation: How does the vegepod system address these requirements?

Students will also investigate the features of the Vegepod system and make an assessment of how its technology assists the plants they are currently growing. This will allow students to identify what aspects of the design are sucessful in growing food in small, managed environments.

Teaching resources

Selecting Produce and Getting Started:

Calendar of Operations Worksheet.

Parts of Vegetables Worksheet.

Properties of Soil Experiment.

Vegepod Checklist/Evaluation Activity.

Indigenous Food Production Worksheet.

Nutrients Worksheet.

Types of Irrigation Worksheet.

Pest and Disease Activity.

Wicking Experiment.

PART FIVE

Content (NESA)

STAGE 4 - Agriculture and Food Technologies

Producing and implementing

- produce and implement an agricultural project and/or produce nutritious food (ACTDEP039)
- identify and apply safe and ethical work practices, for example:
  - › correct use of tools and equipment
  - › food safety and hygiene practices

Researching and planning

- design and plan a product associated with agricultural production (ACTDEP036)
- investigate ideal conditions for growth and development of an agricultural plant or animal (ACTDEK032)
- develop a schedule or calendar for ongoing care of a plant or animal species associated with an agricultural project (ACTDEP039)

Classroom, learning and assessment

Harvest and Celebrate!

Students will learn how to harvest and store their vegetables.

Based on the availability of resources, students may either take their vegetables home or create their recipe/meals at school. This follows on from Part Three of the unit. Students will now require feedback on their recipe and/or meal creations.

Recipes/Meals can then be judged by:

- peer evaluation on creativity and their ability to meet the needs of adolescents as well as being culturally relevant.
- peer assessment on presentation, taste and cultural relevance.

Teaching resources

Harvest and Celebrate!

Vegetable Harvesting Worksheet.

Recipe Feedback Activity.

PART SIX

Content (NESA)

STAGE 4 - Agriculture and Food Technologies

Identifying and defining

- evaluate environments that have been designed in consultation with community groups, for example:
  - a school or community garden
- develop criteria to evaluate design ideas, processes and solutions, the functionality, aesthetics and a range of constraints, eg accessibility, cultural, economic, resources, safety, social, sustainability, technical (ACTDEP038, ACTDIP027, ACTDIP031)

Testing and evaluating

- evaluate the effectiveness and suitability of choices made during the development and production of the solution
- assess the solution against the predetermined criteria

Classroom, learning and assessment

Pod to Plate Class Evaluation:

In Part Four students made their own individual assessment regarding the effectiveness of the Vegepod system. As a class they will discuss the effectiveness and suitability of the system in terms of meeting their own needs (creating food for their nutritional needs or for a cultural based celebration) within a school based environment.

They will then discuss within their original groups how their own choices in terms of garden bed design and management may have affected their ability to produce food for their meal. They may need to consult their calendar of operations and recipe feedback provided by students and/or teacher.

This could be done alongside the Design Portfolio, or added to the portfolio as part of student assessment.

Assessment overview

Assessment Task: Practical Assessment, Design Portfolio.

Student Feedback: Vegepod Certificates, Recipe feedback, Pod to Plate Student and Class Evaluation.

Evaluation

Pod to Plate Student and Class Evaluations.

Acknowledgements

All outcomes and content were sourced from the NSW syllabus for the Australian curriculum – Technology Mandatory Years 7-8 Syllabus, prepared by the NSW Education Standards Authority.

Sourced

educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/technologies/technology-mandatory

Further resources at vegepod.com.au

Vegepod's website provides valuable information and guides for teachers teaching the SproutHigh unit, as follows:

Assembly Guides

https://vegepod.com.au/pages/assembly-videos

Seed Planting Guides

https://vegepod.com.au/pages/seed-videos

User Guides

https://vegepod.com.au/pages/user-guides

Frequently Asked Questions

https://vegepod.com.au/pages/faq

Latest News

https://vegepod.com.au/blogs/news

Part 1

What are the requirements of Plants?

Part One: Teacher Notes

What are the requirements of Plants

Content covered:

Investigate ideal conditions for growth and development of an agricultural plant or animal (ACTDEK032)

Classroom, learning and assessment:

Students will learn about the key requirements of plants. Plants are unique in that they produce their own food through the process of photosynthesis.

When growing plants for human consumption students need to consider:

- availability of water
- availability and amount of sunlight
- growing medium
- nutrient access and availability
- climate

Definition of a Plant:

A plant has several definitions:

" A living thing that grows in earth, in water, or on other plants, usually has a stem, leaves, roots, and flowers and produces seeds."

Cambridge Dictionary https://www.google.com.au/amp/s/dictionary.cambridge.org/amp/english/plant

"Plant, (kingdom Plantae), any multicellular eukaryotic life-form characterised by:

(1) Photosynthetic nutrition
(2) Essentially unlimited growth at localised regions
(3) Cells that contain cellulose in their walls
(4) Absence of organs of locomotion
(5) Absence of nervous systems
(6) Life histories that show an alteration of haploid and diploid generations

Britannica https://www.britannica.com/plant/plant

Some key points for students:

- Plants are a living organism.
- They grow in a variety of different mediums, most commonly in soil, but they can also grow in water, sand, rocks and man-made mediums such as rock pools or vermiculite.
- They are made up of roots, stems, leaves and fruits or seed pods.
- They create their own food or energy through a process known as photosynthesis.
- From a gardening perspective, plants are considered either edible such as vegetables or ornamental such as roses. Some plants can be considered both such as nasturtiums.

Student Activity:

As a class, students could brainstorm everything they know about plants and create a classroom mind map. Correct statements or ideas could be identified and students could then develop their own definition of a plant.

Parts of a Plant and Photosynthesis:

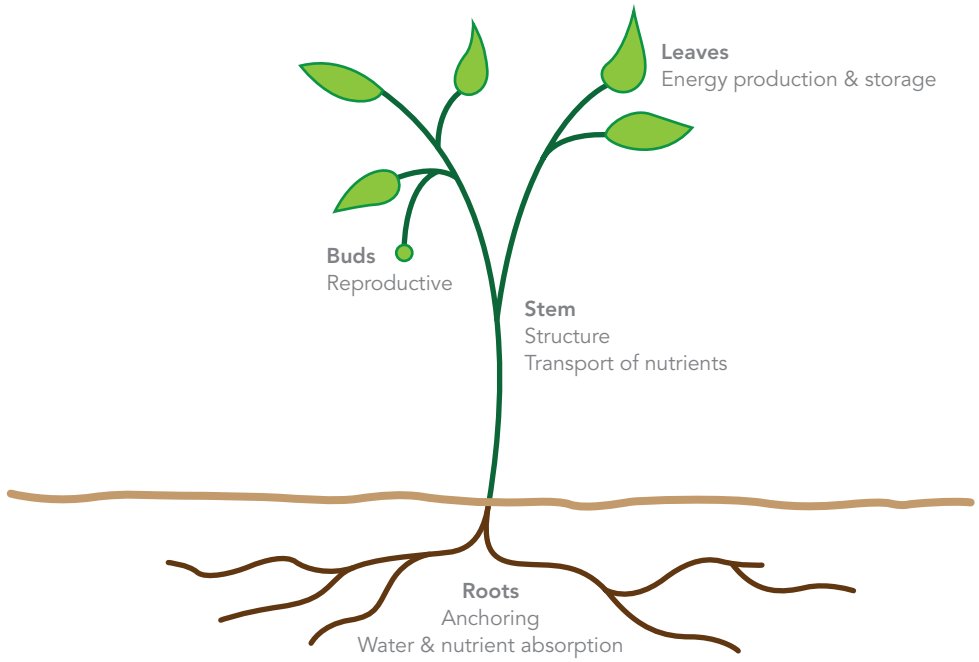


Figure 1: Parts of a Plant

Photosynthesis is the name of the process where plants convert the energy from sunlight into chemical energy which is used by the plant to grow, develop and maintain itself.

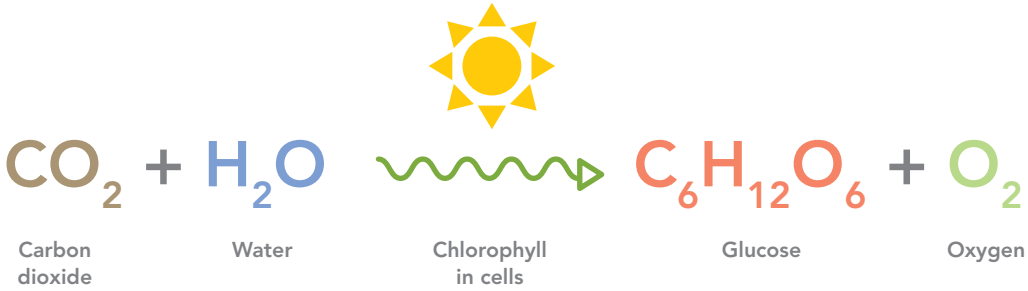


Figure 2: Process of Photosynthesis

Things we need to consider when growing Plants:

1. Availability of water: Water is a key part of the photosynthetic reaction. It is also important for transporting nutrients from the soil and is also required by plant cells for various chemical reactions.

