

EXPERIENCING NATIVE TREES IN YOUR GREEN SPACE

Education resource



Photo: Nicole Portner Photography

Department of
Conservation
Te Papa Atawhai

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A. Introduction



New Zealand trees

New Zealand has many unique plants and trees. 80% of our plants are endemic (found nowhere else but here). They evolved over millions of years to adapt to the climate, ecosystems and conditions of these isolated islands.

What is the difference between a plant and a tree?

The plant group (kingdom) includes trees, flowering plants, ferns, mosses, liverworts and hornworts. Trees are a subset of plants: therefore all trees are plants but not all plants are trees.

This resource focuses on 16 common widespread New Zealand native trees. For information about other types of plants see: doc.govt.nz

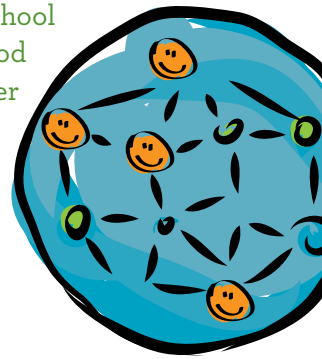


Kōwhai tree

The big picture

You are connected to plants and trees in your local environment.

You, the trees, plants, insects and birds, your school and neighbourhood are part of a bigger ecosystem.



Why are trees and plants important?

Trees and plants are essential for life on Earth. Plants are living things which provide many necessary resources to support humans and animals: food, shelter, habitat, oxygen, nutrients, medicines and building materials. Trees also protect soils, preventing erosion and loss of top soil. They filter water, keeping it clean. Trees are important regulators of our climate: storing carbon and reducing climate change. For more information on the benefits of planting trees, see: tfsnz.org.nz

In Te Ao Māori, trees are part of whakapapa (connections and ancestry) links to animals, people and the environment. Plants and trees are in the domain of Tāne Mahuta (Atua/Lord of trees and forests).

Green spaces, trees and ecosystems

A green space ecosystem relies on plants and trees (producers) to provide the necessary resources and conditions for consumers like birds and insects. An ecosystem includes living things (plants, animals, fungi, and microorganisms) and non-living things (e.g. rocks, soil, sunlight and water). The living and non-living things interact with and rely on each other. For more information about the characteristics of living things, see:

sciencelearn.org.nz.

No plant survives in isolation. Trees and plants are interconnected with other plants, animals and the environment. Each tree, plant and animal has a role to play.



Silvereeye on rātā tree



Curriculum links

Science

Living World: Life processes Levels 1 & 2: Recognise that all living things have certain requirements so they can stay alive.

Levels 3 & 4: Recognise that there are life processes common to all living things and that these occur in different ways.

Planet Earth and Beyond: Earth systems

L 1 & 2: Explore and describe natural features and resources.

L 3 & 4: Appreciate that water, air, rocks and soil and life forms (e.g. trees) make up our planet and that these are Earth's resources.

Nature of Science: Investigating in Science and Communicating in Science

L 1-4- Extend their experiences and personal explanations of the natural world through exploration, play, asking questions, and discussing simple models.

L 1-4- Build their language and develop their understandings of the many ways the natural world can be represented.

Science capabilities: Gather and interpret data, use evidence, critique evidence, interpret representations and engage with science.

Minor curriculum links:

Science: Living World: Evolution, Ecology, Planet Earth and Beyond: Earth systems

Nature of Science: Understanding about science; Participating and contributing

English: Listening, reading and viewing; Speaking, writing and presenting; Ideas

Mathematics: Statistics.

Why find out about trees in your green space?

Identifying which native trees are present in your environment can tell you about the environmental conditions, which animals might live in the area, and any underlying issues that may be present. It will help you to understand what is happening there, and which habitat and foods are available for birds and insects.

This resource provides guidance around facilitating experiences in nature, centred around native trees. It encourages respect and appreciation for trees and their role in enhancing green spaces.

Key concepts

Using this resource, students can:

- connect with and learn about widespread New Zealand native trees
- identify key native trees
- begin to understand how native plants and trees are part of a wider ecosystem.

Key vocabulary

• plant • tree • producer • oxygen • Tāne Mahuta • leaf • seed • flower
• trunk • branch • ecosystem • native

Branch	Woody parts of the tree growing from the trunk or other branches
Ecosystem	An ecosystem is all of the plants, animals and other living and non-living things interacting with each other in a particular place
Flower	The part of a plant which holds the seeds
Leaf	A flattened part of a plant, coming off the stem, where photosynthesis and other processes take place
Native	Plants/trees have arrived in New Zealand by themselves and are found here as well as in other countries
Oxygen	Important gas in the air produced by green plants which animals breathe. Oxygen has no colour or smell but makes up about 1/5 of the gas in the atmosphere
Plant	A living thing which is stationary and absorbs water and nutrients to produce its own food (using the process of photosynthesis). Examples of plants are: trees, shrubs, herbs, grasses, mosses, ferns, liverworts and hornworts

Producer	A producer is an organism that produces its own food using the sun's energy
Roots	The underground parts of plant/ trees that hold them in the ground, provide support and absorb water and nutrients from soil
Seed	The reproductive part of a flowering plant which grows into a new plant
Tāne Mahuta	In Te Ao Māori, Tāne Mahuta is the atua (god/deity) of the trees and forests
Tree	A woody plant which grows to a height
Trunk	The main woody stem of the tree

Symbols used in this resource



This symbol represents New Zealand Curriculum links included in the resource.



This symbol represents hands-on, outdoor learning experiences. These experiences encourage student connection to a local natural environment.



This symbol represents student activities to learn about native trees and reflect on their hands-on, outdoor learning experiences.



This symbol represents inquiry-based learning experiences.



This symbol represents learning experiences around Mātauranga Māori (Māori knowledge and perspectives).

B. Suggested learning sequence



1. IDENTIFY A LOCAL GREEN SPACE in your school or community.

Explore the local green space using the **Exploring your local environment resource**



2. EXPERIENCE BIRDS IN YOUR GREEN SPACE

Explore and investigate birds living in your green space using the **Experiencing birds in your green space resource**



3. EXPERIENCE INVERTEBRATES IN YOUR GREEN SPACE

Explore and investigate invertebrates in your green space using the **Experiencing invertebrates in your green space resource**



4. EXPERIENCING NATIVE TREES IN YOUR GREEN SPACE

Explore and investigate native trees in your green space using this resource

Introducing native trees in your green space

Using hands-on, outdoor learning experiences, students explore leaves and trees-encouraging interest and connection.

Planning your investigation and learning about native trees

Students continue their learning inquiry, reflecting on knowledge and then ask questions about native trees and their connections.

Identifying native trees in their environment

Gathering and reflecting on data. Students add to their knowledge, reflect on predictions, and use and critique their evidence/data about trees.

Extending thinking about native trees

Explore Māori perspectives. Add to big picture knowledge about the green space and how trees influence the ecosystem.

Sharing knowledge and taking the next steps

Students share their findings with the community and then take the next steps in exploring their green spaces.



5. INVESTIGATE ANIMAL PESTS IN YOUR GREEN SPACE

Explore and investigate animal pests in your green space using the **Investigating animal pests in your green space resource**



6. INVESTIGATE PLANT PESTS IN YOUR GREEN SPACE

Explore and investigate plant pests in your green space using the **Investigating plant pests in your green space resource**



7. COME TO CONCLUSIONS AND LEARN HOW TO ENHANCE BIODIVERSITY

in your green space with the **Enhancing biodiversity in your green space resource**



8. FORM AN ACTION PLAN

for your green space using the **Tools for action resource**

This resource is based around these New Zealand native trees

Flowering trees (Angiosperms)

Kōwhai: *Sophora microphylla*

Cabbage tree/Tī Kōuka: *Cordyline australis*

Mānuka/Tea tree: *Leptospermum scoparium*

Lancewood/Horoeka: *Pseudopanax crassifolius*

Māhoe/Whiteywood: *Melicytus ramiflorus*

Kōtukutuku/Tree fuchsia: *Fuchsia excorticata*

Lemonwood/Tarata: *Pittosporum eugenioides*

Patē (Patate)/Seven finger: *Schefflera digitata*

Rātā (both Northern and Southern): *Metrosideros robusta/umbellata*

Broadleaf/Kapuka: *Griselinia littoralis*

Nikau: *Rhopalostylis sapida*

Tree fern

Silver tree fern/Ponga: *Cyathea dealbata*



Pohutukawa tree in full bloom



Kauri tree

Conifers: Podocarps

Kahikatea/White pine: *Dacrocarpus dacrydioides*

Tōtara: *Podocarpus totara*

Rimu/Red pine: *Dacrydium cupressinum*

Mataī/Black pine: *Prumnopitus taxifolia*

NB: The trees listed above are only a small proportion of New Zealand native trees. The species above are a focus for this resource because they are fairly well known, easy to identify, have known ecological links and are found widely throughout New Zealand. Many other plant and tree species will be found in your community, depending on your climate, latitude, altitude, land-use and other factors.

