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Plant Materials for Soil Conservation Technical Note No. H2



Management and Uses of

Ammophila arenaria

(Marram Grass) and

Spinifex sericeus

(Silvery Sand Grass)

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Ammophila arenaria L. (Link) (marram grass or European beach grass) and *Spinifex sericeus* R.Br (Waiwata, silvery sand grass or spinifex) are the two most important grasses used for sand dune stabilisation in New Zealand. Both are primary sand stabilisers which thrive in and indeed require unconsolidated sand for vigorous growth.

Ammophila arenaria although now commonly found on all coastal dunes in New Zealand, originates from the Atlantic coast of Europe. It has been effectively used in sand dune control in many countries including Australia and South Africa.

Spinifex sericeus (formerly known as *S. hirsutus* Labill.) is a native of the New Zealand and Australian coasts where it occurs naturally on the seaward side of the foredune. It is not found in the south of the South Island.

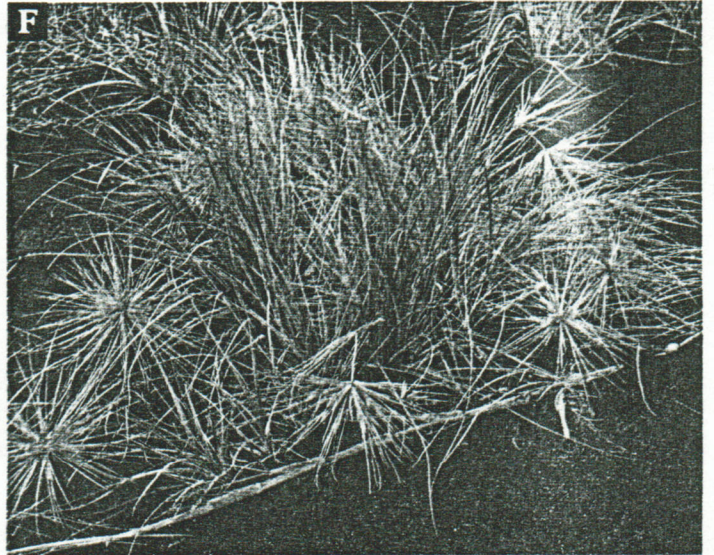
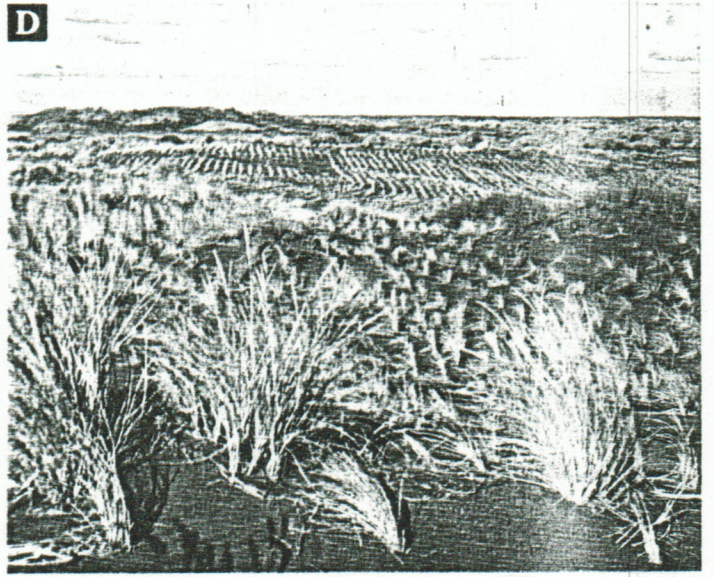
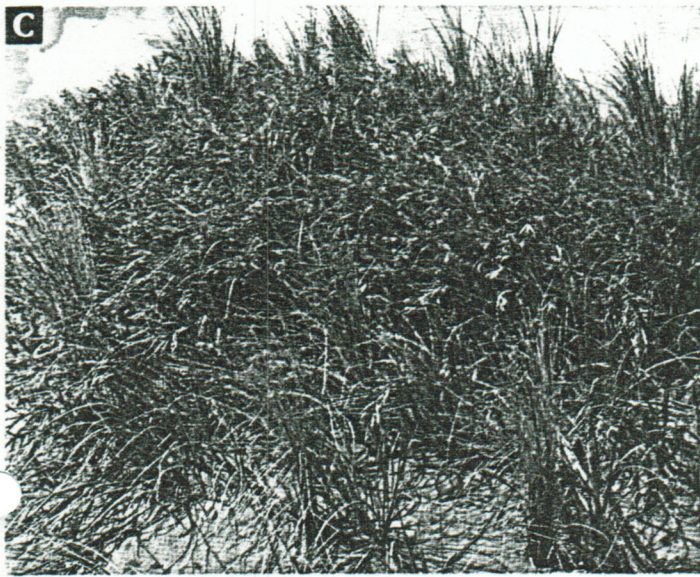
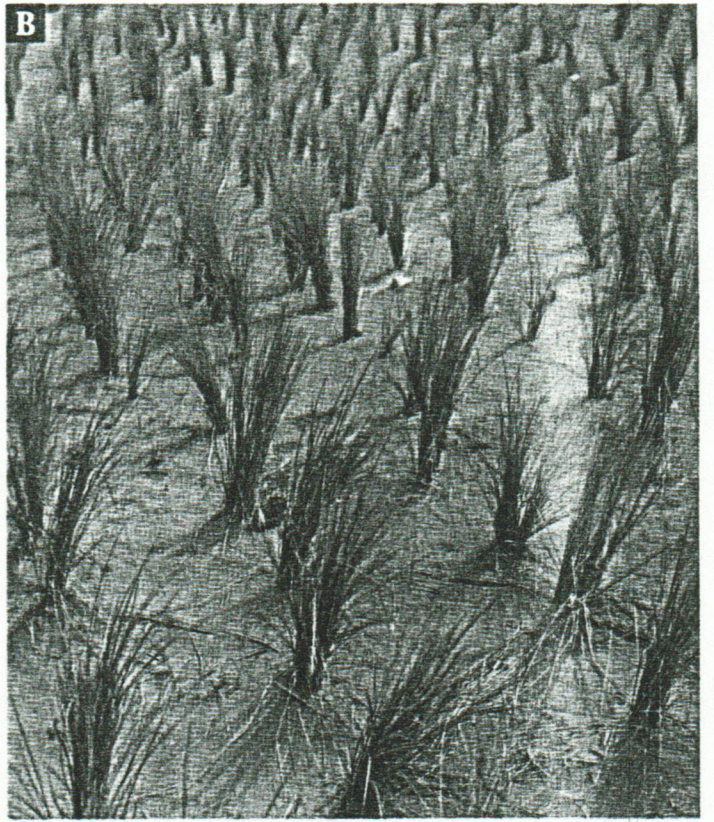
Description

