# PROGRESS REPORT:
# SPINIFEX AND PINGAO PLANTING TRIAL ON AN ERODED FOREDUNE, HARBOUR RD, OHOPE

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## INTRODUCTION

This trial was established as a combined Coastcare BOP Programme project involving the Whakatane District Council, Ohope Coastcare Group, Environment Bay of Plenty and *Forest Research.* Along this section of coastline incipient dune formation has been hindered and a steeply scarped seaward dune front persists. The scarp face is unvegetated and unstable and is not likely to repair over time. This is primarily due to the invasion of exotic grass and weed species, which form a dense rooted mat over the sand dunes. These species do not grow in the same manner as pioneer native perennial sand binding plants, such as spinifex and pingao, which as indicated by Hesp (2000), initiate incipient foredunes and repair eroded areas by trapping new wind-blown sand. These species also provide the flexible barrier necessary to combat long term erosion.

Techniques for removing the exotic weed species cover on foredunes and replacing with a cover of native sand binders was required. This will help optimise dune stabilisation programmes throughout New Zealand where the survival of the native dune grasses is threatened due to weed invasion.

## OBJECTIVES

This trial aims to find the best option for re-establishment of functional dune plants to colonise the dune scarp, and thus minimise or reverse current erosion trends.
The overall objective is to develop guidelines for the restoration of weed infested foredunes for coastal managing agencies and Coast Care groups. This will be achieved by:

1. Evaluating the best methods for reducing the weeds/exotic plants that dominate foredunes.
2. Assessing the best methods of re-establishing native sand binding plants on the foredune.
3. Determining the ability of spinifex and pingao to restore a more natural foredune shape that will be more effective in repairing dunes during 'cut and fill' cycles caused by high waves and tides.

Specific objectives of the planting trial are:

- To compare the effect of different types of initial weed control prior to planting.
- To compare the effect of different types of follow-up weed control post-planting.
- To compare the effect of application of post-planting fertiliser on weeds and native sand binders with non-fertilised control plots.
- To compare performance of spinifex and pingao seedlings raised from seed, and in particular spinifex raised from sorted seed sown directly into final containers.

# TRIAL SITE

The trial site is located on the seaward edge of the dunes between house no. 374 Harbour Rd. and the Ohope Beach Holiday Park, Ohope.

The area surrounding and encompassing the trial site is a highly modified undulating foredune dominated by exotic herbaceous and grass species which form a dense root mat. Dominant plant species will be collected for identification at Forest Research herbarium and listed in Appendix 1.

A highly scarped face has formed along the seaward edge for most of the beach and reaches a height of 2-3 metres. The scarp is extremely steep in places with only the occasional spinifex runner trailing over. Where this occurs, wind-blown sand is being trapped and the angle of the scarp is less steep indicating the significance of these plants in erosion control. Access to the beach for the public is difficult due to this scarping and is of particular concern for the nearby Ohope Beach Holiday Park.

Neighbouring dunes with a higher density of spinifex have been treated with urea over the last two years. This has resulted in colonisation of the scarp and back beach with vigorous spinifex runners and a noticeable reversal of previous erosion trends.

# PLANTING TRIAL

## Site preparation

On June 8th 2000, a 120m long, 5m wide strip extending in a single line along the seaward edge of the top of the scarp was demarcated for the location of the trial. Twenty-four plots of 5m x 5m square were measured out and pegged (Table 1). Areas of major change in vegetation cover were excluded.

The plots had a similar composition and cover of exotic weed species. Plots were rapidly and subjectively assessed for percentage vegetation cover using a modified version of the Daubenmire scale (Daubenmire 1959). For categories of vegetation and percentage cover refer to Appendix 2.

Twenty-four plots were assessed for weed cover using a broad three level visual score and grouped as being predominantly exotic grasses, *Isolepis* or *Muehlenbeckia*. Plots were then assigned to three replicates, according to the predominant vegetation cover (Table 2).