2. Availability of sunlight: Without sunlight, photosynthesis cannot occur. The more light the higher photosynthetic potential. However some plants do not tolerate full exposure to sunlight and their growth may suffer. They may need intermittent or partial light.

3. Type of growing medium: The majority of plants need something to anchor them structurally and growing mediums achieve this. Some growing mediums also provide water and nutrients for the plant to take up through its roots and transport via vessels in the stem (xylem and phloem) to where it is needed by the plant.

4. Nutrient access and availability: Plants need a variety of nutrients, the key ones being nitrogen, phosphorus and potassium. These need to be present and available for use in the growing medium or they need to be added to the soil to ensure the plant's needs are met.

5. Climate: Climate encompasses the whole environment. The weather that surrounds the plant will influence how it grows. Certain plants cannot grow in certain temperatures (soil and air), they may need a certain amount of water or they may not be able to tolerate extreme climatic changes such as frosts.

Part One: Worksheet

Your Local Climate

Research

Using a variety of resources, fill in the following information about your local area:

Location: _____

State: _____

Latitude: _____ Longtitude: _____

Rainfall:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2019													
2018													
2017													

Maximum Temperature:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2019													
2018													
2017													

Minimum Temperature:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2019													
2018													
2017													

What similarities do you notice over time in regards to:

Rainfall

_____

_____

Maximum Temperature:

_____

_____

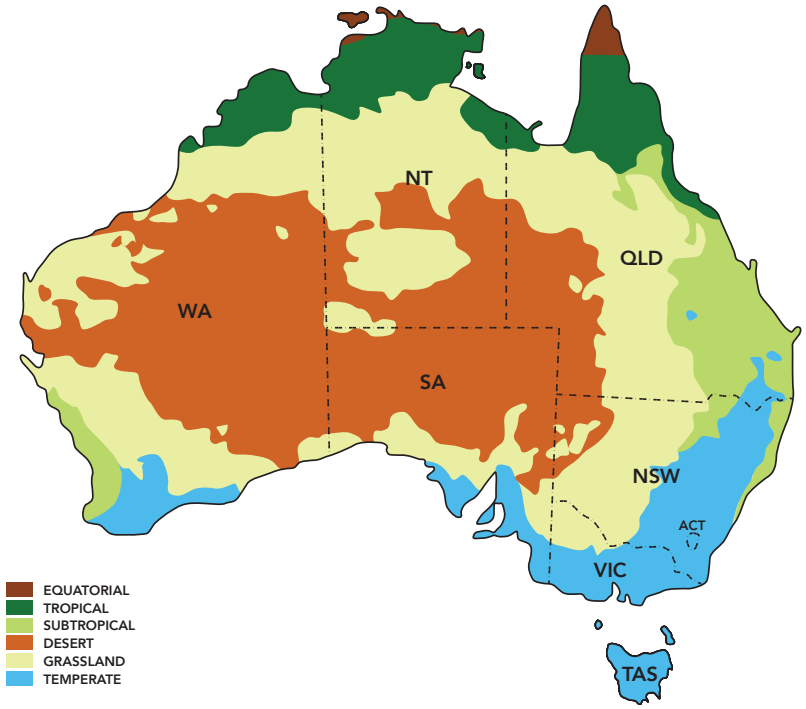
Minimum Temperature:

_____

_____

For 2019, graph Rainfall, Maximum and Minimum temperatures on the grid below:

What else do you know about your location's environment? Think about sunlight/daylight, weather patterns like hail, snow etc.



Based on your research, and using the above diagram of Australia, what type of region is your school in? What are the characteristics of this region?

Part One: Worksheet

Exports and Imports of Australia

As a class, create a mind map that shows all of the products that Australia produces and exports to other countries. Record your findings below:

Agriculture Products of Australia

What exports listed above are produced in your local area?

_____

_____

_____

_____

Using the data below, answer the following questions:

TOP 5 Markets					
VOLUME			VALUE		
1	UAE	39,400T	1	Singapore	$45.3M
2	Singapore	29,900T	2	UAE	$35.9M
3	South Korea	21,200T	3	Japan	$34.2M
4	Malaysia	21,000T	4	Malaysia	$20.7M
5	Japan	16,100T	5	Hong Kong	$15.7M

TOP 5 Commodities					
VOLUME			VALUE		
1	Carrots	111,500T	1	Carrots	$91M
2	Potatoes	38,000T	2	Asparagus	$31M
3	Onions	25,800T	3	Potatoes	$30M
4	Cauliflower & Broccoli	7,700T	4	Onions	$18M
5	Asparagus	6,100T	5	Cauliflower & Broccoli	$17M

Sourced from AUSVEG *https://ausveg.com.au/export/#vegetable_industry_export_snapshot3cd6-0cba*

1. What continents are represented by the top 5 Markets?

_____

2. What is the total value of the top 5 Markets combined?

_____

3. What was the top commodity in regards to volume and value?

_____

Australia also imports a variety of fresh fruits and vegetables.

Create a list below of three reasons why Australia would import fresh fruit from another country?

1. _____

2. _____

3. _____

Part One: Worksheet

Biosecurity

The term biosecurity refers to the protection and processes put in place to protect individuals from living organisms that have the potential to cause harm. Some of these living organisms can affect us directly or indirectly.

For example, Varroa Mite is a pest that affects the European Honey Bee. Although they cannot directly harm us as humans, they do affect the health of bees and prevent them from performing the pollination of many fruits and vegetables. Some fruits and vegetables require bees for the majority of their pollination. Without bees, they cannot reproduce. So Varroa Mite affects us indirectly.

Task: Research a current biosecurity threat to the Australian Fruit industry.

You need to:

1. Name the biosecurity threat and identify whether it is a pest or disease.
2. Name the fruit/s that it affects.
3. Describe its origin and how it could possibly enter Australia.
4. Explain the importance of keeping this pest/disease out of Australia.

