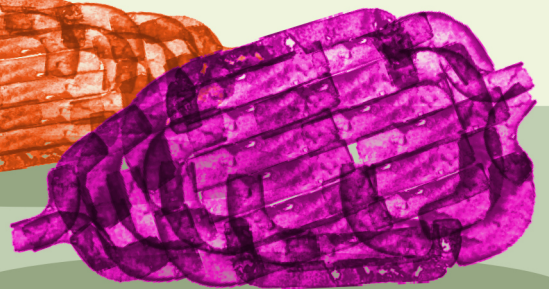
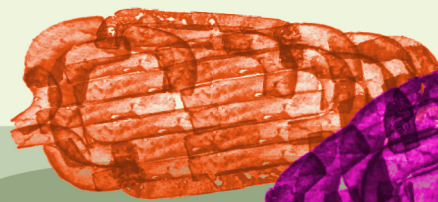
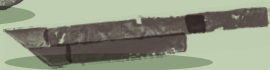




He kūmara reka

Sweet kūmara

sample resource



Introduction

In this unit, students explore ways to change the microclimate for growing kūmara. When Early Māori arrived in Aotearoa New Zealand they found a climate that was more temperate than they were used to and needed to change growing conditions to successfully grow the tropical plants they were used to eating. Students will experiment with different materials and come up with a plan to grow great kūmara.

By the end of this unit, students should be able to:

- explain how important kūmara was to New Zealand's early settlers and how it changed their way of life**
- show there are ways of trapping the Sun's heat energy (for example, facing objects to the Sun for maximum exposure, using heat-absorbing materials, using dark coloured objects, insulation, creating a greenhouse effect)**
- explain that different materials absorb different amounts of heat energy from the Sun**
- explain that some materials are better insulators**
- design a kūmara bed that combines different methods of increasing the soil temperature**

Depending on your students, you might like to teach the whole unit over several weeks, across different curriculum areas including reading. Or you could dive deeper and spend a term linking it to your local curriculum. Classroom teachers could link up with Garden Specialists to teach aspects of the unit in Garden to Table time.

This unit is unique in how it covers all aspects of science as covered in the New Zealand Curriculum, from investigating solar energy in Planet Earth and Beyond, to exploring what plants need in the Living World, looking at heat transfer in the Physical World and exploring different insulators in the Material World, combined with technology and social sciences by linking to Aotearoa Histories Curriculum and mātauranga Māori.

We acknowledge that kūmara do not grow easily in the Southern regions of New Zealand, below the kūmara belt. Māori potatoes/taewa are also seen as a taonga to Māori and might be a nice challenge to grow in Southern schools. They were introduced to Māori by European explorers in the early 18th century and quickly became a main crop.

<https://www.sciencelearn.org.nz/videos/385-taewa-are-taonga-to-maori>

Many Garden to Table schools across the motu are already growing great kūmara. There are still aspects, scientific or cultural, that your students may benefit from in following the lesson sequence in this unit or parts of it. Share your expertise with us, show us your harvests, your hakari/feasts and your local pūrākau – we love to hear what you've been doing.

OVERVIEW

Section 1: How kūmara arrived in Aotearoa New Zealand. How Māori changed the growing environment to suit kūmara.

Section 2: Exploring heat energy and insulation through a Western Science lens.

Section 3: Bringing it all together to decide on the best way to grow our kūmara

SECTION ONE:

How kūmara arrived in Aotearoa New Zealand. How Māori changed the growing environment to suit kūmara.

This section is content-heavy. Pause at any point to explore the details further with your students in a way that suits them. This might be retelling the story, drawing a cartoon, making a video, practicing notetaking or other skills that your students might benefit from.

Lesson 1 What is kūmara?

Learning Outcome:

To find out what we already know about kūmara

Teacher information

To introduce this unit of work, watch and read this lovely story from 5+ A Day Te Taonga Nei Te Kūmara: The Gift of Kūmara. It might be an opportunity to practice pronunciation of kupu Māori, or the names of colours or to find kupu already familiar to your students.

To elicit existing knowledge about kūmara play an interactive True or False game. When students think the statement is true, they stand up. When they think the statement is false they sit down.

Student Activities

Watch Te Taonga Nei Te Kūmara: The Gift of Kūmara

<https://5adayeducation.org.nz/assets/resources/site/eBook6/#/ebook>

True or False:

Kūmara and potatoes come from the same plant family

False – kūmara come from the Morning Glory family Convolvulaceae, potatoes come from the nightshade family Solanaceae and are related to tomatoes, eggplant, capsicum and chillies.

Kūmara were brought to New Zealand in the 1850s on whaling ships from South America

True – but kūmara had already been growing in Aotearoa for centuries after early Māorisettlers had brought them from the Pacific Islands. The original kūmara in New Zealand were only as big as your finger so when the bigger varieties arrived growing them became quickly popular.

