

Pingao

Golden Sand Sedge

- sustainable harvesting of pingao for weaving



Technical Handbook Section 7: Native vegetation on foredunes
7.5 Pingao - sustainable harvesting of pingao for weaving

Keeping our Dunes ALIVE

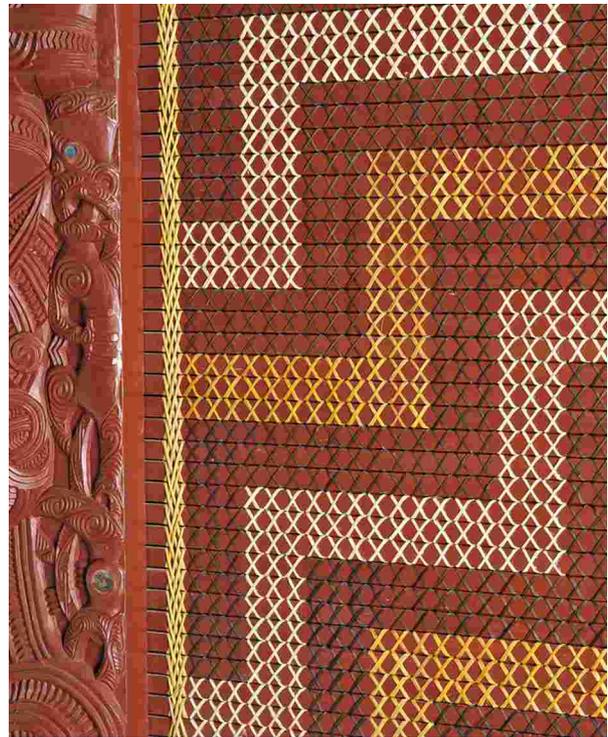


INTRODUCTION

Pingao (*Ficinia spiralis*), sometimes called golden sand sedge, is one of our native sand binding plants found growing on foredunes throughout New Zealand. Pingao was the dominant sand dune plant in the South Island and Stewart Island (where it is known as pikao), and shared that position with kowhangatara (*Spinifex sericeus*) in the North Island (Herbert and Oliphant, 1991).

Pingao has an established status among Maori weavers. It is one of four natural fibres extensively used for weaving by Maori, the other three being harakeke or flax (*Phormium tenax*), ti kouka or cabbage tree (*Cordyline australis*) and kiekie (*Freycinetia banksia*). The leaves of pingao are highly prized in traditional weaving, being the only natural fibre with a colour which cannot be improved upon. It sun-dries to a brilliant orange-gold shade and needs no further processing (Herbert and Oliphant, 1991). Weavers use pingao for patterning highlights – the orange-gold leaves provide a vibrant contrast to the black-dyed or natural pale hues of harakeke and kiekie. A familiar sight is pingao combined with kakaho, kiekie and harakeke in tukutuku panels on the walls of whareniui. The leaves are also used on their own or with other weaving materials to make fine plaited kete (bags), whariki (mats), potae (hats), pare (headbands), belts and raincapes (Sue Scheele, Landcare Research, pers. comm.).

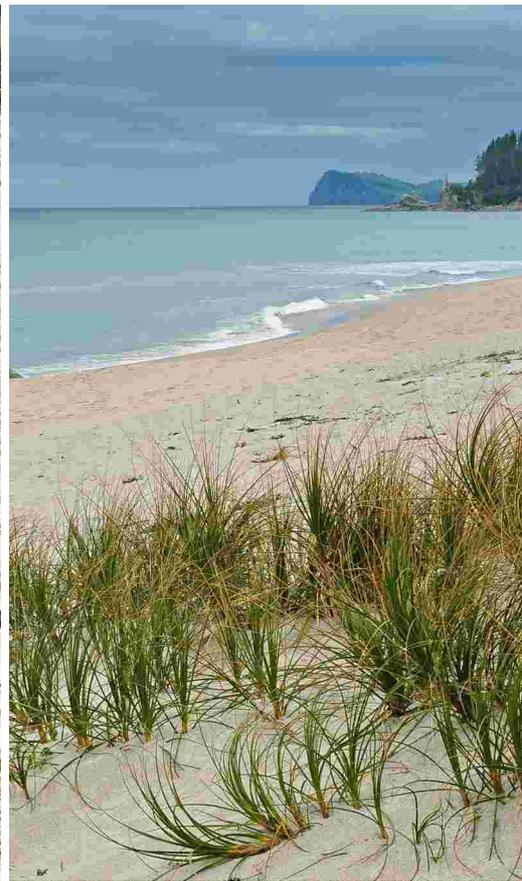
The fine plaited kete or bags using natural golden pingao fibre. Handles are made from the lighter coloured harakeke fibre.