On the June 8th 2000, hand operated low-pressure knapsack sprayers were used to apply to randomly chosen plots from each replicate (Table 2), Roundup at 10ml/l and Pulse surfactant at 2ml/l. In mid-August, dead plant cover was removed from selected plots using spades and rakes and a brushcutter.

## Trial Design

Seedlings were planted at 1 metre spacing. Edge rows in each plot adjacent to other plots were regarded as buffers. The central row was pingao and the outer two rows were spinifex.

20 spinifex/plot and 5 pingao/plot, ie a total of 480 spinifex and 120 pingao plants were required for the trial.

## Planting

Seedlings were sown seed from Naturally Native NZ Plants Ltd Nursery, Whakatane, where the spinifex (480 plants) and pingao (120 plants) seedlings were raised in potting mix in Tinus rootrainers as per guidelines given in Bergin (2000).

On August 24th 2000, seedlings were planted using standard techniques (Bergin 2000). All seedlings received an application of Agpro (a slow release NPK fertiliser) at planting. Half a film canister was used to measure approximately 15g of fertiliser to the bottom of each planting hole.

## Appendix 2.

### a) Percentage canopy classes used to assess vegetation cover (adapted from Daubenmire 1959)

| % Cover | Cover Class |
|---|---|
| <1 | 1 |
| 1 - 5 | 2 |
| 6 - 25 | 3 |
| 26 - 50 | 4 |
| 51 - 75 | 5 |
| 76 - 95 | 6 |
| 96 - 100 | 7 |

### b) Cover class of vegetation in each plot by grass, exotic herb or major species

| **Plot No.** | Exotic grasses | Exotic herbs | tree lupin *Lupinus Aboreus* | clubrush *Isolepis nodosa* | pampas *Cortaderia selloana* | spinifex *Spinifex sericeus* | pohuehue *Muehlenbeckia complexa* | nihinihi *Calystegia soldanella* |
|---|---|---|---|---|---|---|---|---|
| 1 | 5 | 2 | 3 | 2 | | 2 | 2 | 2 |
| 2 | 4 | 4 | 2 | 3 | | 2 | 2 | 2 |
| 3 | 5 | 4 | 3 | | | 2 | 3 | 2 |
| 4 | 5 | 4 | | | | | 3 | 2 |
| 5 | 4 | 4 | 1 | 2 | | 2 | 3 | 2 |
| 6 | 4 | 4 | 1 | 3 | | 1 | 4 | 3 |
| 7 | 3 | 2 | | 5 | | | 3 | 2 |
| 8 | 3 | 3 | 2 | 4 | 2 | | 4 | 2 |
| 9 | 3 | 4 | 3 | 2 | | 1 | 3 | 3 |
| 10 | 4 | 3 | 1 | | | 4 | 3 | 1 |
| 11 | 6 | 1 | | | | | 2 | 2 |
| 12 | 2 | 3 | 1 | 1 | | | 6 | 1 |
| 13 | 4 | 3 | 1 | 3 | | 1 | 3 | 1 |
| 14 | 3 | 3 | 1 | 6 | | 1 | 2 | 1 |
| 15 | 5 | 3 | 1 | | | 2 | 3 | 2 |
| 16 | 3 | 2 | 3 | | | | 4 | 1 |
| 17 | 3 | 2 | 3 | | | | 5 | 1 |
| 18 | 2 | 2 | 3 | | 1 | 1 | 6 | |
| 19 | 3 | 3 | 3 | | 2 | | 6 | 3 |
| 20 | 2 | 3 | 3 | 3 | | | 5 | 3 |
| 21 | 4 | 3 | 1 | 1 | 1 | | 4 | 3 |
| 22 | 5 | 2 | 1 | | | 1 | 4 | 3 |
| 23 | 5 | 3 | 1 | | | 3 | 4 | |
| 24 | 4 | 3 | 1 | | | 2 | 5 | |