Kūmara are underground fruits of a vegetable plant

False – kūmara are actually swollen roots that store the plant's nutrients. Tubers like potatoes are swollen stems, rather than roots.

Kūmara grows well in cold climates

False – Kūmara grow well in warm climates. They are tropical plants so don't grow well where there might be frost. They grow well in the upper half of Te Ika a Māui/the North Island

I love eating kūmara

True and False: Personal choice – some children might not have tried it. For those children who say they don't like it, you could suggest they keep their mind open to new tastes and that they might just like some of the Garden to Table kūmara recipes.

[Watch Koro's Kūmara https://vimeo.com/14229543](https://vimeo.com/14229543)

Discuss the connection of kūmara to Matariki.



Lesson 2 Understanding Polynesian settlement in Aotearoa

Learning Outcome:

To understand how Aotearoa New Zealand was settled

Teacher information

This article talks about Pacific migration and how Aotearoa was settled. It will introduce students to the complex ancient technology needed for Pacific navigation and the origins of mātauranga Māori which has been explored using western methods of archeology.

Use the Teacher Support Material to help you plan a lesson to suit your learners and their reading abilities. You might like to take a deep dive into the article with one reading group and a lighter touch with the whole class. Or one group could focus on each activity in the Teacher Support Material and share their findings back to the class.

Access the Ministry of Education Teacher Support Material here:

<https://instructionalseries.tki.org.nz/Instructional-Series/Connected/Connected-2019-Level-3-Shifting-Views/The-Long-Pause>

The resource links on Page 6 of the Teacher Support Material are worth looking at.

Student Activities

Read this article from Connected Shifting Views: The Long Pause, School Journal, Year 6, Part 1, Number 4, 2007.

https://docs.google.com/presentation/d/1Ey3Lj57h1XKiL3PJZKBgxy4kLer2JgwsjhFfnKyNEow/present?slide=id.g2798d3fd77_o_114

You could discuss:

- When does the article say Aotearoa New Zealand was first settled?
- What role did technology play in migration?
- How does kūmara fit into this story?

Lesson 3 Pūrākau: The Story of Whakaotirangi and her kete of kūmara

Learning Outcome:

To recognise ancient Māori as scientists and observers of the natural world

Teacher information

This pūrākau comes from Tainui. It tells the story of how Tainui's ancestor, Whakaotirangi, brought kūmara to Aotearoa and how she tended her plants to ensure the survival of her crop. It explains the impact of Whakaotirangi changing the way people lived in Aotearoa.

It covers these key ideas: Scientists make careful observations about the world around them. All living things have different requirements to survive and grow. If we want to grow plants, we need to know what they need to grow them well.

Student Activities

Read the story of Whakaotirangi: https://docs.google.com/presentation/d/19ANhKapLrZagEn4QWfMHyeo5MKxWnsouzoHXB_piikY/present?slide=id.g27b3f201f5_o_37

- How is Whakaotirangi considered a scientist? What skills was she using?
- How did she change the land to make it more suitable for growing kūmara? Make a list of the different ways.

If you were going to grow kūmara successfully, what ideas would you borrow from Whakaotirangi?

Begin to gather ideas about how Māori used science to modify soil to be suitable for certain crops. All of these ideas will be useful in the next lessons. You could record them on large pieces of paper on the wall.

<https://www.sciencelearn.org.nz/resources/888-maori-soil-science>

SECTION TWO:

Pūtaiao – Science

Before you start the experiments in this section (depending on the time of year), you might like to begin sprouting your kūmara tipu so they are ready to plant out when the frosts have passed. Look at Lesson 13 for a guide to sprouting kūmara tipu. Start sprouting your tipu around August for planting out in October once the threat of frost has passed.

By now, your students will have a good idea of how extensive the mātauranga Māori – the body of knowledge originating from Māori ancestors – was, shown in the complexities of science to grow kūmara and other plants for food.

We will now work through some Western science experiments exploring similar ideas before bringing all of the knowledge together to grow great kūmara in Section 3.

Ngā Whakaaro Nui/Big ideas:

Heat is a form of energy.

The Sun is our most important source of heat.

A thermometer is used to measure heat. Temperature is a measure of how hot something is.

Dark surfaces absorb more heat than light surfaces.

Insulation is a barrier to the movement of heat. Insulation helps to keep hot things hot and cold things cold.

Heat energy flows from where it is hot, to where it is not.

If you can find the Building Science Concepts series in your school resource library, you might find these books useful:

Book 46 Keeping Warm – Getting Heat Energy and Keeping It (Levels 1-2)

Book 47 Insulation – Keeping Heat Energy In (Levels 3-4)

Book 29 Solar Energy – Sun Power on Earth (Levels 2-4)

After revisiting the idea that when Māori first arrived in New Zealand from the Pacific, they found the climate in New Zealand to be much cooler than their homeland. They had brought with them tropical plants that would need a warmer climate to grow in abundance and so Māori had to change the growing conditions in the land they had arrived in.