The natural golden pingao provides a contrast to other fibres on a tukutuku.

Today, most of the natural foredune systems in New Zealand have been heavily modified or destroyed completely. Fire, grazing by farm stock, browsing by wild animals particularly rabbits, and competition from introduced plants have led to the decline of pingao and even loss of the species from many beaches. The exotic sand binding plant marram grass (*Ammophila arenaria*), introduced to control large-scale erosion over a century ago, has displaced pingao in many regions (Partridge, 1991; Johnson, 1992).

In the past the harvesting of pingao was governed by Maori tikanga, but more recently, in some areas, inappropriate methods of harvesting fibre could have also contributed to the decline of natural stands of pingao.



During the 1990s Coast Care programmes were set up in several regions focussing on restoring indigenous biodiversity including pingao.

LOSS OF PINGAO

In many districts pingao was becoming limited toward the end of last century to sustain the demand for pingao fibre (Courtney, 1984). Weavers interviewed in several regions throughout the country also indicated the loss of pingao (Herbert and Oliphant, 1991). These kuia, many of whom were in their 80s, suggested that it was the establishment of marram grass and the increase in exotic production forestry on coastal sand dunes that displaced the pingao. They also indicated preferred methods for harvesting pingao and how to encourage its growth. But the most consistent theme from the weavers was the need for pingao to be cultivated as a weaving resource. To achieve this, information is required by local communities on methods for re-establishing pingao on sand dunes with a focus on education - "teaching people about pingao."

The resurgence in traditional weaving during the 1980s saw increasing interest in the special cultural qualities of pingao as a natural fibre. During the 1990s Coast Care programmes were set up in several regions focussing on restoring indigenous biodiversity and natural dune form and function to degraded coastal foredunes using native plants. This included the use of the key native sand binder pingao.

As described by Herbert and Oliphant, (1991):

The cultural, spiritual, and traditional significance to Maori people is behind the drive in efforts to maintain and nurture this valuable plant. As the children of Papa-tu-a-nuku were able to bring together the child of Tangaroa and the child of Tane Mahuta in the meeting house, so humans need to intervene now for the children of Tane.

Grow Your Own Pingao Garden

While restoration programmes are underway in many regions to restore foredunes with pingao with the potential to provide a sustainable weaving resource, it may be easier to establish gardens specifically for harvesting of fibre. Weavers can build up their own resources of pingao in a home or community garden. This obviates the need to seek permission to harvest from natural populations. In some regions where pingao is not well established or where quantity and vigour of plants varies from year to year, a well-tended and planned cultivated garden of pingao is likely to give you a more secure supply of fibre.

Pingao does not need sand!

Pingao does not need a sand dune to grow; in fact pingao does not need to grow in sand – it can grow effectively in a wide range of moist, well-drained soils. Sand should be added to lighten heavy soils. Pingao seedlings are usually raised in root trainers from seed and are available from commercial or community-based nurseries in many regions. The methods for establishing pingao on sand dunes given in the Dune Restoration Trust of New Zealand Handbook Technical Article No. 7.2 can be used for planting pingao in gardens. The key requirement at planting is to incorporate a small handful of slow-release NPK fertiliser or a fertiliser tablet.

Caring for your pingao garden

Once seedlings are established (about three months after planting), a light application of high N fast-release fertiliser (such as Urea) will promote faster growth. Summer watering and application of mulching materials such as sawdust, leaf litter, bark or straw will maintain necessary moisture levels and suppress weed growth. Deep mulch will encourage long leaves, improving their utility for weaving (Sue Scheele, Landcare Research, pers.comm.). Although it will grow in semi-shade, full sun will develop the rich golden colours for which pingao is prized.