1._____

2. _____

3. _____

_____

_____

_____

_____

4. _____

_____

_____

_____

_____

_____

Part 2

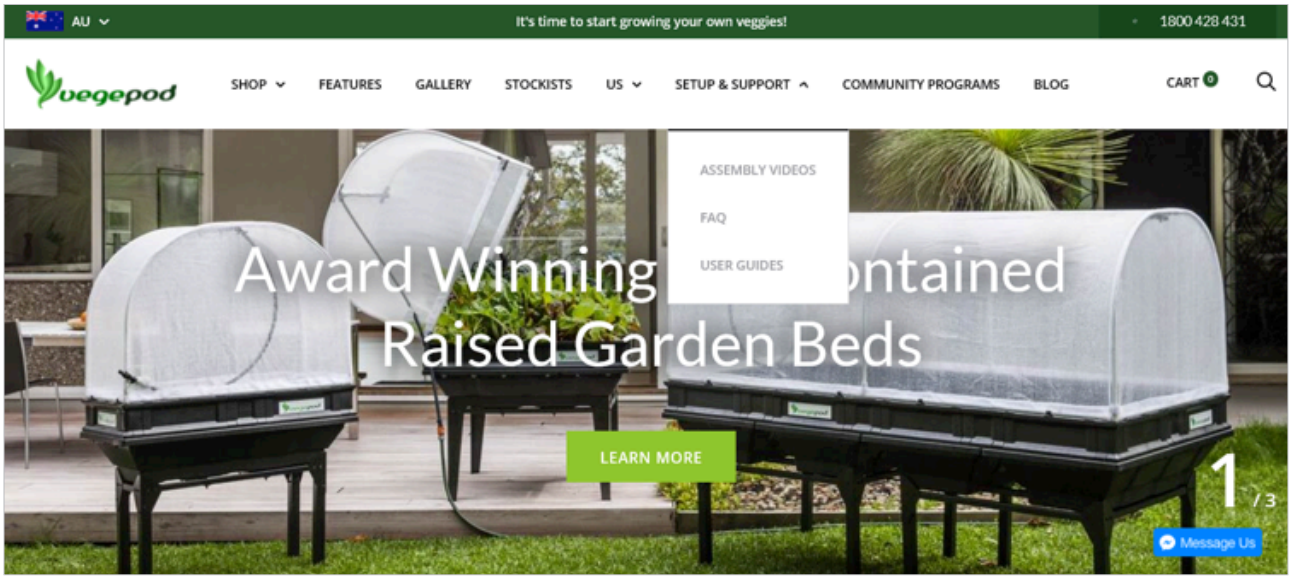
Vegepod Assembly Guides

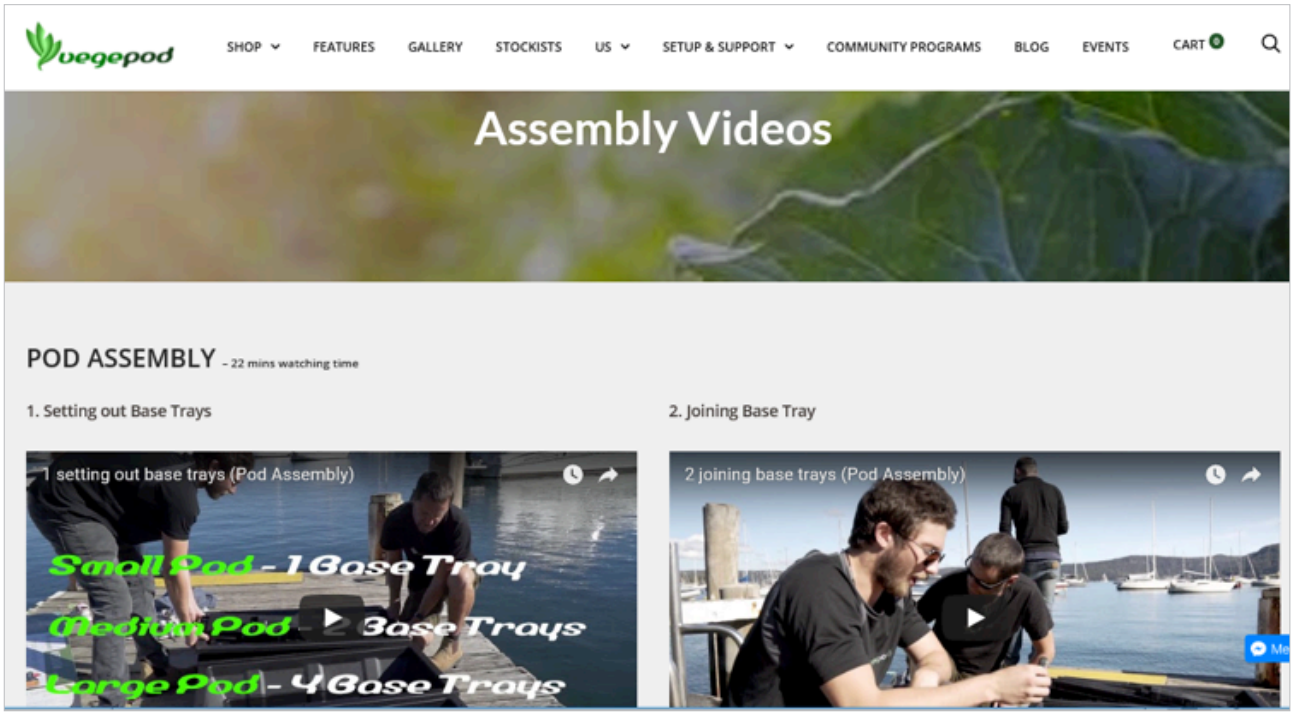
Part Two: Teacher Notes

Assembly Guides

The process of building Vegepods is very simple and does not require any tools.

There are instructions in the box as well as online videos at:
https://vegepod.com.au/pages/assembly-videos





How it works

https://www.youtube.com/watch?v=qyMJi9Thf3U&t=3s&ab_channel=Vegepod

Part 3

Designing the Pod Plate

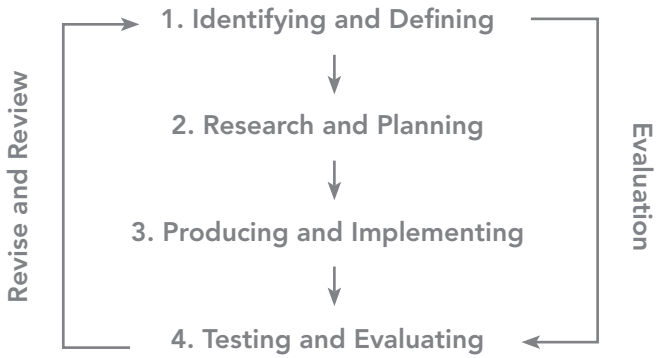
Part Three: Teacher Notes

Designing the Pod Plate

The Vegepod system has many benefits compared to other fruit and vegetable growing systems:

- It provides a continual water source that efficiently captures and stores water for plants to use as required.
- It prevents many unwanted pests and diseases from affecting your fruit and vegetable crop.
- It allows sunlight and air circulation which assists plants to grow to their full potential. Different covers can also be used to change the temperature and amount of sunlight that the Vegepod is exposed to.

This program has included a Design Portfolio that utilises the Vegepod system. It follows the design and production process below:



Students will learn about what plants to select and how to design their garden beds in order to achieve their design brief. This is the overall purpose of this unit.

In Parts Four, Five and Six, there are several feedback and evaluation activities. These can be added or incorporated into your portfolio as part of the design process.

We have not provided a set marking rubric for the portfolio. This is to allow for flexibility. Some of you may include or remove parts of the portfolio to suit the resources you have already or intend to use. Some of you may choose to include the worksheets provided as part of your assessment. Ultimately – the choice is yours!

The portfolio can be worked on concurrently throughout the unit. Many of the worksheets, experiments and activities in Part Four in particular, may assist students in their design and production process.

Design Portfolio

Student Name: _____

Class and Teacher: _____

Date Submitted: _____

Syudent Signature: _____ Teacher Signature: _____

Design Situation

Australia is one of the biggest agricultural producers in the world. As you have already learnt, we produced a large variety of products compared to the rest of the world.

Currently Australian exports around 70% of its overall agricultural output. The export of fresh fruits and vegetables has grown a staggering 37% in value over the last 20 years as an export commodity. (ABARES 2020). Agriculture has however have to change its approach to production. Many industries have had to become more efficient and sustainable in order to survive. This has involved farmers and producers having to think about land use, water use and how they can maintain efficiency in their systems whilst limiting their environmental footprint.

Design brief:

Using your Vegepod system, this meal needs to be nutritionally balanced and utilises seasonally produced ingredients.

Constraints:

List the constraints set by your design brief below:

- _____
- _____
- _____

Criteria for Success

To complete the design brief what do you need to achieve? What will make your project/portfolio a success? Write your answer below:

What do you currently know and what skills do you currently have to complete this project/portfolio?

What do you need to research and investigate in order to complete your project? What skills would you like to develop whilst completing this project/portfolio?

Plant Selection

Plants are all unique and they have a variety of different requirements. Before you design your plate, you will need to know exactly what plants you can grow.

Additional requirements of plants

You have previously learned about the importance of climate. The climate will ultimately determine what plants you will be able to select and grow.

Seasonality

In a calendar year, there are four major 'seasons'. In Australia these are:

Summer: December, January and February

Autumn: March, April and May

Winter: June, July and August

Spring: September, October and November

Seasons are dictated by the sun and the position of the earth during a given time within the year. They are characterised by changes in the weather and the amount of daylight available at a given time. This influences the overall ecology of an area. Ecology is the study of how different organisms interact with one another and the physical environment.

When we refer to the seasonality of a fruit or vegetable plant, we are referring to when the fruit or vegetable will be available based on its growing cycle.

For example: Leeks are a cool to temperate growing vegetable. Therefore the best time for them to grow is during Autumn and/or Winter. They take 20-25 weeks to grow from seed to maturity so they are ready to harvest in Spring and/or Summer. Therefore the seasonality of leeks is Spring and Summer, depending on when they germinated.

Activity: Select any ten vegetables. Using the table below, list them in order and colour in when they are in season throughout the year.

Vegetable	J	F	M	A	M	J	J	A	S	O	N	D

Using your knowledge of the local climate, make a list of fruits and/or vegetables that could be grown now. You should also list the amount of time (in weeks) that it takes to grow these fruits and vegetables. List them below including a bibliography of the resources you used. A good place to start would be a garden guide and there is also plenty of information available online.

Vegetables	Growth to Harvest	Fruits	Growth to Harvest

Garden Bed Design (Research)

Now that you have a list of what you can grow we can start to think about your garden bed design!

There are a few things you will need to consider:

- Time to grow and harvest: All fruits and vegetables have different growing cycles. Some plants take only a few weeks from seed to harvest like the radish (6-8 weeks), whilst others can take years before they produce something edible. So we need to think about:
- How long you have to grow your produce?
- Could you reduce the growth time? (For example, purchase seedlings instead of growing from seeds.)
- What are the size and depth requirements of the plant? Will it fit into the Vegepod system?
- Will you be using your own recipes or one provided by your teacher? Will you be able to grow all or some of your ingredients?

Using the space below, brainstorm some of the issues you may experience with the fruits and vegetables you have selected:

Recipe Selection

Please tick what you have selected:

☐ Your own

Name of recipe: _____

☐ Recipe provided

Name of recipe: _____

List below the ingredients you will be able to grow (based on seasonality and climate)

_____

_____

_____

Why are vegetables an important part of your diet?

_____

_____

_____

Will your recipe meet your daily nutritional requirements? If not could you make changes so it does? What changes would they be?

