EARLY PERFORMANCE OF SAND BINDERS ON A RESHAPED FOREDUNE, OAKURA BEACH, NEW PLYMOUTH

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INTRODUCTION

This report briefly summarises early performance of a partially funded Coastal Dune Vegetation Network planting trial established in July 2000 where the indigenous sand binding species, spinifex and pingao, were planted on a reshaped foredune. Trial objectives and design are given but full details on rationale for the trial and establishment are given in an establishment report (Bergin *et al.* 2000). Collaborators in this joint trial include:

- Oakura Beach Care Group
- New Plymouth District Council
- Taranaki Regional Council
- *Forest Research*, Rotorua

TRIAL OBJECTIVES

- To mechanically reshape degraded foredune and revegetate with indigenous sand binding species
- To compare performance of spinifex and pingao at different plant densities
- To monitor sand movement and changes in reshaped dune profile compared to degraded dune scarp

METHOD

Dune reshaping

A 150 m long 10 m wide strip was demarcated for the location of the trial in consultation with the local Beach Care group. Exotic grass cover was sprayed with herbicide and pohutukawa & flax transplanted to the backdune. The dune was reshaped as indicated in Hesp & Grant (2000). A tracked excavator with bulk bucket used to:

- remove upper layer of dead vegetation & soil cap from foredune to landward zone
- reshape sand to form bund on inland side & a 15° slope to high water mark on seaward side
- dune leveled for planting.

Fences & signs placed around new dune immediately after planting.

Planting trial
The trial comprised 3 replicates of 4 plots each with different treatment combinations of plant spacing & fertiliser applied randomly to each plot. Treatments were:

- 3 plant types (spinifex from seed & from cuttings, pingao)
- 2 slow-release fertilisers - Agpro tablets, Plantacote Pluss
- Two plant spacings - 50 cm, 70 cm.

Three types of plants tested were:

- Spinifex seedlings from seed – good balance of shoot/root system
- Spinifex seedlings from cuttings – tall seedlings, moderate development of root systems
- Pingao – small seedlings, root systems not fully occupying containers

Sand movement
Four permanent transects were surveyed before & after reshaping. Pegs were placed at fixed heights throughout trial plots to monitor localised sand movement.

Maintenance and monitoring
Weed control has included spraying kikuyu grass along the landward margin to prevent re-invasion of the site and hand pulling of occasional exotic weeds including marram grass scattered throughout the reshaped foredune. One application of Urea fertiliser at the rate of 50 kg N/ha was applied in October 2000. The trial was assessed for survival in October 2000 and January 2001. Growth performance was also assessed in January 2001 where six rows for covering the range of plant type were sampled in each plot for plant height and spread. Peg heights were measured to determine changes in sand movement.

EARLY PERFORMANCE
(Six months after reshaping)

Sand movement
There were no major changes in the dune profile since reshaping. Some localised sand movement was evident within plots some plots particularly were seedlings had been planted at the wider spacing of 70 cm.

Plant survival
Overall survival 3 months after planting was 80% and 6 months after planting was 70% (Table 1). Across all treatments, survival approximately six months after planting (January 2001) was there was 79% for spinifex raised from seed, 66% survival for spinifex raised from cuttings and only 48% survival for pingao seedlings (Fig. 1). The small size of the pingao seedlings planted is likely to be a factor in the relatively high mortality of this species. Conversely, the high quality spinifex seedlings raised from seed in likely to have contributed to good survival with this plant type.