Maintaining quality and quantity of fibre

As pingao is a sand binder, sustained vigorous growth is achieved for natural stands by a constant supply of wind-blown sand being trapped by its leaves resulting in dune building. In a garden, pingao will eventually lose vigour, and while occasional light dressing of fast-release fertiliser will boost growth, depending on growth rates and the site, plants after two to three years may become unthrifty as long spreading rhizomes develop and the garden becomes dominated by large sprawling plants. Older plants with large terminal leaf clusters dominated by curved leaves may yield lower quantities of straight leaves favoured for weaving. It may be necessary to replace a proportion of plants every three years or so to ensure an ongoing supply of fibre from young vigorous plants with straight leaves.

Choice of pingao

Provenance trials indicate substantial differences in length of leaves of pingao growing in different regions of New Zealand. Provenances (used here to specify the place of origin of a pingao population), show important differences in the weaving properties of the leaves (Bergin and Herbert, 1999). These relate to leaf length and width, roughness, straightness, and bending strength. For instance, some pingao populations (e.g., Port Waikato and Ocean Beach, Napier) tend to have a sprawling rhizomatous habit; others (e.g., provenances from the west and south of the South Island) are more erect plants with many basal tillers forming a tussock-like plant.

While local restoration programmes are encouraged wherever possible to restore their dunes using plants raised from locally sourced seed, weavers have the option of including pingao from other regions in their gardens where the garden is located well away from natural populations. Note that there is a marked difference in frost tolerance between provenances where pingao from northern latitudes may not grow in cooler regions, so care in choice of provenance and garden location will be required. While further work is required on determining differences in fibre quality between provenances of pingao, a garden gives weavers the option of raising pingao from different regions.





SUSTAINABLE HARVESTING TRIALS

The effects of different harvesting methods on plant vigour, and the quantity of useful fibre obtained, have been evaluated in field trials on natural populations growing on the Bay of Plenty and Manawatu - Rangitikei dune systems. Three harvesting methods were compared:

- **Cutting** – the most commonly used harvesting method by weavers in which the whole leaf cluster is severed from the rhizome;
- **Wrenching** – a technique sometimes used by weavers but difficult to undertake, in which the centre portion of a leaf cluster is removed by bending and pulling; and
- **Clipping** – a harvesting method only occasionally used in which leaves of high quality are selected and cut individually from leaf clusters.

The three harvesting methods were tested on lateral leaf clusters borne at regular intervals along a rhizome but only the cutting method was tested on terminal leaf clusters.

COMPARING HARVESTING METHODS

The results showed clearly that survival of the main growing shoots, and retention and production of juvenile shoots were highest when the clipping method was used (Figure 1). It was also found that:

- Clipping did not affect leaf cluster survival, whereas wrenching and cutting resulted in severe mortality;
- Although all methods produced the same number of large weaving quality leaves (about 10 per cluster), cutting and wrenching involved unnecessary harvesting of unwanted material, and caused destruction of growing shoots;
- Typical numbers of leaves taken in each operation were:
 - 50-100 with cutting method
 - 25-35 with wrenching
 - 7-35 with clipping



Cutting technique.



Cutting of whole shoots, or wrenching can cause more damage than the clipping technique shown below, and can result in wastage as the leaves will not be suitable for weaving.



Clipping technique.



The curved leaves of terminal leaf clusters (left) are less favoured for weaving than the straight leaves growing in lateral clusters (right).



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In the Bay of Plenty trial, no difference was found between summer and autumn harvesting in terms of quantity and quality of weaving leaves taken from the same area. Autumn harvested leaves were slightly longer (49.8 cm) than summer harvested leaves (45.4 cm). Summer harvested clusters had twice as many juvenile (immature) leaves (40.2) as autumn harvested clusters (21.4).

Weavers found that on some plants a higher proportion of leaves from leaf clusters at the ends of rhizomes (terminal) were curved compared to leaves growing in clusters originating along rhizomes (lateral). Curved leaves are not favoured for weaving as they distort weaving patterns and cause uneven tension and layout of woven products. The clipping technique allowed for the selection of leaves most preferred to provide fibre for weaving – long and straight.