Northern New Zealand iconic species

The following trees are particularly relevant in Northern New Zealand (as they occur there naturally) but can also be found elsewhere:

- Pōhutukawa: *Metrosideros excelsa*. See: [doc.govt.nz](https://www.doc.govt.nz)
- Kauri: *Agathis australis*. See: [doc.govt.nz](https://www.doc.govt.nz)

For more information about kauri, see also:

Keep Kauri Standing: Documents and Resources:

[kauridieback.co.nz](https://www.kauridieback.co.nz)

Science Learning Hub Kauri Dieback article:

beta.sciencelearn.org.nz

Southern New Zealand iconic species

The following trees are particularly relevant to Southern New Zealand (as they occur there naturally) but can also be found elsewhere:

- Beech trees (hard beech, silver beech, mountain beech, red beech and black beech). For more information see [doc.govt.nz](https://www.doc.govt.nz)
- Mountain cedar: *Libocedrus bidwillii*. See [doc.govt.nz](https://www.doc.govt.nz)



Silver beech



New Zealand mountain cedar.
Photo: Phil Bendle

C. Introducing trees in your green space



Establish prior knowledge of students with these hands-on outdoor learning experiences.

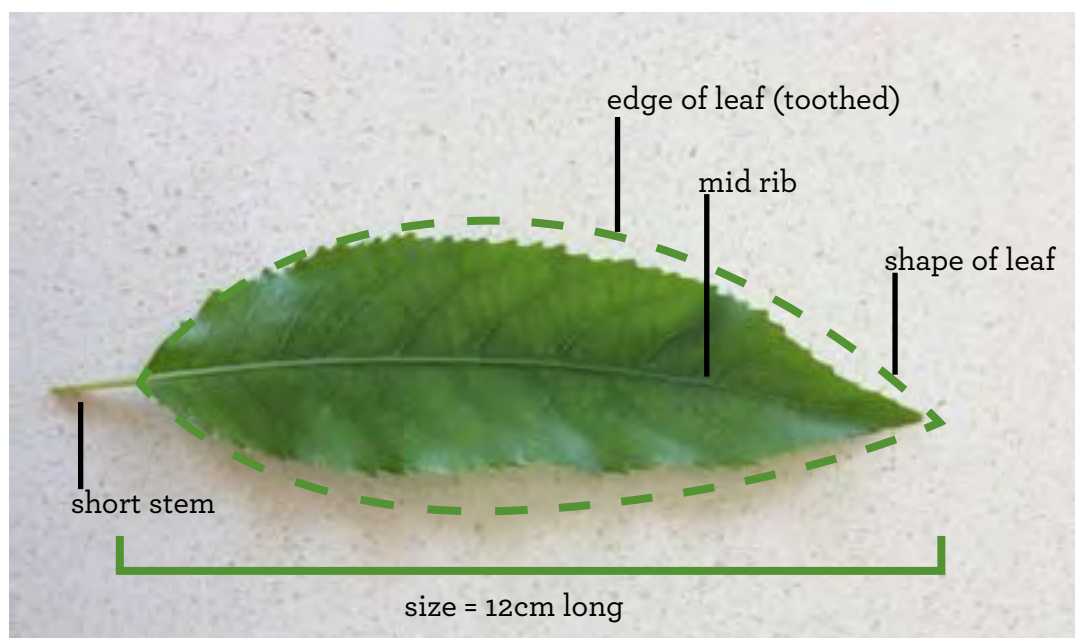
Looking closely at leaves

Students can collect leaves from your green space or around your school. Encourage taking fallen leaves rather than picking them directly from plants.

Features of a leaf

Introduce students to the features of a leaf: size, shape, edges, patterns, arrangement on the stem, leaf coating, texture, colour and other aspects.

The leaf below is from a māhoe/whiteywood tree.



Explore the textures, colours and patterns of leaves. For example the māhoe leaf has a smooth texture and papery feel, bright green colour, and lined patterns and veins.









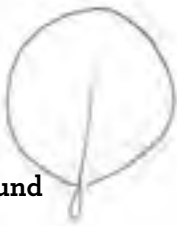


Use the leaf guide on the following page and observed features of the leaves to group the leaves you found.

After grouping, students can share ideas about their grouping with others and discuss the different choices made.

Leaf guide

Use the chart below to help to put the leaves you have collected into groups of similar leaves.

This chart gives some examples of leaf features. Other features include: texture, size, coatings and colour. These can also be used as cues for grouping.

Shapes	Edges	Arrangement on stem
 <p>Hand shaped</p>	<p>Toothed edges</p> 	<p>Leaves grow by themselves off stem</p> 
 <p>Spear shaped</p>  <p>Heart shaped</p>	<p>Wavy edges</p> 	 <p>Leaves opposite on stem</p>
 <p>Needle shaped</p>  <p>Round</p>	<p>Smooth edges</p> 	<p>Leaves are not opposite (alternating) off stem</p> 

Leaf art

Leaf rubbings

Make leaf rubbings of your leaves/leaf groups. Hold one leaf at a time under paper while gently going over the paper with a crayon (only over the area where the leaf is). Apply even pressure. Try holding the crayon in different ways to see if it changes the quality and effects of your rubbings.

Leaf prints and mixed media leaf artwork

Use found objects, paint and leaves to make mixed media pictures of trees in your green space.

Leaves can be used as stencils or stamps. Spray or paint over leaves to give a stencil effect.

Experiment with rolling paint onto leaves and making prints or stamps. Use rollers to achieve an even result. For an excellent tutorial on how to print leaves onto fabric, see: artfulparent.com



Image courtesy of The Artful Parent (artfulparent.com)



Other introductory activity ideas

Build a tree activity

[doc.govt.nz](https://www.doc.govt.nz)

In this activity students take on the roles of different parts of a tree learn how they work.

Let's be a tree activity (for juniors)

[doc.govt.nz](https://www.doc.govt.nz)

A drama activity to encourage learning about how a tree functions.



Exploring trees and leaves

N.B: Before beginning this learning experience, ensure students are familiar with the parts of a tree: e.g. leaves, branches, bark, seeds, flowers, fruit, trunk, roots. See slideshow [New Zealand trees slideshow](#)

Plant sensory bingo

Students can use the [plant sensory bingo sheet](#) to investigate trees in their green space. In groups, pairs or individually, students can explore plants and trees using their senses and record/tick off what they find. Look at trees, plants and leaves closely. Engage the four senses to look, touch, smell and feel leaves and plants. Avoid tasting.

This learning experience helps the teacher to informally assess prior knowledge and experiences of students. Students learn to look closely at leaves and examine how they are different. They also become familiar with the parts of a tree.

D. Identifying native trees



Before gathering data about trees

View the presentation: [New Zealand trees slideshow](#) to familiarise students with identification tools and features of New Zealand trees.



Gathering data about native trees in the green space

For younger students (approximately Year 1-4)

The focus for this age-group is on identifying a chosen 1-5 key native tree species. Students make observations of trees in the green space and then decide if these 1-5 trees are present or not present (choose 1-5 relevant species for your area from the 16 [NZ tree ID sheets](#)).