_____

_____

_____

Will the nutritional value of your recipe be impacted based on the preparation techniques you will need to use to prepare your recipe? If so what adjustments could you make?

_____

_____

_____

Companion Planting

Think about yourself. You have people that you like and get along with. You like to hang around those people. Sometimes there will be people that you don't like as much, and you would prefer to hang around with others. Plants are the same!

Companion planting is where we group plants together that essentially like each other. Generally these plants like each other for a reason. They may provide and share nutrients with each other or they may provide structural support for growth. Some plants even deter pests from one another.

Using some of the resources you used earlier, determine which plants like to be grown together, as well as which ones do not like to be grown together. List the reason why they are friend or foe. An example has been provided for you:

Plant Combination	Friend or Foe?	Reasoning
Tomato and Basil	Friends	Basil acts as a pest deterrent for tomatoes and it also acts as a natural fungicide

Competition in Plants

When we talk about competition in plants, we are thinking about what negatively effects plant growth. There are three essential things that plants will compete for:

- Water
- Nutrients
- Light

To reduce competition with plants and guarantee optimum growth, we need to ensure each plant receives adequate waterand nutrients as well as having access to the right amount of sunlight. We reduce competition by giving plants enough space, and preventing any plant from inhibiting another. For example consider plant heights to make sure taller plants don't shade smaller plants, which would reduce their access to sunlight.

Garden Bed Design – Final design for Vegepod System

Using what you have learned, you will now need to design your Vegepod bed. Using the next page, make a scaled drawing of your Vegepod. In it you will need to include:

- Measurements of the pod itself.
- Symbols for each of the vegetables/fruits you intend to plant.
- Each plant grown needs to be represented and a depth and spacing measurement should also be noted. For example lettuce may be planted at a depth of 5mm with a 10 cm spacing from any other plant. This needs to be represented on the diagram.
- You need to show where North is on your diagram and determine if shade will affect your Vegepod.
- Taller plants should be planted to the North. This will reduce shading as the sun moves from east to west.
- You will also need to document the growth of your plants over time and include photos, descriptions of any tasks performed week to week as well as other general information.

Garden Bed Design Drawing

Vegepod Documentation

Week: _____

Photo / Drawings:

Student Name: _____

Observations:

_____

_____

_____

_____

_____

_____

_____

_____

Bibliography

Part Three: Recipe Cards

AUTUMN Mixed Vegetable Fritters with Herbed Feta

Ingredients

Fritters

2 potatoes grated
500-600g of grated seasonal vegetables such as beans, pumpkin, zucchini, eggplant, capsicum, celery and spinach
125g of self-raising flour
3 eggs
oil
salt
pepper

Herbed Feta

200g of Danish or Persian feta crumbled into a paste consistency *(This could be substituted with sour cream or butter instead)*
Handful of fresh mixed herbs finely chopped.

Method

1. Combine the grated vegetables, squeeze out any excess fluid and season with salt and pepper.
2. Toss the flour through the vegetable mixture, evenly coating all vegetables.
3. Separate the yolk from the egg white for each of the eggs.
4. Add the yolk to the vegetable mixture, ensuring the mixture is completely coated.
5. Whip the egg whites until stiff peaks form. Fold the egg whites into the vegetable mixture.
6. Place a small amount of oil into a pan over medium heat.
7. Add a small amount of the mixture (80-100g) slowly to the pan. Cook on one side for 5 minutes and then flip the fritter to cook the other side for a further 5 minutes.
8. Once all the mixture has been cooked, mix the fresh herbs into your feta.
9. Serve feta with the warm fritters and enjoy!

Part Three: Recipe Cards

WINTER Brussel Sprout, Cabbage and Bacon Salad with Creamy Dressing

Ingredients

Salad

250g of cooked and finely chopped bacon rashers
250g of finely sliced brussel sprouts
250g of finely sliced cabbage (Wombok, Red or White Cabbage are also suitable)
1 finely grated apple
5 finely chopped spring onions

Dressing

1/3 of a cup of mayonnaise
1/4 of a cup of buttermilk (Can be substituted with cream or salad cream)
1 tablespoon of grated parmesan cheese

Method

1. Combine all the salad ingredients into a bowl and mix through evenly.
2. Combine the mayonnaise and buttermilk together.
3. Slowly add lemon juice and continue mixing.
4. Pour the dressing over the salad and using tongs, evenly coat it with the dressing.
5. Sprinkle with parmesan cheese and enjoy!

Part Three: Recipe Cards

SPRING Beetroot and Pumpkin Tart

Ingredients

1 sheet of puff pastry
200g of cubed beetroot
200g of cubed pumpkin
1 sliced onion
100g of crumbled feta
1 tablespoon of balsamic vinegar or glaze
1-2 tablespoons of oil
fresh or dried thyme
salt
pepper

Method

1. Preheat the oven to 180 degrees celsius.
2. Coat beetroot and pumpkin in oil and place on a roasting tray.
3. Roast in the oven 15-20 minutes until softened.
4. Place the sheet of puff pastry onto a cooled roasting tray.
5. Evenly spread the roasted pumpkin, beetroot and onion over the pastry, leaving a 1-2cm edge.
6. Drizzle balsamic vinegar or glaze over the vegetables.
7. Sprinkle with thyme and feta.
8. Gently fold the edges of the pastry into the tart creating a casing.
9. Bake in the oven for approximately 20 minutes until the pastry is golden.
10. Slice, season with salt and pepper and enjoy!

Part Three: Recipe Cards

SUMMER Pesto Pizza

Ingredients

Pizza Base

1 round of Lebanese flat bread

(Depending on the availability and resources, students may make their own pizza bases. Alternatively pre-made pizza bases may also be used)

Pesto

350g of basil leaves
2-3 garlic cloves
60g of pine nuts
60-80g parmesan cheese
100ml of olive oil

Pizza Toppings

250g of either shredded cooked chicken or diced bacon
250-300g of tomatoes sliced or diced
100g of onion thinly sliced
100g of feta cheese
125g of mozzarella

(This recipe can be made without meat if preferred)

Method

1. Preheat the oven to 180 degrees
2. Place all the dry pesto ingredients into a food processor or blender and process until finely and evenly chopped.
3. Once evenly chopped, slowly pour the olive oil into the pesto mixture until it is throughly combined.
4. Once the pesto has been prepared, spread a thin layer evenly across the pizza base ensuring it is fully covered.
5. Scatter the tomatoes, onion, feta and chicken/bacon evenly across the pizza. Finally scatter the mozzarella as the final layer.
6. Place into an oven for 10 minutes or until the cheese has melted and started to brown.
7. Carefully slice pizza and enjoy!

Part 4

Selecting produce and getting started

Part Four: Teacher Notes

Selecting Produce and Getting Started

Now your students should be ready to plant their plants! The activities in Part Four of the unit are designed around teaching students how to manage the growth and development of their plants. Below is a description of each of the activities.

Calendar of Operations

A calendar of operations is commonly used by producers to pinpoint when certain operations and procedures need to be undertaken. It allows for efficiency and it also allows for producers to forward plan if they experience weather events or market changes. These come in a variety of different formats, allowing for multiple operations to be overlapped. The class could investigate such calendars across a range of agricultural industries.

Parts of a Vegetable

The Vegepod will primarily be responsible for growing vegetables, with the occasional fruit variety. Vegetables are classified many different ways but more commonly they are grouped into what parts are edible. For example root vegetables include carrots, parsnips etc.

Nutrients

This worksheet is designed to introduce students to the major and minor nutrients required by plants for adequate growth and development. Plants like us have a wide variety of nutritional needs, which vary from variety to variety, at different stages of development, and when a plant is suffering from pests and/or diseases. This worksheet gives a general overview followed by a series of questions that will give students an idea of how to be resourceful at school by creating their own usable nutrients.

Types of Irrigation

The Vegepod system has an ability to irrigate using the overhead sprinkler system. However it can also capture natural rainfall, and be watered manually by hand. This worksheet aims to explain what irrigation is, and describe three systems commonly used in vegetable production. Students will need to consider how each of these systems work, and more importantly they will need to determine an advantage and disadvantage of each system.

Pests and Diseases

There are a variety of pests and diseases that affect fruit and vegetables. The Vegepod's canopy prevents pests and diseases. However if the cover is removed, produce may potentially be exposed.

A disease by definition is anything that causes changes to the structure and function of a plant. A pest is different from a disease in that it is an organism (animal/plant) that causes changes to the structure and function of a plant, but they are organisms that can be seen. Diseases are micro-organisms that cannot be viewed with the naked eye. Students will need to investigate a variety of different pest and diseases that cause harm to vegetable crops. They should each select one and complete a vegetable wanted poster. This poster will allow students to be creative, whilst helping them to learn how to identify different pests and diseases.

