

Activity Title:

Seed collection and propagation

Focusing questions

What are the characteristics of pīngao and kōwhangatara?

How can we grow pīngao and kōwhangatara?

Resources required

- Fact sheet – Pīngao and kōwhangatara – page 89
- Copying: photocopy the fact sheet

Prior learning

2a Native dune plants – who lives where and why?

Method

- 1 The objective of this activity is to look at two common native foredune plants; to collect seed heads and propagate plants with a view to replanting foredunes.
2. Discuss with students the features and uses of pīngao and kōwhangatara (using information from the fact sheet **Pīngao and kōwhangatara**).
- 3 Visit local dunes to collect pīngao or kōwhangatara seed heads. Additional information on seed head collection is included on the fact sheet and advice can be obtained from Coast Care. Collection bags can be obtained from Bay of Plenty Regional Council. (Plants seed from October – November each year.)
- 4 Either propagate seeds at school or send them to Coast Care at Bay of Plenty Regional Council. If propagating the seeds at school then warn students that they are actually quite hard to propagate and positive results are not guaranteed! Keep a class or individual diary documenting the process from seed collection to planting. If sending the seeds to Bay of Plenty Regional Council, plants can be collected the following year for planting in local dunes.
- 5 Organise a field visit to a local nursery (such as Naturally Native – Whakatāne) to see their propagation programme in action.
- 6 Conduct class discussions about where the plants could be planted. Planting will occur the year following seed collection. Make contact with Coast Care to arrange a planting day.

Activity Title:

Seed collection and propagation

Environmental Education Aspect:

About, In and For/With the environment

Environmental Education Concept:

- Biodiversity
- Personal and social responsibility for action
- Interdependence
- Sustainability

Curriculum Links:

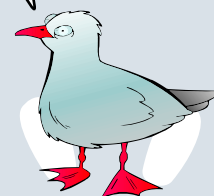
- Social Science
- Science

Suggested Curriculum Level:

Any

SUSTAINABILITY TIP!

Instead of photocopying fact sheets for each student, project a digital copy and save paper.



Possible next steps

- 3g Case study – East coast – an activity based around a marae community on the East coast that has been replanting pīngao for traditional uses.
- 4d Role of plants in dunes – an activity that investigates the role that plants such as kōwhangatara and pīngao play in stabilising dunes and preventing coastal erosion.
- 4e Role of plants in dunes – case study – an activity that applies knowledge gained in 4d to a real life case study that demonstrates the role of plants such as pīngao and kōwhangatara on our coast.



Pīngao and kōwhangatara

Pīngao or Desmoschoenus spiralis or Golden Sand Sedge

Pīngao is a native sand-binding plant and was a prominent feature of New Zealand's dune land. Its tufts of coarse grass-like leaves are a rich golden colour and are borne on long, thick rope-like stems trailing across the dunes. The colouration of pīngao makes it stand out against the grey-green of kōwhangatara (spinifex), our other native sand binding grass species.

Photo: Pīngao at Coastlands – brilliant orange winter



Pīngao is a sand binder and dune builder. Wind blown sand is trapped amongst its leaves, which accumulates and supplies nutrients to the plant. The stems continue to sprout new shoots as the sand shifts and covers them. The seed heads are conspicuous with their rigid dark spikes which grow above the leaves and bear hundreds of dark brown seeds.

The story of pīngao

At the beginning of time there was great conflict between Tāne-mahuta, God of the Forest, and his brother Tangaroa, God of the Sea. Tangaroa was jealous of Tāne, jealous of this success in separating Ranginui the Sky Father from Papa-tū-ā-nuku the Earth Mother.

Tāne-mahuta sought to end the warring between them and as a sign of peace, he plucked his eyebrows and gave them to Tangaroa. Tangaroa could not find it in his heart to forgive and he threw the eyebrows back onto the shore. There they grow today as pīngao, the sand sedge, at the boundary between the forest and the sea.

The dune system is a buffer between the Papa-tū-ā-nuku, the land and the realm of Tangaroa, the sea.

Status

Pīngao was the most widespread and successful plant of our dune lands, along with kōwhangatara or spinifex (*Spinifex sericeus*). It is not found anywhere else in the world so is endemic. Pīngao has now declined to the extent that it has disappeared from many areas and is vulnerable elsewhere.

Today our natural dunes systems have been reduced to a fraction of their former extent. With increasing recreational use, grazing, fire, introduced invasive plants, subdivision, coastal reclamation and sand mining – all of these factors have contributed to the reduction of pīngao along with our protective foredunes.