Equipment

- [NZ tree ID sheets](#) (one per group)
- Recording paper or notebook
- Pencil/pen

Method

- Use the [New Zealand trees slideshow](#), and [NZ tree ID sheets](#) as tools to introduce 1-5 tree species and features such as leaf shape and colour. Familiarise students with the types of tree in your green space (according to ability)
- Walk students through an example – using one of the ID sheets to identify a tree. Encourage them to observe like scientists (using their senses) the leaves, bark and any flowers/fruit on the tree(s)
- Divide students into small groups and give them a copy of an ID sheet of a tree you have already introduced
- In their groups, students can focus on the species on their sheet and decide if it does or does not live in a small area of your green space
- Record the number of each species found in the green space (students can keep a tally)



Curriculum links

Science

Evolution: Levels 1 & 2: Recognise that there are lots of different living things in the world and that they can be grouped in different ways.

Evolution: Levels 3 & 4: Begin to group plants and animals into science-based classifications.



Photo: Nicole Portner

- Younger students may need adult assistance to aid with their observations and to correctly identify features
- Discuss results together and combine information to record which native trees are present in your green space.

Tree identification for older students (approximately Year 5+)

Equipment

- [NZ tree ID sheets](#)
- Recording paper or notebook
- Tape measure (if necessary).

Advanced method

- Use the [New Zealand trees slideshow](#) and [NZ tree ID sheets](#) as tools to introduce relevant native tree species. Familiarise students with an appropriate number of trees in your green space (according to prior knowledge and ability). If students have no prior knowledge, limit focus species to 5
- Divide your green space into equal quadrats (square portions of survey areas)
- Divide students into small groups. Each group of students can become experts at identifying 2-5 species of tree
- Each group can examine one quadrat and record where (if anywhere) they have observed their species of tree. Beginners could just record the presence or absence of each tree on their groups' ID sheets and count them. More advanced students could record the approximate positions of their species using graph paper or maps
- If capable, the groups can examine the different quadrats and survey a wider area for their trees
- When the groups have surveyed the whole area/all the quadrats, the information can be shared to compile a representation of which trees are living in the green space and where they are found (see examples of recording results on following page)
- For students who are very familiar with tree identification, you may wish to give groups all (16) ID sheets and the groups can conduct the entire survey
- Record your sightings of native plants and trees and share with others using the [iNaturalistNZ](#) website or [iNaturalist](#) app. For more instructions about using these tools, see: [Exploring your local environment resource](#) (J. Citizen Science – page 17 and [blog.core-ed.org](#))

Examples of recording results

Beginners:

Tree species	Quadrat	Number of trees
Mānuka	1	3

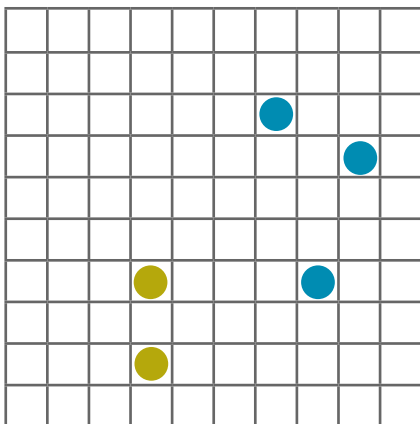
Intermediate:

Tree species	Quadrat	Number of trees
Mānuka	1	3
Lemonwood	1	2
Mānuka	2	5
Lemonwood	2	4

Advanced:

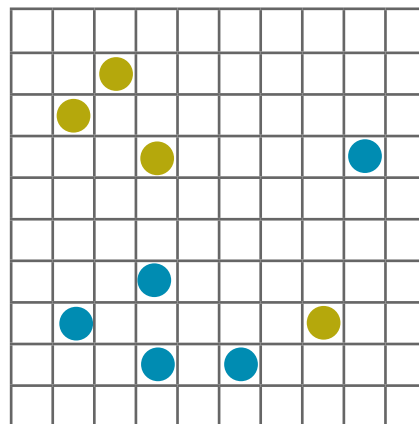
Quadrat one:

● Mānuka ● Lemonwood



Quadrat two:

● Mānuka ● Lemonwood



Verran School students identifying trees in their school grounds.

E. Reflecting on and critiquing data



Using evidence

What did students notice during the tree survey? What do they think about their observations?

What knowledge can they connect to what they have observed? Think, pair share ideas and then record.

For example:

I noticed: 'The bark of the cabbage tree was very rough'

I think: 'A rough trunk might help the tree to defend itself from browsers'

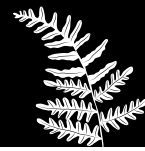
I wonder: 'If smooth trunked trees have more insects living on them?'

I noticed...	I think...	I wonder...

Critiquing evidence

- If you have enough data, plot the trees on a diagram or map of your green space.
- Ask students to consider the following:
 - What were the most common New Zealand trees in your green space?
Why was this?
 - Were there areas with NO trees or areas where there were MANY trees?
Can you think of any reasons for this?
 - Were your sampling methods good? Do you think they gave a reliable result?

F. Planning your investigation and learning about NZ trees



Thinking about the role of trees and plants



Curriculum links

Science: Nature of science:
Investigating in science,
Communicating in science.

Living world: Life processes.

Science capabilities: Interpret representations, Engage with science.

Learning outcome

Students are learning to:

Appreciate that plants provide food, shelter, oxygen and habitat for animals.

Success criteria

Students can:

Describe how plants meet the needs of animals so they can feed, drink, live and survive.

The needs of plants and animals

Plants and trees need light, soil, water, space and air to grow.

Animals cannot produce their own food, so they must eat plants or other animals (who rely on plants) for their energy and nutrition.



How plants meet the needs of animals

Plants are called 'producers' because they produce/make their own food. Plant leaves harness energy from the sun to convert water and carbon dioxide gas into oxygen and sugars. These sugars provide the energy to fuel the life processes of a plant. This process is called photosynthesis.

Photosynthesis basic summary:

Carbon dioxide + water + sunlight → sugars + oxygen

For more information about photosynthesis see: [Photosynthesis : The Dr. Binocs Show](#) and [Photosynthesis : How plants make food](#)



Further exploring how trees provide for animals

Trees provide shelter, habitat, food, oxygen and soil for animals. Without trees, animals would not survive!

The experiential game on page 20 – explores simplified concepts of how plants provide for the needs of animals.

Learn about how animals meet their needs with the help of trees. Thanks to Verran Primary School students and their enviro teacher Maureen Robertson for their help in developing this game.

G. Experiential game: Meet your needs



Before starting the game:

- Divide your group/class in half. One group take on the role of trees/producers and the other half are animals (birds and insects)
- Decide on an area to play in. Set boundaries for the game
- For younger players you may wish to use fewer needs cards (e.g. only water and food) to simplify the game
- Discuss what trees and producers provide for animals (food, shelter, oxygen, habitat, clean water, etc...). Explain that this game focuses on 3 of the needs that plants meet for animals (there are other things plants provide but the game has been kept simple for all age groups).

Equipment needed:

- Enough hoops or cones for the animal players.
- Copy the cards on page 22. Have enough needs cards for half the class to each have a set of them. For example, for a class of 24, you will need 12 copies of page 2 each (which will make 48 cards altogether once they have been cut out).

Instructions

Aim: The aim of the game is for the animal players to meet their needs by collecting the set of (3) needs cards- food, oxygen and shelter.

As above, the class is divided into half trees and the other half animals.

Trees

Trees each receive the same number of needs cards (randomly given). They must space themselves apart as much as is practical in the area given. They lay the cards they have been given face-down on the ground around them (without peeking!) and stay beside them throughout the game. No one knows where the rat cards are!