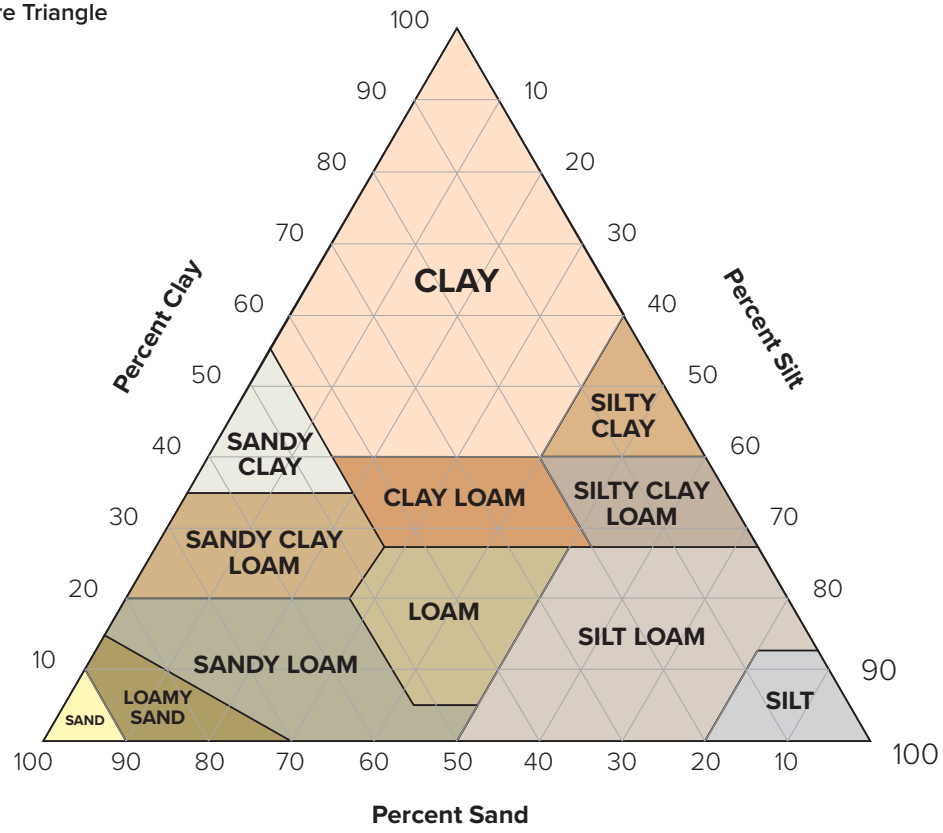
Indigenous Foods Production Task

This worksheet is designed to introduce indigenous land management practices to students. This activity could be expanded to look at other management practices used by Indigenous Australians. Students could also investigate native foods in their area which could potentially be grown by students in the Vegepods.

Properties of Soil

There are many different types of soil and different vegetables will often prefer different types. Each soil type will have its own properties such as an ability to retain water or air. There are more in-depth teaching notes attached to the practical including some additional activities.

The Texture Triangle



Teacher Notes

- Sand should retain the the least amount of water, followed by organic compost and clay.
- Structure in soil refers to the arrangement of particles within the soil.
- Texture in soil refers to the proportion of particular types of particles within the soil.
- Porosity in soil refers to how many holes or pores a soil has based on its texture and structure. Porosity is represented as percentage of the total soil volume.
- Sandy soils have a higher porosity than Loam Soils, Compost and Clay based soils. The water passes through the sand quickly and it does not retain or hold the water.
- Clay based soils have a lower porosity than Loam Soils, Compost and Sandy soils. Water struggles to move through clay based soils and can get trapped. This can become a problem when growing plants as it limits the amount of oxygen available in the soil. Plants will often become 'water logged'.
- Loam soils are soils that contain a balanced percentage of sand, silt and clay. It is the best type of soil to grow plants in when mixed with compost. It allows water to pass through, but more slowly. As it has a percentage of organic matter available, it provides nutrients and retains moisture which can be used by the plants.

Additional/Extension Activities

- pH Testing: Students can perform pH tests on the soil they have put into their Vegepods. They can then determine what nutrients will and will not be available in their pods and research how they can change this.
- Making compost: Students can use vegetative waste around school including any waste from the Vegepods themselves (thinned out plants, damaged leaves and stems etc) and learn how to create compost. What are the different methods used and how do they work? Students could then create their own composting area and/or system that suits their own requirements.
- Physical soil testing: Students can perform the Ribbon test. Here students can determine the structure and texture of soil samples by feel.

Wicking Experiment

Wicking is the movement of liquid using capillary action. There are two experiments. One aims to show the movement of water in a plant visually. The other aims to show wicking in action. Additional teaching notes are offered.

- Wicking is the movement of liquid using capillary action. Some substances and mediums have a greater potential for wicking than others.
- The first experiment aims to show students the movement of water through the vessels into the parts of the plant that it is needed. The dye allows students to see how water moves through a plant. It may combine in sections of the leaf area, changing to a purple colour.
- The second experiment aims to show the movement of water through the ‘wick’ into the empty beaker. Fluid should slowly be deposited into the empty beaker from both beakers. The water will mix and change to a purple colour.

Extension/Additional Activity

You could test the wicking ability of different materials in Experiment 2 using cotton, bamboo or nylon for example. Students can then determine which materials have more efficient wicking abilities.

Vegepod Checklist/Evaluation Activity

By now students should understand how the Vegepod system works. Students will need to assess each of its features based on their overall understanding of how the system is constructed and how it has worked for them individually. This understanding is slowly built between Parts Two and Four of the program. Students could do this a number of ways:

- Individually: This could be addressed as part of the student’s portfolio, or it could be completed as a class task/activity.
- In groups: Students could collaborate on their ideas and create a review or an article that supports or critiques the system based on their own experience.
- Class debate: The class could be separated into two groups and asked to debate the Vegepod’s success or failure. For example: “The Vegepod System is the most effective way to grow vegetable produce in our classroom.”

Part Four: Worksheet

Calendar of Operations

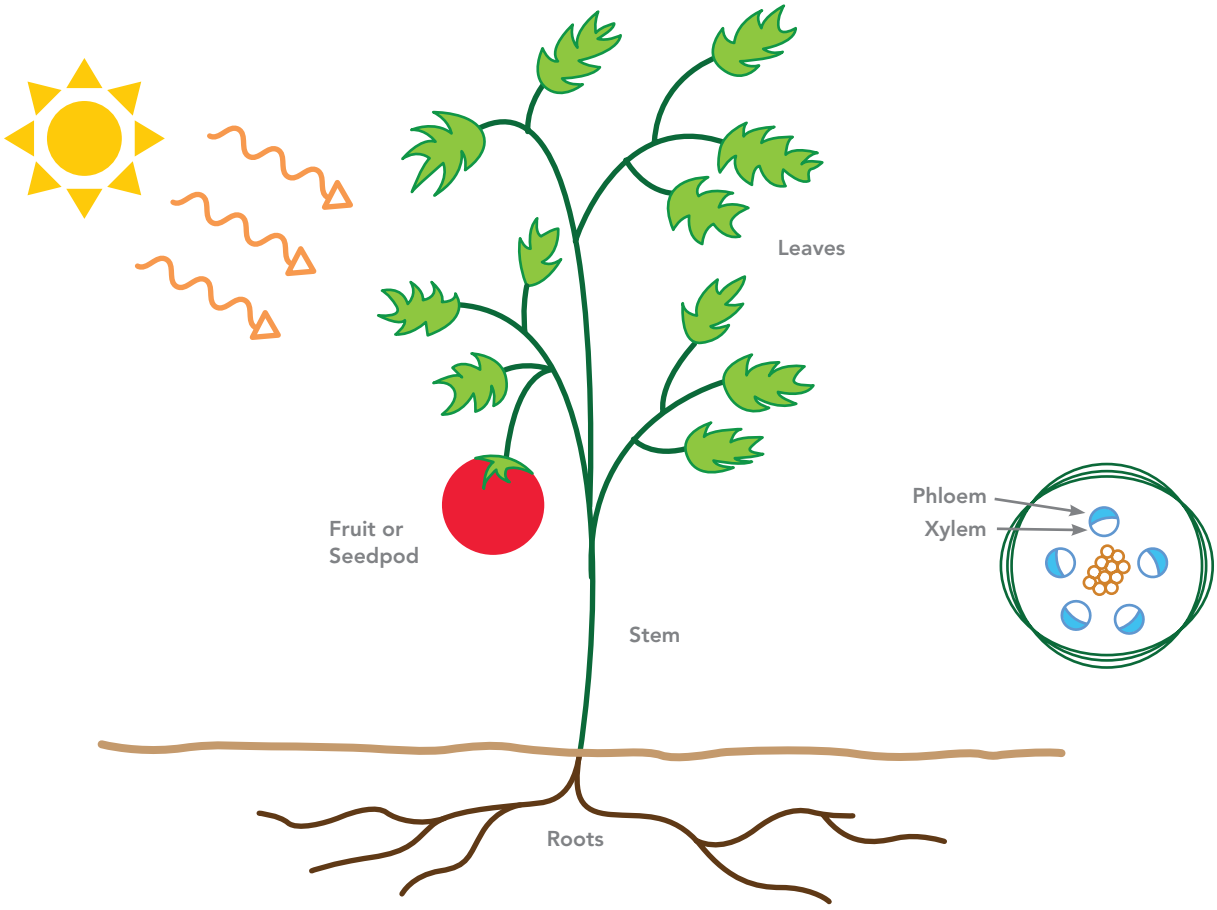
In your groups, you will need to complete your calendar of operations. Using your school timetable, plan when you will have access to your Vegepod, and what activities you will need to do such as weeding, irrigation, harvesting etc. Any additional activities that you didn't plan for should also be recorded.