The two grasses are readily differentiated by the following: marram grass is monoecious, erect and with underground rhizomes while spinifex grass is dioecious with prominent female seed heads, a more trailing habit and with runners on top of the sand.

Marram grass is a tall, erect, spring and summer growing perennial grass, forming compact clumps with 60-80 cm high culms.

• PLATE H2 AMMOPHILA AND SPINIFEX

- A. Established plants of *Ammophila arenaria*.
- B. *Ammophila arenaria*, recently planted for sand-dune stabilisation, Himatangi, Manawatu.
- C. Male plants of *Spinifex hirsutus*, Castlecliff, Wanganui.
- D. Sand-dune stabilisation with *Ammophila arenaria*, Turakina.
- E. Inflorescence of male plant of *Spinifex hirsutus*.
- F. Habit and inflorescence of female plant of *Spinifex hirsutus*.



It spreads rapidly through loose sand by strong rhizomes, several metres long, which send up new shoots through accumulated sand and with new roots forming at the nodes. The leaves are bluish green, 6 mm wide, ribbed on the upper side and sharply pointed. They are usually tightly rolled up to minimise transpiration. The flowerheads are compact, narrow, cylindrical plumes which develop from December to January. The seedheads when ripe are green yellow but marram grass does not set much seed under New Zealand conditions.

Spinifex is a 30 cm high stoloniferous perennial grass with stout overground creeping runners several metres long which develop roots and leafy shoots at the nodes. The leaves are silvery hairy, 7-8 cm wide, with incurved margins and a fine tapered point.

It is one of the few dioecious grasses, the male and female flowers developing on different plants in the spring. The male flowers are arranged in loose terminal or axillary clusters. The female flowers develop into large 15 cm round, spiny terminal seedheads which when ripe in mid summer break off and are blown along the beach by the wind. Volunteer seedlings are often found amongst driftwood above high water mark.