Animals

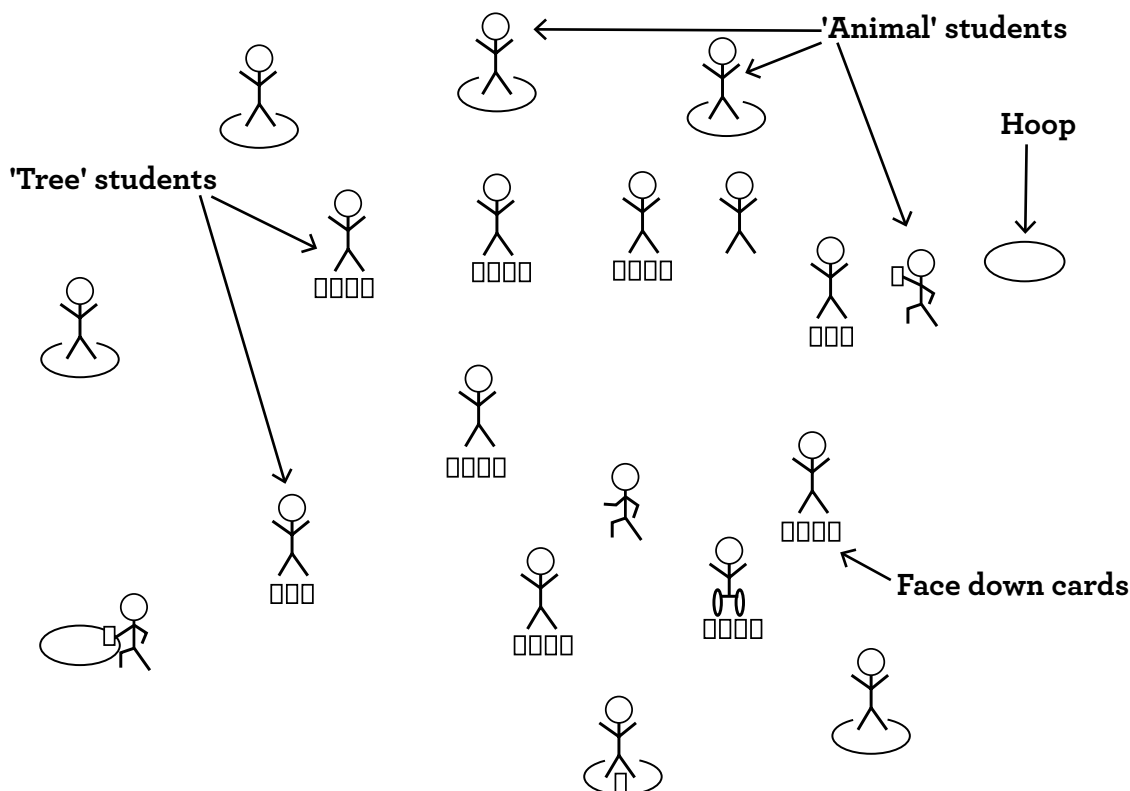
Animals may spread around the perimeter of the 'forest'/game boundary.

When the Teacher says 'GO', the animals may walk to take ONE card from a tree back to their hoop or cone and place it there. They must not peek at cards until they are back at their hoop and must only get one card at a time. When moving amongst the trees students must be careful not to collide with others. If they peek or collide into someone the student is given a warning and must go out of the boundary and count to 5 before moving again.

Once the card is in the hoop/at the cone they can go for another card. If it is a card they don't need (e.g. a double up) they can put it back at a tree.

If animals pick up a pest card they must stop and give out the need cards they have collected to nearby trees - every card at a different tree. Other animals can pick up the cards but the student cannot take back their discarded cards.

Animals keep collecting and putting cards into their hoop until they satisfy all their needs.



Winning the game

If students have collected all 3 needs cards they go back to their hoop and wave their arms signalling that all their needs have been met. The first student(s) with their needs met wins the game.

After each round, swap the two groups over: the trees become animals and animals become trees.

H. Extend thinking about native trees



Investigating trees – Continuing or starting a learning inquiry

- After exploring leaves and trees in the green space, ask students to think about what roles they play
- Do students have questions about trees and plants? What questions did they have through previous resources/inquiries?
- Record ideas for inquiry questions e.g. What do trees do in an ecosystem? How are they beneficial for animals?
- Plan an investigation and decide how you will find out the answers to your questions
- If you have access to experts, invite them to come and speak to the students about a topic they are interested in learning more about
- View the [New Zealand trees slideshow](#) to introduce students to tree parts and ID features.

Trees in the ecosystem

Trees are a vital part of ecosystems. Animals meet their needs using resources provided by plants and trees in the environment. Every part of a tree is performing a function for animals or the wider ecosystem e.g. the roots of the tree hold the soil together and provide habitat for some invertebrates.



How do plants and animals rely on each other and the environment?

Within a green space, animals and plants have different requirements to stay alive. Many animals rely on plants for food, shelter and air to breathe, while many plants rely on animals to help them reproduce; for example, nectar feeding birds such as tūī, pollinate flowers. Seed producing plants rely on native birds to disperse their seeds. In an ecosystem, all living things could not survive without each other, or non-living elements such as water and the sun.

Explore the following [Connections information sheets](#) (PDFs) to find out more about how trees are connected to animals:

[Cabbage tree/Tī Kouka connections](#)

[Mānuka connections](#)

[Tree fuchsia/Kōtukutuku connections](#)

[Other connections](#)

[Native trees and their connections with people](#)

These information sheets can be used as part of your reading programme or as a prompt for writing or artwork about connections between trees and animals.

Try this interactive game to reinforce learning about how animals and trees interact in an ecosystem: doc.govt.nz



Māori perspectives of trees

In Te Ao Māori, Ranginui (the Sky Father) and Papatūānuku (the Earth Mother) had children who are atua (deities or gods). The atua look after the different elements and domains of the Earth. Tānē Mahuta (one of Ranginui and Papatūānuku's children) is the atua of trees and forests. He created trees, birds and insects. Tānē protects/looks after these beings in the green space. When dealing with trees or taking parts of trees to use, there is a belief and protocol (tikanga) that a person should ask Tānē Mahuta for permission to use any trees or other natural resources. Read the **Legend of Rātā and the Tōtara** to learn about tikanga and trees (on the next page).

Whakatauki / Proverbs

Many proverbs or whakatauki are based on the traits and characteristics of native trees.

***Ko te manu e kai ana i te miro,
nōna te ngahere.***

***Ko te manu e kai ana i te mātauranga,
Nōna te ao.***

***The bird that eats of the miro tree
owns the forest.
The bird that feasts on knowledge
Owns the world***

Ka whati te ti, ka wana te ti, ka rito te ti

When a cabbage tree is broken it shoots up and grows a new head of leaves

Rongoā Māori

Trees and plants were a source of materials, building supplies, weaving materials and medicines historically for Māori.

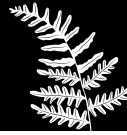
Rongoā Māori is a system of healing and health maintenance, using native trees. For example:

- the inner bark of pohutukawa can be used to treat dysentery and diarrhoea
- the sticky liquid from cabbage tree leaves was applied to cuts, sores and dry skin
- mānuka leaves were boiled in water and drunk to help kidneys and bladder work more efficiently.

Learn more about Rongoā Māori (traditional medicinal use of plants) in:

- *Junior Journal 48, Level 2, 2014 – Helpful trees and plants, Rongoā Māori*
- *The science of Rongoā: Connected L3 2015*
- Science Learning Hub-Rongoā Māori: beta.sciencelearn.org.nz
- *Nga taonga o te ngahere – treasures of the forest. By Tom Paul 1987.*
- Landcare Research Māori plant use database: maoriplantuse.landcareresearch.co.nz
- [The legend of rata.](#)

I. Native trees resource list



School Journals

- Coronation forest: School Journal Level 2 May 2015*
- Kauri Island: School Journal Level 4 November 2014*
- Pōhutukawa: Junior Journal 45, Level 2, 2012*
- My amazing plant: Connected, No. 1, 1999 p 9*
- Killer plants: School Journal, Part 2, No. 1, 2010 p 8-13*
- Do you eat grass? SJ Part 2, No. 4, 1999 p 26-27*
- The world of ferns: Connected 3, 2002*
- Heartbeat: School Journal Level 3, June 2012*

Websites

doc.govt.nz/nature/native-plants

doc.govt.nz/nature/habitats/forests

New Zealand Plant Conservation Network – Introduction to plants: nzpcn.org.nz

Trees for survival website: tfsnz.org.nz

ESOL online growth context: esolonline.tki.org.nz

Science Learning Hub

Flowering plants context: beta.sciencelearn.org.nz

Fern context: sciencelearn.org.nz

Books

Discovering New Zealand trees by Sandra Morris, New Holland Publishers, 2015

Pohutukawa by Sandra Morris. Dummy, 2012.