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1					
Week 2					
Week 3					
Week 4					
Week 5					
Week 6					
Week 7					
Week 8					
Week 9					
Week 10					
Week 11					

Part Four: Worksheet

Parts of a Vegetable

Below is a labelled plant:



Based on your understanding, fill in the missing blanks using the words listed.

All plants have _____. They have two major functions. The first is to anchor the plant, allowing it to maintain its structure. The second is to take up _____ and _____ required by the plant for growth and development. The stem acts as a structural support for fruits, seedpods and leaves, it also contains _____ that are responsible for transporting _____, nutrients and water to where it is needed by the plant. Leaves are responsible for creating energy through _____. Chlorophyll in the cells assists the plant in trapping light and converting it into useable _____. The leaf is also responsible for maintaining water balance via the _____ on the underside of the leaf. The fruit or seedpod is the _____ part of the plant. It stores the seed, which is used by the plant to reproduce itself.

energy **stomata** **vessels** **reproductive**

roots **photosynthesis** **sugars** **nutrients** **water**

Vegetables can be categorised by the parts that are used or consumed. For example:

Root Vegetables = carrot and beetroot

Stem Vegetables = celery and leek

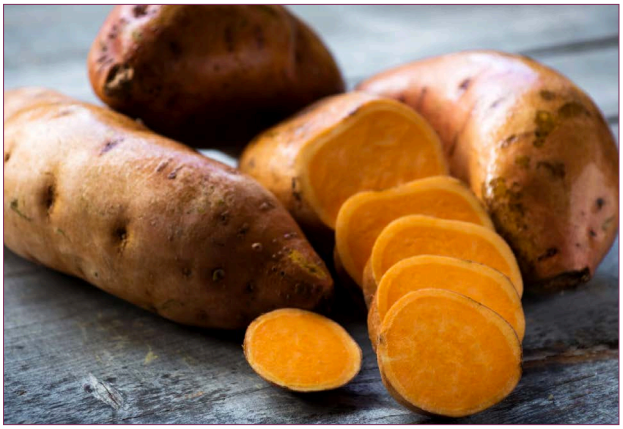
Leaf Vegetables = lettuce and spinach

Seedpods = beans and peas

Fruits = tomato and avocado

Tubers = potato and yam

Each photo below shows a different type of vegetable. Classify each one by its type.

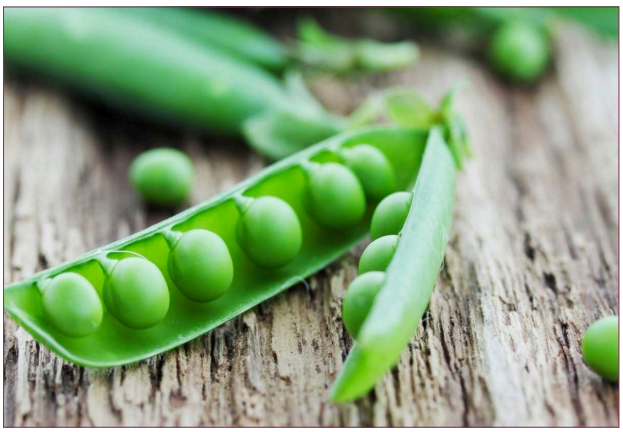


Vegetable type _____

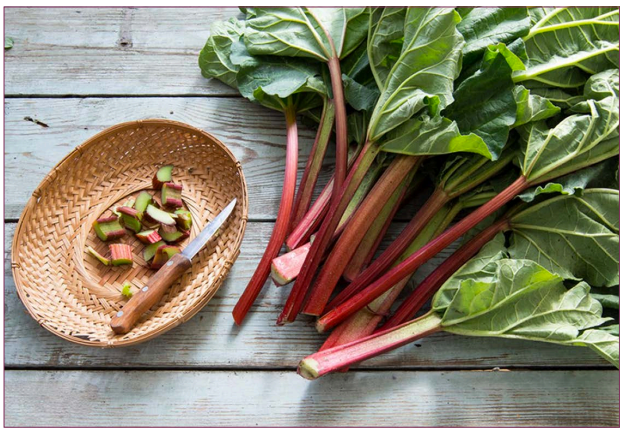
Vegetable type _____

Vegetable type _____

Vegetable type _____



Vegetable type _____



Vegetable type _____

Part Four: Worksheet

Nutrients

Nutrients are substances that an organism may need or use to grow and develop. Plants need a variety of nutrients, with some being more important than others.

The three major elements that all plants require include:

- Nitrogen (N)
- Phosphorus (P)
- Potassium (K)

Plants also need other nutrients in smaller amounts depending on the type and the maturity of the plant.
These nutrients are secondary elements or trace elements and include:

- Calcium (Ca)
- Sulphur (S)
- Magnesium (Mg)
- Iron (Fe)
- Boron (B)
- Copper (Cu)
- Molybdenum (Mo)

Some nutrients are naturally occurring within the soil. However if a plant is deficient, meaning it lacks a necessary nutrient, it is necessary to supply that nutrient. A fertiliser is a substance that can be used to add nutrients to the soil to increase its fertility. Fertilisers can be naturally occurring such as compost or manure, or chemically based such as Urea (Nitrogen) or Superphosphate (Phosphorus).

Answer the following questions:

1. Select one major element/nutrient and one minor element/nutrient. What do each of these nutrients do for the plant?

_____

_____

2. How can you tell if a plant is suffering from a nutrient deficiency?
   List the common symptoms that the majority of plants may experience.

_____

_____

3. Compost is one way we can add nutrients back into the soil, particularly if it is nutrient deficient. What is compost?
   Are there different types? How could you make your own compost at school?

_____

_____

Part Four: Worksheet

Types of Irrigation

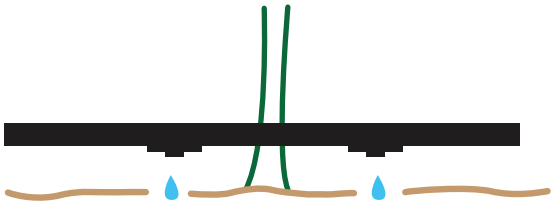
Irrigation is the process of supplying water manually to a crop or plant. There are many different ways to irrigate plants and each has various advantage and disadvantages. The aim when irrigating is to maximise the amount of water the plant receives, whilst also reducing water losses in the process.

Some forms of irrigation can lose water through evaporation whereas others are not as accurate or efficient in terms of their application. Some plants may receive more water than others for example.

Below are a few different types of irrigation methods used for growing vegetables along with a description of how they work. For each method determine both an advantage and a disadvantage of using it.

Drip Irrigation:

Drip irrigation is often supplied by pipes with specialised fittings that allow water to 'drip' slowly and directly onto plants. Some are based above the ground, and aimed directly at the base of the plant. Others are buried within the soil and drip slowly onto the root system.



Advantages: _____

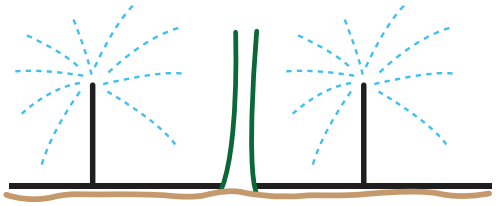
_____

Disadvantages: _____

_____

Sprinkler Irrigation:

Sprinkler irrigation is also supplied via a network of pipes to specialised sprinkler fittings above ground. The sprinklers spray a fine particle or mist from the sprinkler jet or head. Depending on the type of jet and the pressure of the water, the water will spray around the head of the sprinkler which remains in a fixed position.



Advantages: _____

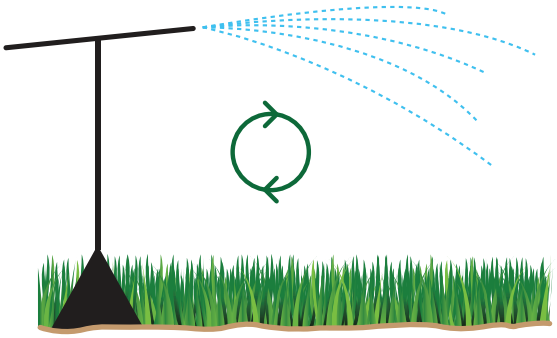
_____

Disadvantages: _____

_____

Pivot Irrigation:

Pivot irrigation is irrigation that is supplied around a central pivot. This pivot can be moved or set permanently and will spray water as a jet in a full 360 degree revolution. Some pivot systems may have a single jet or head. Others may have several heads or jets that are connected creating a larger system capable of watering a much larger area. The water is generally supplied via a water source using a pump.