Using this idea, work with students to explore ways of increasing soil temperature and ways of keeping that heat. This will include both heat absorption and thermal insulation.

Temperature vs Heat:

Definition – Temperature – a measurement of the amount of heat

Definition – Heat – a form of energy that causes a rise in temperature when the heat energy moves from a warm object to a cooler object

For more information, videos and activities, visit the Science Learning Hub:

<https://www.sciencelearn.org.nz/resources/2262-physical-world-heat>

If you would like to look at heat absorption in more detail before exploring how to increase soil temperature for growing kūmara this is a nice experiment from Science Learning Hub (<https://www.sciencelearn.org.nz/resources/1751-using-heat-energy>) where you wrap chocolate biscuits in different coloured paper and types of wrapping to see which chocolate melts the fastest.



Lesson 8 What do you know about heat and the Sun?

Learning Outcome:

To record what you already know about heat energy

Teacher information

Read or watch the story, Māui Catches the Sun:

<https://youtu.be/akmCMwYmf4E> for the story read in Te reo Māori with subtitles in Te reo Pākehā/English.

<https://youtu.be/bIRBQo9SgJI> for a version read in English.

Ask students to discuss the power of the Sun shown in the story. Did they notice the parched land near where Tama-Nui-Te-Rā/the Sun lived? What else does the Sun do for us?

Student Activities

Māui needed to catch the Sun because it was moving too fast to get all of the jobs done in the day but the Sun gives us more than just daylight.

Ask students to record their ideas that might answer this question: How can we catch the power of the Sun? There is no wrong answer. We are just recording our thinking at this stage.

As students work, ask them to also consider these ideas:

- Where does the heat energy come from?
- Where does the heat energy go?
- What do we do with the heat energy?
- How can we keep the heat energy?
- What would happen if Māui didn't let the Sun go?

Check that students understand that the Sun gives us light and heat.

Take note of which students understand other benefits we get from the Sun, e.g. it warms our bodies and the air, it dries our washing, it can burn our skin, it heats the air in daytime, it helps our plants grow.

Take note of those students using scientific language, e.g. temperature, energy.

Connect to previous learning by asking:

Why is knowing about heat energy important for growing kūmara? How do we use the Sun to grow our plants? How will we use this knowledge to grow our kūmara?



Lesson 15 Growing your own kūmara

Learning Outcome:

To grow kūmara by combining all of the knowledge

Teacher information

Prepare your bed, your māra kūmara. Talk to your students about how they would like to try growing kūmara. What would they like to try? What traditional methods might they use? What have they learnt from their scientific experiments about how to warm the soil effectively?

Decide on how you will measure success. Will you measure weight of kūmara at harvest time? Or is there another measure of success?

Student Activities

We are going to grow our tipu into great kūmara by combining everything we have learnt.

First we need to set some success criteria:

- How will we know our kūmara are great?
- Will we weigh our harvest?
- What are we growing kūmara for? For a hakari/feast at Matariki? For our Garden to Table programme? For sharing with whānau? For gifting to the community?

To grow great kūmara we need to combine all of the different parts of our learning including:

1. Absorbing heat energy from the sun
2. Retaining heat energy by insulating
3. Preparing and modifying your soil. Growing in mounds?
4. Tikanga and local traditions used by iwi, e.g. karakia
5. Traditional growing methods like sprouting tipu in shallow beds or modern methods like sprouting in water?

Watch this video showing how tipu are planted at Te Parapara, <https://vimeo.com/198974193> and this one Room 7 Planting Kūmara: <https://vimeo.com/52972472> from Tāmaki Primary showing how to plant the tipu. Remember to push the J shape stem into the soil gently to encourage more roots to sprout from the stem and so the growing kūmara don't tangle or grow deep roots. The root end of the J should be facing east to face the rising Tama-Nui-Te-Rā, the Sun. Wait until the threat of frost has passed before planting tipu into the māra kūmara.

The kūmara can be harvested in about 150 days, before the first frost. Harvest on a dry day so that the kūmara don't rot. Look at your local maramataka (maramataka - Māori lunar calendar, a planting and fishing monthly almanac) to help choose the best day to harvest. What harvest traditions might you like to use? If you have a big harvest, what is the best way to store them?

What are you going to cook? Garden to Table has some delicious recipes for enjoying your kūmara including:

- Kūmara and orange bliss balls
- Honey-baked kūmara – bilingual recipe
- Kūmara chips with bonfire mayo – bilingual recipe

Tino reka!



This file is a sample showing parts of a Garden to Table curriculum resource.

Please see www.gardentotable.org.nz for more information about what we offer to member schools.

