

**INTERIM EXECUTIVE SUMMARY**

**INVESTIGATION NO:** P1112  
**KEY OUTPUT NO:** 4.4

**INVESTIGATION TITLE:** Rehabilitation of coastal sand dunes using spinifex

**STUDY VENUE:** National

**INVESTIGATION LEADER:** D. O. Bergin

**INVESTIGATION STATUS:** Fieldwork in progress

**CLIENT:** Department of Conservation

**FINISH DATE:** 30.6.1995

**INVESTIGATION SUMMARY:**

The Indigenous Forest Management section, New Zealand Forest Research Institute (NZ FRI), Rotorua, have been investigating the role that indigenous sand binding species, including spinifex (*Spinifex sericeus*), have in stabilising sand dunes. Australia has the same species of spinifex where it has been widely used in several states for major rehabilitation programmes. A review of the use of spinifex in both countries concluded that use of spinifex is a feasible option for stabilisation of disturbed or degraded sites but comprehensive planting trials were required to determine appropriate techniques for New Zealand conditions (Bergin, D. O.; Shaw, W. B. 1991: Propagation and establishment of spinifex - a review. FRI Contract Report FWE 91/27 (unpubl.) 18p.). Nursery and field trials of spinifex initiated by the Indigenous Forest Management section have continued into the third year. Three establishment methods are being investigated: planting of nursery-raised seedlings, transplanting of cutting-type material onto dunes, and direct seeding onto dunes. The latter two methods are widely used on a large scale in revegetation of dunes in Queensland and New South Wales. Seedlings of spinifex have been raised at the NZ FRI Nursery and seed and cutting material collected when appropriate. Field trials have been established on east and west coast dunes in the North Island and the performance is being monitored.

**OBJECTIVES:**

1. To complete raising spinifex seedlings in the nursery for planting trials
2. To collect further spinifex seed for direct seeding trials
3. To design and establish trials on at least one site to compare establishment of spinifex by direct seeding, transplanting of cuttings, and planting of nursery-raised seedlings
4. To monitor performance of trials and assess the effectiveness of planting treatments including plant colonisation and sand stabilisation for up to two years (June 1995)
5. To compare cost of planting methods and produce guidelines for planting spinifex relevant to eroding coastal sites in New Zealand (June 1995)

**METHOD:**

1. Investigation into seeding characteristics of spinifex are continuing. For the Coromandel and Port Waikato sites, local seed was collected and assessed for viability in germination trials. Options for large-scale seed collection, storage and seed preparation were investigated.
2. To overcome difficulties in raising large numbers of spinifex seedlings, a variety of propagation techniques are being trialed including direct seeding into final containers and delaying transplanting from seed trays to containers.
3. Using the results of an earlier pilot spinifex planting trial established on a Bay of Plenty dune, further trials were established on a Coromandel sand dune in spring 1993 and at Port Waikato in autumn 1994.

4. For the out-planting trials, treatments included planting of nursery-raised seedlings, transplanting of two types of cuttings, and sowing seed using two different methods. Fertiliser treatments were superimposed with unfertilised plots as controls. Treatments were applied to 3 m diameter circular plots in a randomised complete block design with four replicates. Parameters measured included survival, growth and health of planted seedlings, degree of sand movement, and number and length of runners.

#### **INTERIM RESULTS:**

- Seedheads comprise 75-200 spikelets with a significant variation in the number of sound seed per seedhead (0-60). The number of sound seed in collections may be related to proximity of male and female plants at collection sites. Low numbers of sound seed occur where spinifex colonies are dominated by female plants.
- Storage of dry seedheads packed into hessian bags and kept in a dark, cool place maintains viability. Storage areas need to be kept free of rodents.
- Nursery-raised seedlings planted on dunes with an application of a slow-release NPK fertiliser have high survivals and good growth.
- Transplanting of cuttings in spring is hampered by the lack of suitable cutting material. Runners have become brittle and many have been covered up by sand during winter storms. Transplanting of sprigs (divisions taken from established spinifex plants) has been less successful than transplanting of cuttings.
- Despite low viability of seed used to date, some germination has occurred within 4 months of sowing on dunes using the New South Wales method of placing a handful of seedheads (2-4 spikes) into 150 mm deep holes dug in the sand at 60 cm spacing.

#### **INTERIM CONCLUSIONS:**

- Seed soundness needs to be regularly checked during spinifex seed collection operations to ensure only seedheads containing viable seed are collected. Avoid areas where colonies are dominated by female plants.
- The preferred season for transplanting of runners appears to be autumn when there is a greater abundance of cutting material available for transplanting compared to spring. However, autumn-planted cuttings are exposed to winter storms before they have had a chance to establish. On some exposed beaches, first-winter losses may be high.
- Planting of nursery-raised seedlings have out-performed other treatments within the first year of establishment especially where slow-release fertiliser has been applied. Once techniques for raising large numbers of spinifex seedlings are refined, planting of seedlings with application of fertiliser is likely to be a preferred option for establishing spinifex in high profile areas, or where sand movement is too severe for direct seeding or transplanting of cuttings.

#### **PUBLICATIONS OR OTHER SIGNIFICANT OUTPUTS:**

- Bergin, D. O. 1993: Propagation and establishment of spinifex (*Spinifex sericeus*). A visit to nurseries and sand dune revegetation sites, Australia, June 1993. New Zealand Forest Research Institute Project Record No. 3930 (Unpubl.). 18p.
- Bergin, D. O. ; Herbert, J. W. 1994: Establishment of spinifex fertiliser trials, Matarangi Beach and Whiritoa Beach, Coromandel. New Zealand Forest Research Institute Establishment Report (Unpubl.). 10p.
- Bergin, D. O. : Herbert, J. W. 1994: Restoration of native plant communities on sand dunes. *What's New in Forest Research*, New Zealand Forest Research Institute, No. 232. 4p.
- Bergin, D. O. ; Herbert, J. W. 1994: Spinifex establishment trial, Whiritoa. Performance of first seasons growth. New Zealand Forest Research Institute Project Record (Unpubl.). 9p.