Advantages: _____

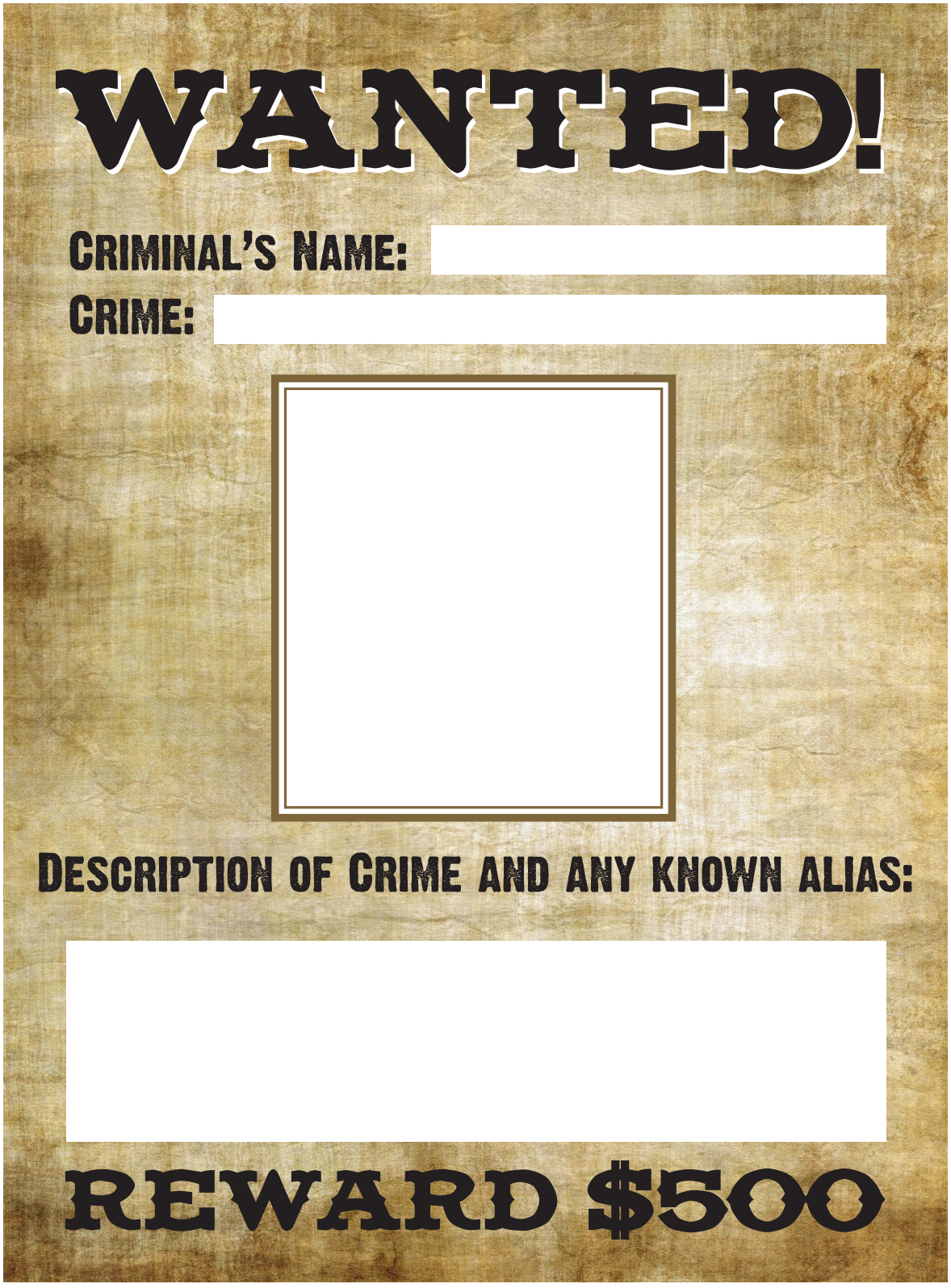
_____

Disadvantages: _____

_____

Part Four: Worksheet

Pest and Diseases



Part Four: Worksheet

Indigenous Food Production

Aboriginal and Torres Strait Islander peoples have a deep, spiritual connection with the land. They have been custodians of Australia for tens of thousands of years and continue to be custodians, carefully managing and preserving the country using a variety of land management practices. Many of these cultural practices were utilised to ensure that food resources were responsibly managed so they could be sustained and used by future generations.

Firestick Farming:

Indigenous Australians have used fire as part of their cultural management of the land for thousands of years. Fire served many purposes. In regards to food production, they cleared areas of land, encouraging native grasses to grow. This in turn attracted animals like kangaroos, which could then be hunted for food. Many essential native plants also required fire for germination. The type and time of these burning activities varied between areas. This knowledge was passed between generations ensuring future generations could continue to effectively manage natural resources.

Plant establishment:

Whilst many Indigenous Australians collected foods that grew naturally, they also actively cultivated the land, collecting and planting a variety of plants which were used as a food source. Murnong is a perennial plant. Also known as a Yam Daisy, it produces a number of tubers or yams in the soil which could be dug up and eaten or stored as a future food source. These plants were carefully harvested, ensuring that a tuber or tubers remained, so they could continue to grow and reproduce new tubers. Indigenous Australians also farmed and processed grain. There is significant evidence to suggest that large expanses of land were tilled, and a variety of grasses and grains were grown. These grains were harvested and ground to make flour. An example is Pancium grass or native Millet.

Diversification and Seasonality:

As noted in the introduction, Indigenous Australians have a deep and powerful connection to the land and their management of it has always centred around respect and sustainability. Food sourcing was done seasonally, ensuring that plants were preserved for the future. A variety of foods were produced and collected which not only ensured a varied diet, but more importantly it preserved species allowing continuous regeneration for future generations.

Questions to discuss / research as a class:

Are there any other plants that benefit from fire? Do you think traditional burning would provide any other advantages? What would they be?

_____

_____

_____

Part Four: Experiment

Properties of Soil

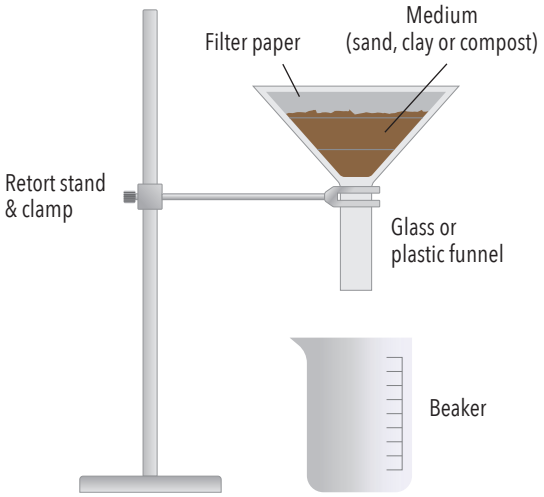
Aim

To observe the movement of water between different soil types.

Materials

- 1 cup of each sand, organic compost and clay.
- 3 filter papers
- 3 glass or plastic funnels
- 6 x 100mL beakers
- 300mL of water
- 3 retort stands
- stopwatch

Diagram



Method

1. Each funnel should be secured above a beaker using a retort stand as per the diagram.
2. A single filter paper should then be placed into each of the funnels.
3. Place the sand, compost and clay into each funnel individually. Lightly compact each material using minimal pressure.
4. Carefully fill three remaining beakers with 100ml of water.
5. Start the stopwatch and carefully pour the contents of the beaker into the funnel containing sand. After 5 minutes record the amount of water collected into the beaker. If the lower beaker fills before 5 minutes, record the time it took to collect all water. Repeat for compost and clay.
6. Record any other observations for discussion.

Discussion

1. What material retained the most water? What material retained the least?
2. What do you notice about the structure and texture of each material? Does this affect the porosity?
3. Which material would be the best for growing plants? Explain why providing evidence.

Part Four: Experiment

Wicking

Aim

To observe wicking and capillary action in plants.