Sometimes large patches of plants of only one sex are found; these have grown from one single seedling.

Adaptation

Both marram grass and spinifex are well adapted to the inhospitable coastal sand dune conditions. They thrive in raw sand, which is low in plant nutrients and organic matter, and are tolerant to drought, extreme temperatures, strong wind, sand blast and salt spray.

Spinifex is more tolerant to seawater and to salt spray than marram grass and is therefore better adapted to the toe and seaward slope of the foredunes. Both are deep rooting and have the ability to grow up through accumulations of windblown sand. In fact without a regular supply of fresh sand they lose their vigour and on stable dunes eventually die out.

Uses

Marram grass and spinifex are beyond doubt the most effective sand binding (sand stilling) plants available. They are used as primary stabilisers to control moving coastal sand dunes. Their long flexible leaves reduce wind velocity and encourage sand deposition in the lee of the plants.

Spinifex is mainly used for foredune planting. The extensive stolons grow down slopes and in hollows collecting sand and smoothing out the dune face.

Marram grass is more suitable for planting on top of the foredune and on the sand dunes and blowouts further away from the coast. It has also been successfully used to stabilise inland sand dunes near Cromwell and to control blowing pumice sand along the Desert Road, north of Waiouru.

Whereas marram grass is unpalatable to stock, spinifex is palatable; hence cattle should be excluded from coastal dunes.

Propagation and Establishment

Spinifex can be established from seed or from cuttings made from runners. Seed germination and strike rate of cuttings is often disappointing.

Seed is best sown in January-February when the seedheads can be collected from the beach, either as complete seedheads or as individual seeds removed from the seedheads. Seed should be buried 2.5-4 cm deep. Soaking the seed for 24 hours in seawater will improve germination.

Cuttings, particularly tip cuttings, 50-60 cm long, prepared from vigorous growing stolons are planted in early spring, some 20-30 cm deep and at a spacing of 1 × 1 m.

Spinifex can also be established by transplanting volunteer seedlings, carefully dug up without disturbing the root system.

Marram grass is always propagated vegetatively by transplanting bundles of culms gathered from vigorous 2- or 3-year old clumps.

Planting material can be collected from well established existing stands, or from special selected sheltered "nursery" areas where the marram grass production is boosted by extra fertiliser applications of nitrolime at 125 kg/ha in spring and autumn.

The planting stock is dug with a sharp spade 5-10 cm below the surface. The tillers should have at least 2 nodes and are trimmed to about 50-60 cm. Some 5 to 8 culms per bundle are planted in a 20-25 cm deep V-shaped hole and well heeled in. Spacing varies from 60 × 60 cm to 100 × 100 cm depending on the degree of wind exposure. Planting is in rows at right angles to the prevailing wind (preferably on the contour) while the bundles should be staggered in the rows to prevent wind funnels. Planting time is June, July and August. Small areas and steep dunes are planted by hand, while more extensive areas are machine planted using specially developed marram planters pulled by a crawler tractor.

For both marram and spinifex, nitrolime (calcium ammonium nitrate) applied at 45 kg/ha in spring and autumn will increase growth and early establishment.

Management

Except for topdressing, the exclusion of stock and the speedy repair of any blowout that may occur, no special management practices are required.

Pests and Diseases

Marram grass and spinifex are free from major pests and diseases in New Zealand.

Source of Material

Marram grass can be obtained through the New Zealand Forest Service while spinifex is not commercially available and seed or cuttings have to be collected from existing stands.

Further Reading

- Connor, H. E. 1984: Breeding systems in New Zealand grasses. IX: Sex ratios in dioecious *Spinifex sericeus*. *NZ Journal of Botany* 22: 569-574.
- Harty, R. L.; McDonald, T. J. 1972: Germination behaviour in beach spinifex (*Spinifex hirsutus* Labill.). *Australian Journal of Botany* 20: 241-251.
- McDonald, T. J. 1983: Life cycle studies on sand spinifex grass (*Spinifex hirsutus*). Report D02.12. Beach Protection Authority, Brisbane, Queensland. pp. 75-95.
- Mort, H. D. A. 1950: Vegetation survey of the marine sand drifts of New South Wales: Part II. Some remarks on useful stabilising species. *Journal of Soil Conservation New South Wales* 6 (2): 63-72.