Use of pīngao

Pīngao is much sought after by Māori weavers. Sun-dried, it produces a bright golden yellow fibre which provides a vibrant contrast to the red and black dyed fibres used in tukutuku panelling, and also for the weaving of kete and whāriki. With a resurgence in Māori crafts there is an increasing demand for pīngao as a raw material. But at the same time pīngao is not plentiful. Supplementary planting and careful management of established stands is now necessary.

Pīngao and kōwhangatara are effective in long term control of coastal erosion. Plants can grow to keep up with the movement of sand where as rigid walls and structures are soon buried or undermined. It is now common practice to use native vegetation in dune restoration programmes.

The future

Dunes and their special plants such as pīngao are just as unique and important as our great kauri forests, however, few natural dune lands remain or are adequately protected. The threat of invasion by weeds such as boxthorn, shining buckthorn, bone seed and gorse is very real.

Programmes of pīngao re-vegetation and protection are required to re-establish a sustainable population and resource for our dunes.

We need your help and support to retain this important foredune plant species. Please look after the fragile dunes and the dune plants along our coastline. You can help by reducing your impact on the dunes – use the main access ways and stay off the foredunes. You could also take action and collect seeds or plant dune plants.

Ngā mahi tahi – Working together as one



Seed collection with kids from Te Akau Ki Pāpāmoa School

Kōwhangatara or spinifex or spinifex sericeus

Kōwhangatara or spinifex is a native species and is common on the sand dunes around the coasts of New Zealand, Australia and New Caledonia.

It is identifiable by its rough or hairy grass appearance, silvery colour, and creeping runners that run down or across the dunes.

Other features include the large seed heads of radiating spikes (female, seed bearing inflorescence), which once mature or ripe blow free to roll about the beach until becoming lodged and releasing their seeds. Kōwhangatara also spreads by horizontal creeping runners which give out roots and side runners at each leaf junction.

Kōwhangatara grass is an important pioneer sand stabilising plant occurring naturally on the coastal dunes of New Zealand. Kōwhangatara is salt-tolerant and once established can withstand extreme temperature, drought and has the ability to grow through accumulations of wind blown sand.

Many areas of our coastline have been modified and disturbed by farming, recreational activities and development. As a result the native dune binding species have been impacted upon and destroyed leaving areas of dune unstable and without protection from wind erosion.

Kōwhangatara grows well on all parts of the frontal dune and is usually the dominant species along with pīngao (*Desmoschoenus spiralis*) colonising the seaward slope. Both kōwhangatara and pīngao are the main species used in planting programmes for dune re-vegetation programmes.

Because of its high tolerance to salt water, kōwhangatara grows down to the toe of the dunes and helps build up the dune front. The upright leafy shoots reduce surface wind velocity resulting in sand deposition with frequent burial of the leaves and stems. Cycles of sand deposition and vegetative growth are important features of the dune-forming process.

Seed collection and growing of kōwhangatara

Kōwhangatara is harder to propagate than pīngao. It germinates readily from good seed but then has a high mortality rate as the seedlings grow. (This should not discourage you as you may be able to identify new methods of propagation and help with future plantings.)

The seed is contained in a seed head, resembling a spiky ball. Each seed head can contain up to 150 spikelets containing seed. When the seed is mature the seed ball is released from the plant and is often found being blown along a beach and over dunes by the wind. This usually occurs after Christmas.

Guidelines for seed collection:

- Collect entire seed heads by either collecting fallen seed heads or those which come away easily by hand from the parent plant.
- Collect only mature golden straw-coloured seed heads (see Figure 1).



Figure 1: Golden seed heads (female flowers).



Figure 2: Male flowers.



Figure 3: 'Black Smut' Fungus.

- Avoid picking male flower heads as they contain no seeds (see figure 2) and do not pick half formed heads – as they are either still developing or may have some defects.
- Avoid also seed heads that have strange black lumps half way up the spikes. This is a fungus called Black Smut – honest! Any seeds on infected heads will not germinate (see figure 3).
- Try to collect seed heads that are close to male plants (see figure 2). This ensures the best possible pollination of seeds.

- Store seeds in breathable bags. Paper rubbish bags are ideal. Plastic bags can cause mould to grow on the seeds which will destroy them.
- Record on the bag, the date and name of the beach where you collected the seed heads.
- Store bags away from rodents or sparrows. They like to eat kōwhangatara seed!

Propagation guidelines

- Separate the spikelets looking for fertile seeds (see figure 4)



Figure 4: Separating spikelets.