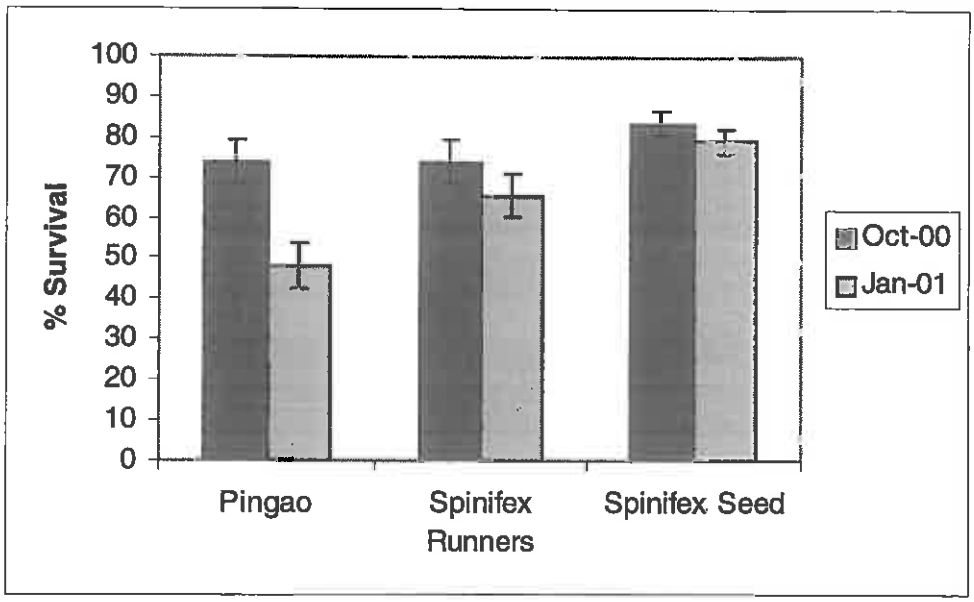

Figure 1: Survival of sand binders 3 months (Oct 2000) and 6 months after planting (January 2001) on a reshaped foredune, Oakura Beach, New Plymouth.

Growth

There was a significant difference in height growth and plant vigour for spacing (Table 1). Within plant types, there was significantly better height growth where seedlings had been established at the narrow spacing of 50 cm compared to seedlings planted at 70 cm spacing (Fig. 2). Height growth of spinifex raised from seed is comparable to pingao but significantly better than spinifex raised from runners. There was a significant increasing trend of improved plant vigour from pingao to spinifex raised from runners to spinifex raised from seed (Table 1). There was no difference in plant spread at either spacing.

Spinifex raised from seed had significantly more runners than spinifex raised from runners (Fig. 3) but runner length was greater for runners (Table 1). Spinifex raised from runners appeared to form runners earlier than seedlings. There were no differences between fertiliser types applied at planting.

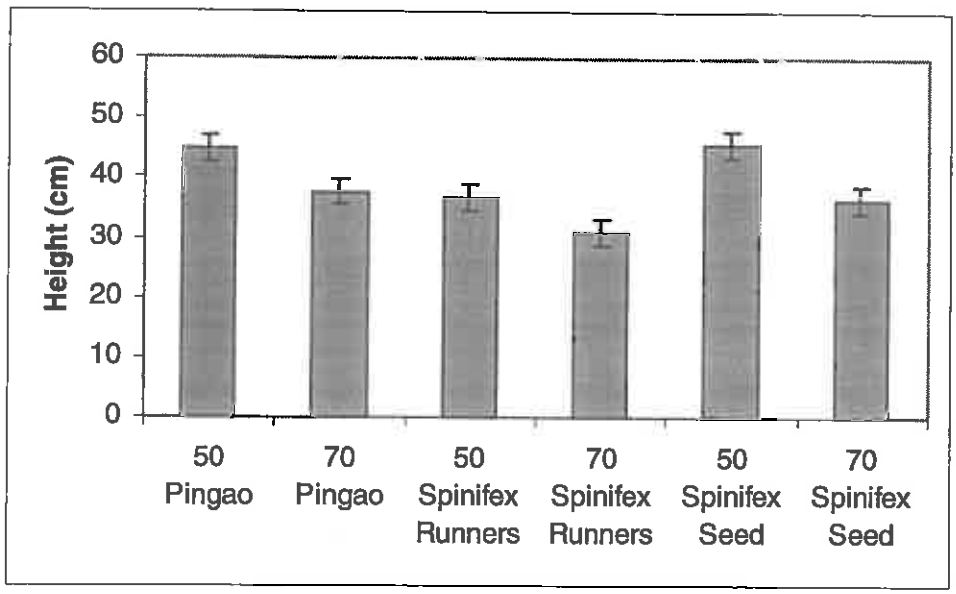

Figure 2: Height of sand binders 6 months after planting at two different spacings of 50 cm apart and 70 cm apart on a reshaped foredune, Oakura Beach, New Plymouth.