A pukeko in a ponga tree by Kingi Ihaka, Penguin, 2014

Tree identification help

Which native tree? By Andrew Crowe. Penguin books, 1992- 2009.

The life-size guide to native trees and other common plants of New Zealand, by Andrew Crowe. Penguin books, 2000.

J. Sharing knowledge and taking the next steps



Becoming part of the wider science community: Engage with science

Citizen science

Citizen science enables students to participate in the scientific community and contribute to increasing their knowledge about New Zealand trees and animals. It assists learning using all aspects of the Nature of science strand, as well as the science capabilities.

NatureWatchNZ / iNaturalist citizen science projects

Record observations of native plants and trees and share with others using the

iNaturalistNZ website or **iNaturalist** app. For more instructions about using these tools, see: **Resource 1: Exploring your local environment** (page 17 and **blog.core-ed.org**).



Further exploring human impacts on native trees

For more information about how humans have altered the New Zealand landscape and affected native trees in New Zealand, see these resources:

Science Learning Hub deforestation article: **sciencelearn.org.nz**

Timber! School Journal: L3, Nov 2011 **esolonline.tki.org.nz**



Take the next steps towards environmental action

Use **Resource 7: Enhancing biodiversity in your green space** to reflect on the species found in your green space and to form a plan for increasing biodiversity and eliminating any pests.

Continue learning about plants and trees. For a comprehensive resource suitable for extended teaching and learning about plants, see: **nzpcn.org.nz**

Network with others who are involved with restoration and enhancing trees in your local community.

Then use **Resource 8: Tools for action** to organise and plan an environmental action which will enhance biodiversity and native trees you have found in your green space.



Trees that count

Trees That Count is a national project which aims to have every New Zealander plant a tree in 2017 – that’s 4.7 million trees! This will enhance biodiversity and help to reduce climate change. For more information see: doc.govt.nz

Trees for survival

Trees for survival is an environmental education programme which assists schools to grow and plant native trees and connects communities. See: tfsnz.org.nz









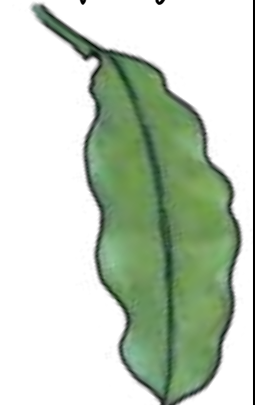



Plant sensory bingo

Look for the following objects in your green space.

Tick the objects you find.

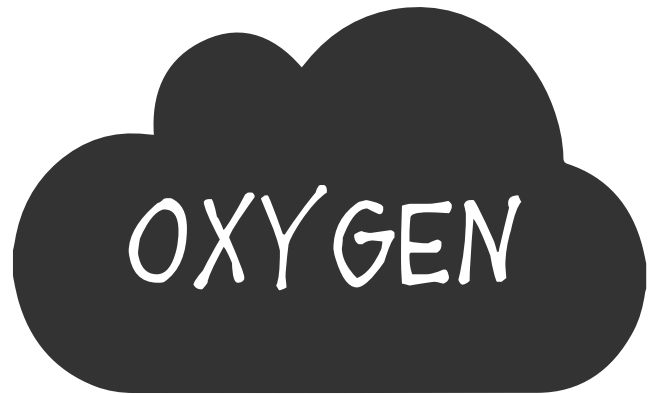
Found a whole line? You've got a bingo!

<p>A seed</p> 	<p>rough bark</p> 	<p>a branch</p> 	<p>a furry leaf</p> 	<p>a leaf that is not green</p> 
<p>flowers</p> 	<p>tree roots</p> 	<p>a shiny leaf</p> 	<p>a leaf with wavy edges</p> 	<p>a leaf with toothed edges</p> 

Select 'current page' in the print dialogue box

Needs cards

Copy enough for half of your group to have each of the needs cards.



Select 'current page' in the print dialogue box

1. Kōwhai

Sophora microphylla

A branching tree common throughout New Zealand. Many parts of this tree are poisonous. Take care when handling.

Leaves

Small rounded leaves that are opposite on the stem.



Bark

Smooth, white/grey-brown, patchy.



Kōwhai tree in full bloom



Kōwhai tree with no flowers. Photo: Shan Walker

Flowers

Yellow, medium sized tube-like flowers with olive green tops.



Photo: Phil Bendle

Seeds/seed pods

Seeds are yellow. The seeds are poisonous.



Photo: Phil Bendle



Size

Up to 10 metres tall.

Select 'current page' in the print dialogue box

For more information about kōwhai, see doc.govt.nz

2. Cabbage tree / Ti kōuka

Cordyline australis

Found throughout the North and South Islands. Common in open areas, farmland, scrub and wetlands.

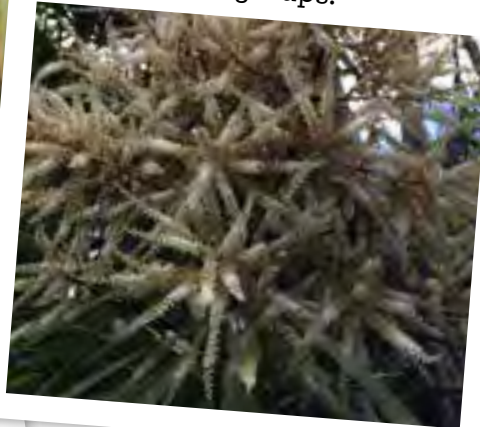
Leaves

Very long, narrow leaves. Can be green/yellow or brown.



Flowers

Small, white flowers, growing in groups.



Fruit/seeds:

Bluish white, small, round fruit.

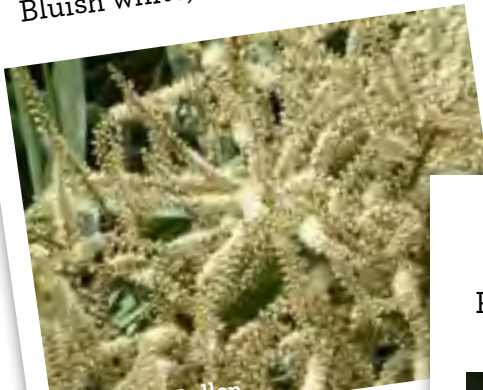


Photo: Kiri Pullen

Bark

Rough, grey-brown trunk. Feels spongy when squeezed.



Photo: Phil Bendle

Size

Up to 20 metres tall.

For more information about cabbage trees, see doc.govt.nz

Select 'current page' in the print dialogue box

3. Mānuka/Tea tree

Leptospermum scoparium

A small tree common throughout New Zealand. Grows easily in open areas.

Leaves

Small, hard leaves with smooth edges. Feel spiky to touch.



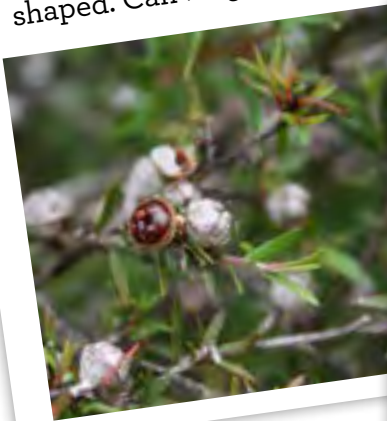
Flowers

Small white flowers with 5 petals. Dark brown centres.



Seeds/seed capsules

Seed pods are round and bowl shaped. Can be grey-brown.



Bark

Flaky, messy looking brown bark.



Size

Up to 4 metres tall.

Select 'current page' in the print dialogue box

There are many other species of tea tree (e.g. Kanuka) that can look slightly different to Mānuka. See:

www.doc.govt.nz for more information on these differences.

4. Lancewood/Horoeka

Pseudopanax crassifolius

A flowering tree common throughout New Zealand. This tree looks quite different when it is young to when it is an adult tree (see leaf photos below).

Leaves

Leaves alternate off the stem and are pale underneath. Juvenile leaves are dark brown-green, long, very toothed and hard. Adult leaves are shorter, wider and lighter green compared to young leaves.