- Plant in potting mix with the point down at a depth of 2-3 cm, water daily and keep between 15°C - 25°C – a small glasshouse or similar will provide a suitable environment.

Germination occurs between 2-6 weeks after sowing and is often sporadic. Ensure that the seed tray has free drainage to prevent water logging.



Figure 5 and 6: Seed trays at the nursery.

- The transfer of seedlings from the seed tray to either root trainers or planter bags can be done when they are 6-8cm high. Take care not to damage the root system when removing from the seed tray. Ensure the roots are vertically descending when removing from the seed tray, and that they are also vertically descending when re-potting. This helps to encourage long vertical root systems which help with plant establishment in moving sands.

- A mixture, 50/50 of coarse sand and peat is recommended with a slow release fertiliser to assist plant growth. Once planted in bags or root trainers, ensure the plants don't become waterlogged – they require good free drainage.
- Trials of growing kōwhangatara have included taking cuttings and the planting of whole seed heads.

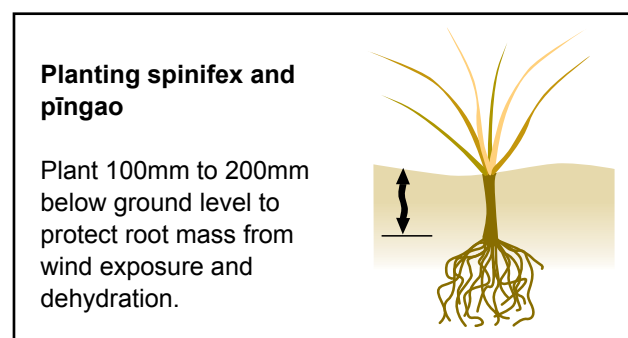
Cuttings – taken from healthy long growing shoots. Place the cutting in a coarse sand mix and water regularly. Roots may begin to appear after 2 weeks – cuttings can then be planted out into bags or root trainers.

Whole seed head plantings – in some areas whole seed heads have been planted in a trench – 100 - 150mm deep, covered with sand and left to germinate naturally. Lower rates of success have been achieved, but this is a quick, low-input method.

- Young plants should be protected from frosts during the winter period and shaded/watered during the summer period.

Planting

- Planting should be carried out between June and September to ensure good establishment for the coming summer period. Plant at 50 – 100 cm spacing and bury the potting mix about 100 mm below sand level.
- Contact your local Coast Care coordinator for advice and assistance with planting.



Additional information for growing pīngao

The following are basic guidelines.

The propagation of pīngao by seed is more successful than growing from cuttings.

Seed head collection

Seed heads are conspicuous from October onwards, with the upright spikes bearing hundreds of brown seeds. The seeds ripen from mid December onwards and can be easily identified when some seed husks have already started shedding and are found around the base of the plant.

Either collect full seed heads by cutting off with garden secateurs or by shaking attached seed heads inside a bag to dislodge any ripe seed. Seed should be collected in a paper bag so the seeds don't sweat. Paper bags containing seeds should be marked with the date and location of seed collection.

Seed can either be dry stored or sown fresh into a moist 50/50 peat/sand mixture to germinate – keep moist.

Propagation

Once germinated (4-8 weeks), water regularly and ensure the seed tray has good free drainage. The seedlings should be left to grow to 8 cm high before pricking out into root trainers or planter bags. Potting mix should consist of around 30% coarse sand and the remainder a peat/potting mix. Slow release fertiliser assist with plant growth and nutrients.

Your pīngao plants should be protected from frosts during the winter period and shaded/watered during the summer period.

Planting

Planting should be carried out between June and September to ensure good establishment for the coming summer period. Plant at 50 – 100 cm spacing and bury the potting mix about 100 mm below sand level.

For further information contact:

- Bay of Plenty Regional Council - Coast Care coordinator
- Your local council
- A local nursery

***Kia ngātahi te tiaki takutai -
Working together to care for our coast***

Find out more

If you want more information on Coast Care groups and programmes contact:

Coast Care Coordinator, Bay of Plenty Regional Council

Telephone: 0800 884 880

Facsimile: 0800 884 882

Email: coastcare@boprc.govt.nz

Website: www.boprc.govt.nz

Address: 5 Quay Street, PO Box 364, Whakatāne 3158



Bay of Plenty Regional Council in partnership with Tauranga City Council; Whakatāne, Western Bay of Plenty, and Ōpōtiki District Councils; and the Department of Conservation.