As only a small proportion of leaves need to be collected from each leaf cluster using the clipping method, most of the plant remains intact. This method therefore allows for sustainable harvesting of fibre for weaving of natural populations of pingao on our sand dunes without any detrimental effect on dune stability.

HARVESTING OUTER LEAVES

A further method favoured for harvesting fibre by some weavers, is to carefully strip the outer leaves from leaf clusters. Single leaves can be pulled off clusters using a downward motion. This method was not included in the harvesting trials so the effect on the remaining plant is not known. However, it is likely that removal of small numbers of outer leaves will not significantly affect performance.

The outer leaves will be the oldest and often the longer leaves of the cluster but there is likely to be a higher proportion of more curved leaves than leaves in the centre of the cluster. Older leaves will also have more blemishes not favoured by weavers including blotchy colouring, browsing damage by

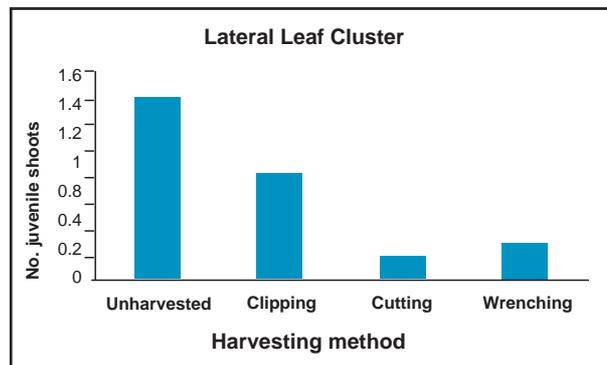
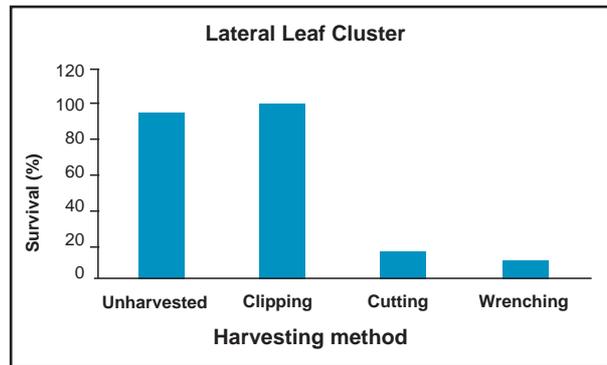


Figure 1: Survival of pingao leaf clusters and number of juvenile shoots remaining nine months after harvesting.



A favoured method for harvesting pingao by some weavers is to carefully strip outer leaves from established pingao plants. This method was not included in comparative trials but removal of a few outer leaves per cluster is not likely to affect plant performance.

rabbits or other disturbance, and frayed leaf ends from weathering storms and sand movement. Care is required in selecting vigorous healthy clusters that have a high proportion of high quality outer leaves for weaving.



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Small and dainty!

While weavers prefer longer leaves for kete (bags), whariki (mats) and potae (hats), shorter leaves can make a wide range of smaller decorative items. These can include ear-rings, putiputi (flowers) and floral bouquet, brooches or corsages, gift tags, and small containers and baskets.





RECOMMENDATIONS FOR HARVESTING PINGAO

Based on these trials, the following recommendations for collectors of pingao include:

1. Use the selective clipping method in which only leaves of weaving quality are removed from leaf clusters. Small citrus pruners or sharp scissors should be used.
2. Harvesting of pingao by cutting or wrenching should be discouraged as these methods stop shoot growth, remove juvenile leaves which are not suitable for weaving, and cause wasteful removal of leaves which are subsequently discarded. Repeated harvesting by cutting and wrenching may contribute to instability of the foredune by removal of vegetation cover.
3. Restriction of harvesting to summer or autumn is not likely to result in more, or better quality weaving material.

Protocols for harvesting

Before harvesting leaves of pingao from natural stands on coastal dunes, check for protocols from local iwi and managing agencies. Constraints on the removal of pingao are also imposed by coastal managing authorities such as the Department of Conservation and Regional and District Councils.

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