Bark

Straight, thin trunk with white-grey-brown patchy bark.



Fruit

Purple-black fruit.



Flowers

Small green-yellow flowers.



Size

Up to 15 metres tall

Select 'current page' in the print dialogue box

For more information about lancewood, see doc.govt.nz

5. Māhoe / Whitey-wood

Melicytus ramiflorus

A flowering tree common throughout New Zealand.

Leaves

Medium sized leaves with toothed edges. Alternate on stem.

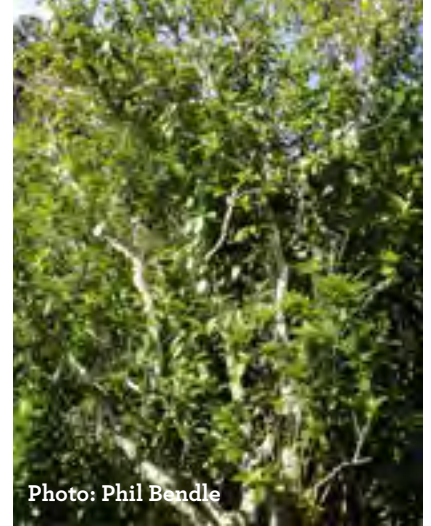


Photo: Phil Bendle

Fruit

Purple small round berries.



Photo: Phil Bendle

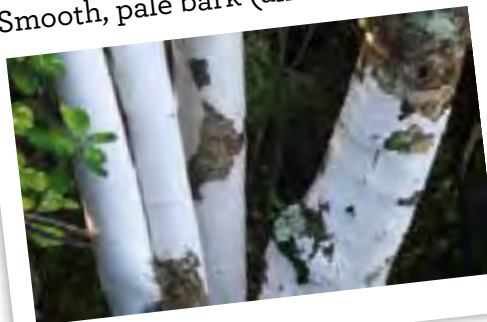
Flowers

Pale yellow-green star shaped flowers which branch off the stem.



Bark

Smooth, pale bark (almost white).



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Size

Up to 10 metres tall

6. Kōtukutuku / Tree fuchsia

Fuchsia excorticata

A flowering tree common throughout New Zealand. Can be deciduous in colder southern areas of New Zealand.

Leaves

Thin, long leaves. Wavy edges. Underside silvery grey.



Photo: Phil Bendle



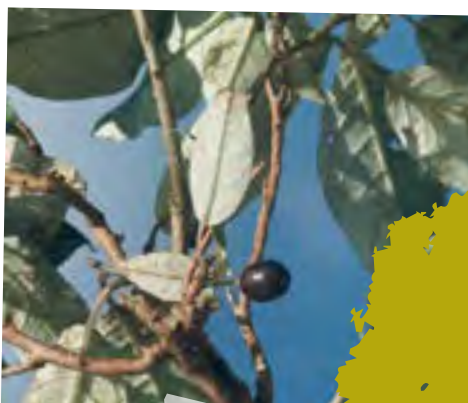
Photo: Phil Bendle



Photo: Kiri Pullen

Fruit

Dark purple berries when ripe, green earlier on.



Flowers

Green- purple- red flowers that hang downwards in groups.



Photo: Brent Tandy

Bark

Loose papery bark that can be stringy.



Size

Up to 12 metres tall

35

7. Lemonwood/Tarata

Pittosporum eugenioides

A flowering tree found throughout New Zealand in a variety of places.

Leaves

Smell like lemon when crushed.
Glossy on top, wavy edges.



Bark

Textured and grey colour.



Flowers

Cream, star-shaped, small flowers
that grow in bunches. Smell sweet.



Fruit

Green round berries in
spring – summer.



Size

Up to 12
metres
tall

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page' in the
print dialogue
box

For more information about
kōtukutuku, see doc.govt.nz

8. Patē (Patate)/Seven finger

Schefflera digitata

A flowering tree common throughout New Zealand. Dry, soft wood.

Leaves

Hand shaped long leaves with 7-9 'fingers'. Opposite on stem.

Photo: Herb Christophers



Photo: Phil Bendle

Flowers

Flowers are small and green - cream colour. They hang in groups in summer.

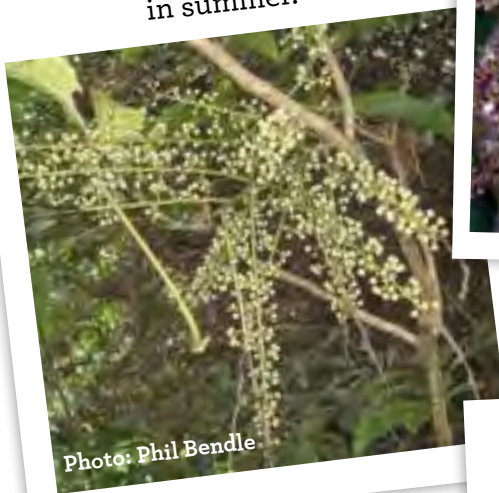


Photo: Phil Bendle

Fruit

White or dark purple (when ripe), very small round fruit.

Photo: Phil Bendle



Bark

Greenish- brown coloured bark.



Size

Up to 8m tall

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9. Northern & southern rātā

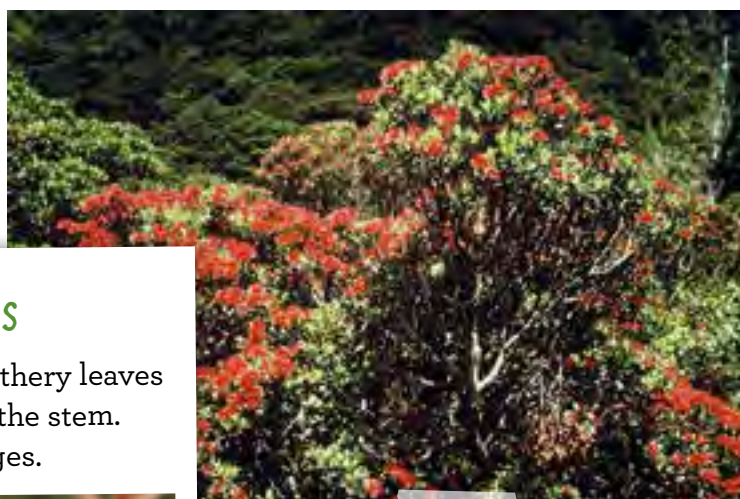
Metrosideros robusta & *Metrosideros umbellata*

Northern rātā: a flowering tree common in the North Island. Northern rātā often seeds and grows in branches of other trees then sends its roots down and takes over the host tree. Trunk often hollow.

Southern rātā: a flowering tree common throughout most of New Zealand except Northland and the east coast of South Island. Southern rātā starts life on the ground and does not have a host tree.

Flowers

Flowers appear in spring – summer (Nov-Jan) and are red/pink and sometimes orange.



Leaves

Oval, dark green, leathery leaves that alternate on the stem. Smooth edges.



Seeds

Brown seed capsules contain hundreds of seeds.

For more information about rātā, see doc.govt.nz and projectcrimson.org.nz

Size

Northern rātā: up to 25-40 metres tall; 2.5 metres wide trunk.

Southern rātā: up to 15 metres tall; 1 metre wide trunk.

Select 'current page' in the print dialogue box

10. Kapuka/Broadleaf

Griselinea littoralis

A flowering tree common throughout New Zealand in a variety of settings.
Can tolerate cold and can be found up to 1000m above sea level.

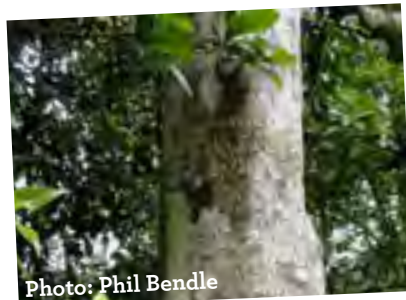
Flowers

Small yellow-cream flowers.