Materials

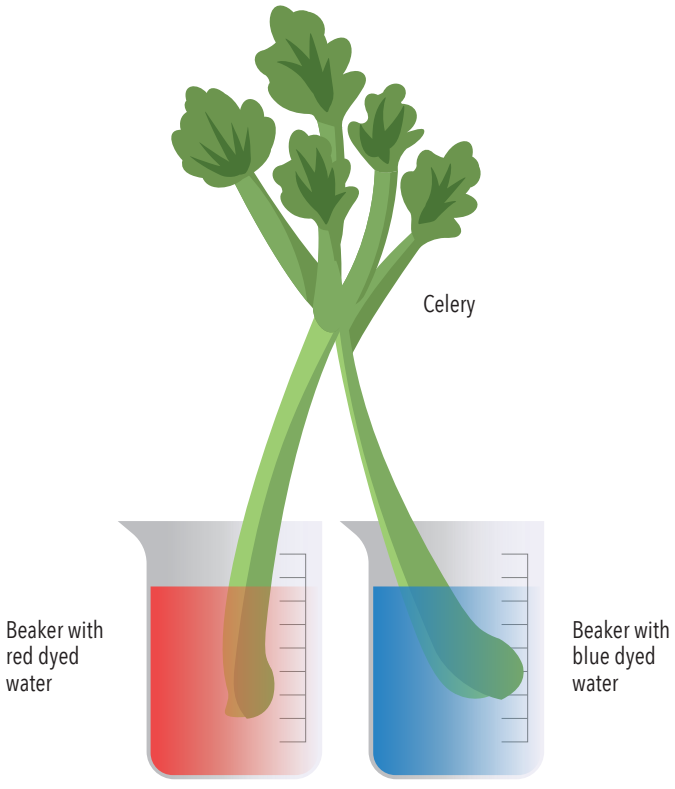
- 1 stem of celery with leaves attached
- 2 pieces of paper towel or 2 Chux wipes
- 1-3 drops of red food dye
- 1-3 drops of blue food dye
- Stirring rod or spoon
- 5 beakers or small clear containers (approximately 100ml capacity)
- Small knife or scalpel

Method

Experiment 1

1. Two beakers should be half filled with water and placed side by side.
2. 1 to 3 drops of red food dye should be placed in one beaker and stirred.
3. 1 to 3 drops of blue food dye should be placed into the other remaining beaker and stirred.
4. Using the knife, the celery stem should be cut from the base through the middle of the stalk. This cut should continue so that half the stem is split.
5. Place one half of the stem into the red dyed water and the other half into the blue dyed water.
6. Changes to the celery should be observed for the next 7 days.

Diagram

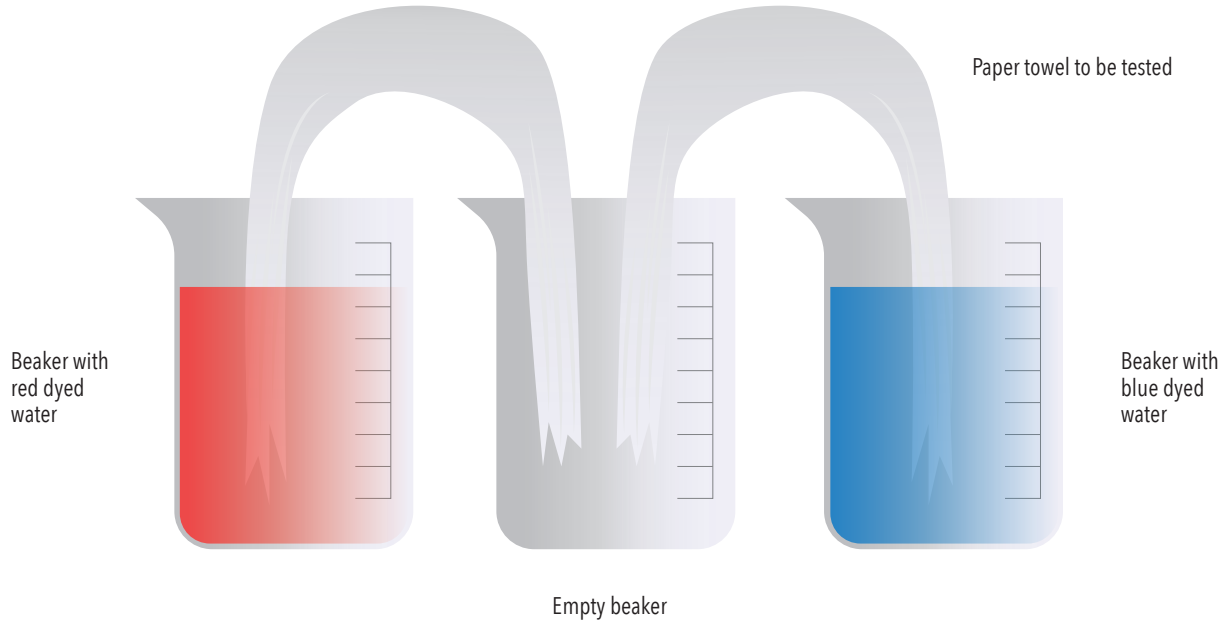


Method

Experiment 2

1. Two beakers should be half filled with water and placed either side of an empty beaker.
2. 1 to 3 drops of red food dye should be placed in one beaker with water and stirred.
3. 1 to 3 drops of blue food dye should be placed into the other beaker with water and stirred.
4. Paper towel or Chux should be folded to create two narrow strips.
5. One strip should be placed into each solution at one end, with the other end being fed into the empty beaker.
6. Any changes or observations should be observed for the next 7 days.

Diagram



Discussion:

1. What changes did you observe in the Experiment 1 over the 7 day period?
2. Give an explanation as to why these changes occurred.
3. What changes did you observe in Experiment 2 over the 7 day period?
4. Give an explanation as to why these changes occurred.

Part 5

Harvest and Celebrate

Part Five: Teacher Notes

Cooking and Recipe Feedback

As explained in Part Three of the program, there are two options:

1. If your school has the capability to prepare food, then students can use these resources to create their own meal/recipe, or follow one of the recipes provided.
2. If these resources are not available, students can take their produce home to eat with their families. They can however work together to create a recipe that uses what they have grown.

Recipe Activity:

If your class selected option 1:

Students can be given feedback a variety of different ways. If they utilise the recipes provided, feedback could be given on:

- Their overall use of the kitchen utensils and equipment.
- Execution of their overall meal/dish.
- How it tastes.

If students create their own recipes, additional feedback could be given on:

- Creativity and use of the vegetables they have grown
- Whether the recipe meets their nutritional needs
- Whether the meal is culturally or seasonally relevant (depending on what they have been instructed to base their meal on or around)

If your class selected option 2:

Students can create their recipes in class. These could be given similar feedback as in option 1 but they could also be peer reviewed, adding a secondary form of feedback. Students could also compare their recipes to the suggested recipes and make comparisons on flavour, use of seasonal produce and whether they meet the dietary guidelines for adults.

Part Five: Worksheet

Harvesting

Harvesting is the process of collecting a plant once it has finished growing to its full potential. Each plant will vary in the time it takes to grow, and this will be influenced by health, competition and climatic changes.

There are two forms or methods of harvest:

1. Manual harvesting.
2. Mechanical harvesting.

Manual harvesting

This is the harvesting of fruits and vegetables manually by hand. If the amount of produce to be harvested is small, it is usually harvested manually. Some fruits and vegetables may be also be harvested manually to protect their integrity as determined by their end use and/or overall quality requirements.

Mechanical harvesting

This is the harvesting fruits and vegetables using technology and is used mostly by commercial producers as it is more time efficient and allows continuous production.

How do we harvest our vegetables?

There are a few things you need to consider before harvesting your vegetables and/or fruits:

1. Are they ready? Earlier in the unit you would have written down when your produce would be ready to harvest on your Calendar of Operations. If your plants are relatively healthy, and there haven't been significant changes to their environment, then they should be ready by the harvest date.
2. What will you be harvesting? What parts of your produce are going to be eaten? Now that you understand about the parts of different vegetables you will need to think about how they should be harvested. Leaves can be individually harvested. However in some cases, it may be easier to remove all the leaves at once, such as a lettuce for example. Identify what parts of the plant are edible, consider how much you need and harvest accordingly.
3. What you will need? Some vegetables can be harvested with your hands, whereas others may require some extra force so you may need a pair of snips or secateurs. If you don't plan to use your harvest straight away, you may also need to consider different types of storage. Root and tuber vegetables are generally best kept in a cool dark environment. Leaves, stems and seedpods have varying storage requirements - some can be kept at room temperature but most will keep longer in the fridge. Leaf based vegetables should be used as quickly as possible and kept in the fridge to preserve.

Snips

Secateurs

Questions:

1. When harvesting from your Vegepod, you may need to use snips or secateurs. What safety considerations are there with using these tools? What are different ways you can manage these safety concerns?

2. Think about the vegetables you will be harvesting? What other considerations do you need to make to ensure that they remain fresh prior to use?

3. How do you know that your vegetables are ready to harvest? Describe how you came to this conclusion?

Part 6

Pod to Plate Class Evaluation

Part Six: Activity

Pod to Plate Project Evaluation

Now it is time to evaluate your design and production process:

Did you achieve your design brief? Describe how:

Is there anything you would have done differently? Think back to your criteria for success.

What parts of your project and portfolio were your favourite and most successful?

How did the rest of the class compare in regards to meeting the design brief?

What feedback did you receive on your design and production process?
Describe below:

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Part Six: Certificates