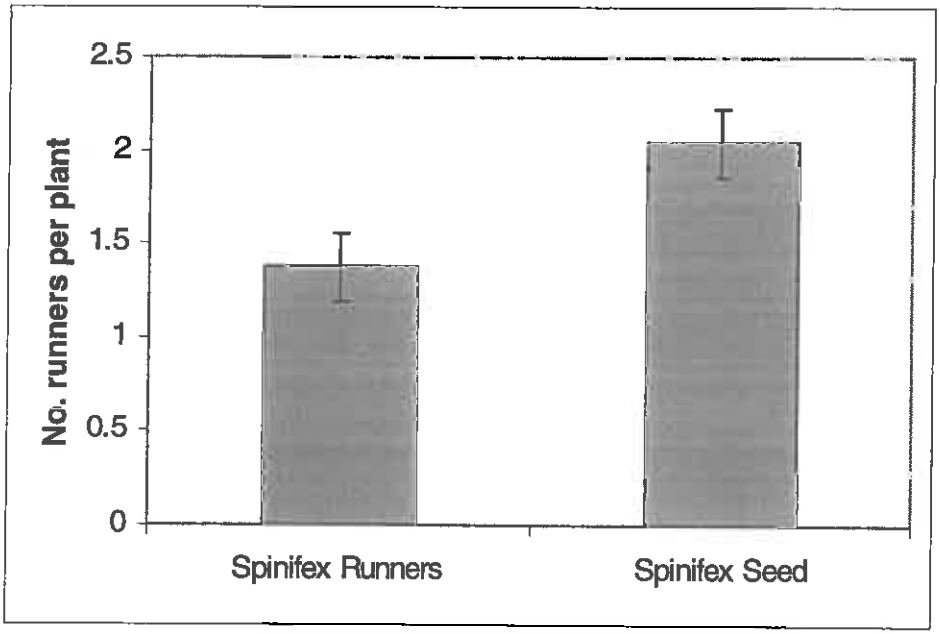

Figure 3: Number of runners per plant for spinifex raised either from seed or runners 6 months after planting on a reshaped foredune, Oakura Beach, New Plymouth.

Table 1: Survival and growth of spinifex raised from seed or runners and pingao planted 6 months earlier on a reshaped foredune, Oakura Beach, New Plymouth. Within groups, values followed by the same letter are not significantly different (p = 0.01).

	Height (cm)	Spread (cm)+	Vigour (1-5)*	Mean no. of pingao shoots/plant	Mean no. spinifex flowers/plant	Mean no. runners /plant	Mean runner length (cm)	Survivlal October 2000 (%)	Survival January 2001 (%)
Spacing									
50 cm	42.4 a	46.8 a	4.2 a	3.2 a	5 a	1.74 a	68.4 a	81.4 a	72.9 a
70 cm	35.0 b	45.2 a	3.8 b	3.0 a	6 a	1.67 a	66.7 a	77.7 a	67.6 a
Fertiliser									
Agpro	38.8 a	46.4 a	4.0 a	3.0 a	5 a	1.83 a	67.3 a	77.9 a	68.0 a
Plantacote plus	38.6 a	45.6 a	4.0 a	3.2 a	6 a	1.58 a	67.8 a	81.4 a	72.8 a
Plant type									
Pingao	41.3 a	39.9 a	3.4 a	3.1 a				73.9 a	48.1 a
Spinifex runner	33.8 b	44.3 a	4.0 b		11 a	1.37 a	70.4 a	74.0 a	65.6 ab
Spinifex seed	41.0 a	53.8 b	4.5 c		0 b	2.04 b	64.7 b	83.5 a	79.4 b
All	**38.7**	**46.0**	**4.0**	**3.1**	**6**	**1.71**	**67.5**	**79.7**	**70.4**

+ Plant spread calculated as square root of (length x breadth)

* Vigour score : 1 - weak, 2 - unthrifty, 3 - average, 4 - good, 5 - robust.