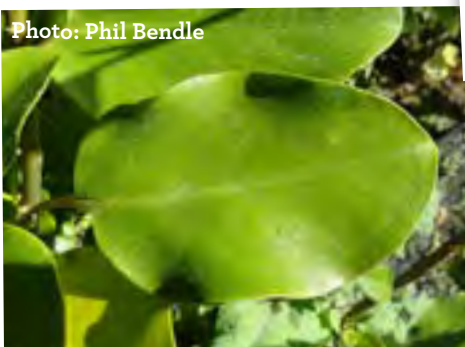
Bark

Rough, dark trunk.



Leaves

Thick green leaves that are smooth and shiny. Slightly wavy edges. Round-oval shape, alternate on the stem.



Fruit

Small dark purple fruit.

Size

Up to 20 metres tall

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11. Nikau

Rhopalostylis sapida

New Zealand's only palm tree and the southernmost palm in the world.
Slow growing and found in coastal or low-lying, warm areas.

Flowers

Pink-pale purple flowers grow together on stalks.



Leaves

Long, narrow leaves with smooth edges. The fronds can be up to 3 metres long.



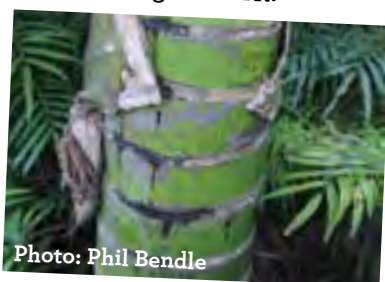
Fruit

Bright red, round fruits grow in bunches and take about a year to ripen.



Bark

Smooth, green ringed bark.



Size

Up to 15 metres tall

Select 'current page' in the print dialogue box

For more information about nikau, see doc.govt.nz

12. Silver fern/ponga

Cyathea Dealbata

A tree fern usually found in dry or open areas. Only this tree fern has the silver underside of the leaves.

Fronds

Lobed fronds. A silver colour appears underneath leaves when tree is 3-4 years old.



Mature silver fern.
Photo: Phil Bendle



Bark

Dark brown spiky trunk with big sticks (frond bases) coming out from trunk.



Spores

Spores are contained in brown round capsules under leaves.



Juvenile silver fern.
Photo: Phil Bendle

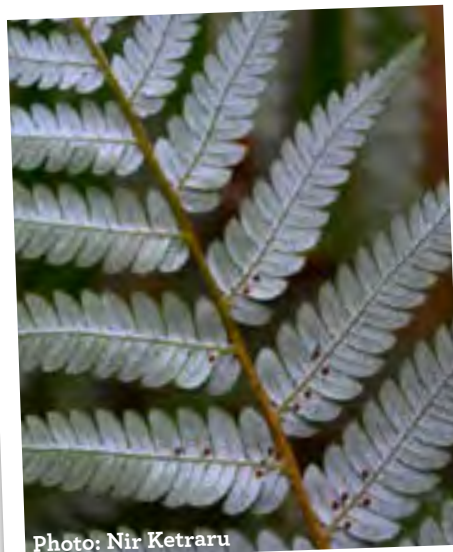


Photo: Nir Ketraru



Size

Up to 10 metres tall

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13. Kahikatea

Dacrycarpus dacrydioides

A non-flowering tree (conifer) usually found in wet areas.
Lives to 500 + years. Ancient and unique tree.

Cones

Orange cones appear on male trees in spring.



Leaves

Very small, scale like leaves that are arranged like a spiral on the stem.



Size

Up to 80 metres tall – New Zealand's tallest tree.

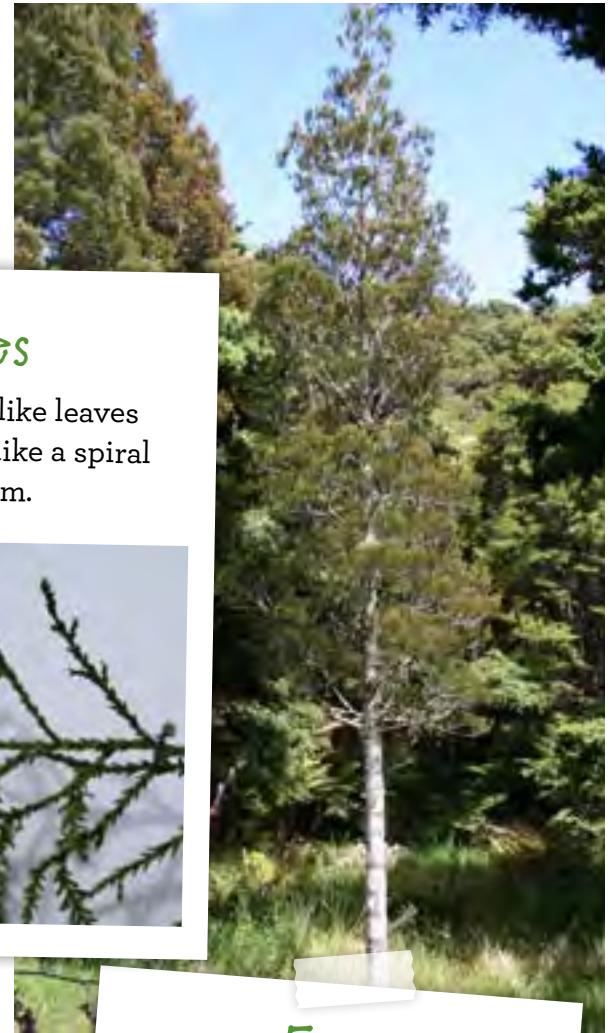
Bark

Textured grey and white.



Fruit

Small orange-red fruit that grows under a purple-black seed. To eat the fruit birds must first eat the seed.



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14. Tōtara

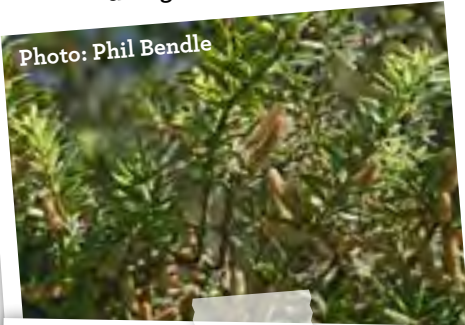
Podocarpus totara

A non-flowering tree (conifer), common throughout New Zealand.

Cones

Cones appear in spring and are green-brown.

Photo: Phil Bendle



Leaves

Small, spiky, dark-green leaves that alternate on the stem. Smooth edges.



Fruit

Small red fruit that grows under a green-black seed. To eat the fruit birds must first eat the seed.



Bark

Brown and has flaky strips.

Photo: Phil Bendle



Photo: Phil Bendle



Select 'current page' in the print dialogue box

Size

Up to 30 metres tall

Please note - other species of tōtara can look slightly different.

15. Rimu

Dacrydium cupressinum

A non-flowering tree (conifer) common throughout New Zealand.

Leaves

Small, scale like leaves that grow close to the stem in long 'needles'. Prickly to touch.



Fruit

Fruit cup that carries the red-black seed is only produced every 5-6 years.



Cones

Very small cones appear on female trees.



Size

Up to 50 metres tall

Bark

Brown and has flaky strips.



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16. Matai

Prumnopitus taxifolia

A non-flowering tree (conifer) quite common throughout New Zealand.
The young matai looks quite different to the adult tree.

Leaves

Small, straight, dark-green leaves that alternate on the stem.
Smooth edges with round tips.
(NB: Miro tree leaves look similar but have banana shaped leaves).



Fruit

Purple – black round fruit.

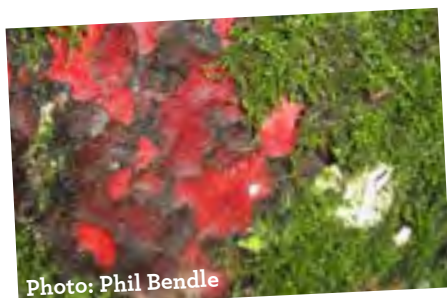


Cones

Yellow cones.

Bark

Grey-brown bark that flakes off in big chunks, leaving red patches on trunk.



Size

Up to 30 metres tall



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Cabbage tree / ti kōuka connections



Foods for animals
Cabbage tree flowers provide nectar for bees, flies, other insects and geckos. The white flowers are pollinated by these animals and then become fruit (berries). These white berries are good food for birds like kererū.

Habitat
Cabbage trees provide shelter and habitat for animals. Harrier hawks use the leaves for making their nests. Hollows in cabbage trees provide important roost sites for our native long-tailed bat.



Interesting fact
In parts of the South Island cabbage trees were planted as 'way marker' trees to direct Māori on their journeys.

Threats
In 1987, a mystery disease started to kill off cabbage trees in the North Island. After nearly five years of work, scientists found the cause was a parasite, which they think might be spread from tree to tree by a tiny sap-sucking insect, the introduced passion vine hopper. The disease makes leaves fall off when still green. Plant pests such as old man's beard can also smother and kill cabbage trees.

Cabbage tree moth
Look for the beautiful cabbage tree moth and their caterpillars on cabbage trees. The moths hide under dead leaves during the day and caterpillars eat the young leaves.

Select 'current page' in the print dialogue box

Mānuka connections

Habitat

Mānuka trees provide shelter and habitat for animals.

Grey warblers and fantails like to build nests and feed in trees like mānuka and kanuka.

Invertebrate connections

Many invertebrates such as moths, bees, flies, wētā, spiders and beetles, feed and live on mānuka trees.

Mānuka branches and trunks are sometimes covered with sooty mould (a black fungus that feeds on the honeydew from scale insects).

Stick insects like to eat mānuka.

Foods for animals

Mānuka trees provide pollen and nectar for native bees, flies, moths, beetles and geckos.

Interesting fact

This tree produces the nectar for our world famous mānuka honey which is believed to have great healing properties.

Threats

Introduced animals, such as goats and sheep, usually don't choose to eat mānuka. This makes it a great choice to plant when you want to start growing a forest. However plant pests such as wandering willie and ivy can take over open areas, stopping mānuka seedlings growing.

People can be a threat to mānuka, when they cut it down for firewood or for other use of land.

Native beetle on mānuka.



Puriri moth on mānuka. Photo: Phil Bendle



Bee on Mānuka. Photo: Nga Manu Images NZ



Gecko on Mānuka. Photo: Rod Morris



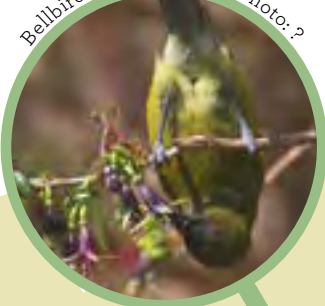
Mānuka tree. Photo: Shan Walker



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Tree fuchsia/Kōtukutuku connections

Bellbird on tree fuchsia. Photo: ?



Foods for animals

Kōtukutuku provides nectar, fruit and seeds for visiting birds at different times of the year.

Tūi, bellbirds and silvereyes drink the nectar of tree fuchsia.

The seeds, flowers and fruit are an important food for tūi and kererū.

Habitat

Tree fuchsia provides habitat and shelter for many animals. It can grow to 12 metres tall – it is the largest fuchsia in the world.

Tūi on tree fuchsia, Stewart Island. Photo: Andrea Lightfoot.



Invertebrate connections

Peripatus (velvet worm) prefer areas of native forest floor where trees like tree fuchsia grow.

Wētā will eat the fruit of kōtukutuku.

Tree fuchsia. Photo: Phil Bendle



Tree fuchsia flower. Photo: Brent Tandy.



Threats

Possums love tree fuchsia and will eat it until it disappears. Goats will also eat these trees. Plant pests such as buddleia and banana passionfruit can invade areas where tree fuchsia grows.

Possum. Photo: DOC



Interesting fact

The flowers of tree fuchsia are unique: they change colour once they have been pollinated and the pollen is blue!

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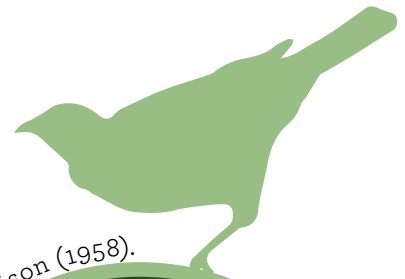


Kōwhai. Photo: Phil Bendle.



Kōwhai

Kōwhai flowers are an important nectar source for birds. They attract tūi, bellbirds and silvereyes to gardens or green spaces. These birds later 'graze' kōwhai trees for insects to feed their young.



patē fruit Photo: Peter Morrison (1958).



Patē/Seven finger

This tree is a magnet for getting birds to your garden or green space. Many birds LOVE the berries of patē.

Other connections



Broadleaf flower. Photo: Kiri Pullen.



Kāpuka/Broadleaf

Kāpuka is also known as 'possum icecream' as it is a favourite food of theirs. Where there are high possum numbers, these beautiful trees disappear. You may also find the large black and white longhorn beetle under kapuka leaves.



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Waka taua Photo: Stacy White.



Traditional Māori uses of trees

Tōtara were one of the trees used to make 'waka taua': single hulled canoes. Berries were eaten as food. Its branches were used as friction sticks for the fire lighting with māhoe.

Tarata/ Lemonwood

There are accounts of our ancestors in New Zealand chewing the gum of tarata for bad breath.

Building and construction

Native timbers (e.g. kauri, kahikatea, mātai, rimu and others) were used regularly by early settlers for building houses, furniture and other items. Rata timber is incredibly hard, strong and durable.

Other timbers had different properties useful for certain things, e.g. kahikatea was used to make butter boxes in the early 1900's, because it didn't make the butter smell.

Māhoe/Whiteywood

With tōtara, was used for fire lighting because mahoe is very soft and easy to ignite. People twirled a hardwood stick like a tōtara branch on the mahoe creating fire through friction.

Silver fern tree. Photo: Phil Bendle.



Cultural connections

Ponga/Silver Fern: Silver fern is the namesake and generally regarded as a symbol of the New Zealand Silver Ferns netball team.

Kauri: Tāne Mahuta in Waipoua Forest, Northland (our largest known living kauri tree) has become world famous and iconic. This tree represents Tāne Mahuta (Lord/atua of the forest).

Native trees and their connections with people

Tane Mahuta. Photo: ?



Horoeka/ Lancewood

In the past Māori would select a young horoeka and twist it into a certain shape that then grew to become a tokotoko (ceremonial staff).

Photo: Te Papa Tongarewa



Kauri furniture. Photo: National Library New Zealand

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The legend of rata

Information notes 7

Māori

The Legend of Rata

Rata needed to build a canoe, so he and his men went to the forest and chose a tall straight tōtara to cut down. At the first blow of the adze, a hundred birds flew out of the branches in fright. As the blows continued, beetles and moths and wētās dropped to the ground and anxious green geckos clambered to the branch tips. The work took many days and when the tree was felled the workers went home to rest. However, that night the birds and insects and

fairy folk of the forest put all the woodchips together and rebuilt the tōtara so that when the men returned it was standing in the forest once more.

Angrily, Rata had the tōtara felled again and he and his men did not stop until the branches were cut from the trunk. Then, very tired, they went to rest. That night the birds and insects and fairy folk of the forest put the tree together again. The next morning when Rata saw the tree standing, he was even more determined to build his canoe and again he felled it.

This time when his men went home he hid in the forest and waited. When the night came and the birds and insects and fairy folk set to work again, Rata stood up and cried, "That is my tree! I need it for my waka!" And they replied, "It is not your tree, it belongs to Tāne, and we need it for our home!" Rata was ashamed. He had been so determined to have his canoe that he had not thought of how it would affect the forest and the creatures that lived there. Rata apologised to the forest dwellers and spoke to Tāne, the God of the forest, explaining that his need for a waka was great. His karakia (prayer) to Tāne was long and humble and when he had finished, he fell asleep, exhausted.

As he slept, fluttering and scuttling, rasping and scraping sounds filled the air. The birds and insects and fairy folk were at work again. When Rata woke at dawn he could not believe his eyes, the most beautiful waka he had ever seen rested on the forest floor before him.

Rata's waka carried his tribe for many generations, and the lesson he learned was long remembered.



Painting by A.S. Paterson. *Wonder Tales of Maoniland* by A.W. Reed, first printed 1948

Early European illustration of Māori in Dusky Sound