The effect of soil moisture ameliorants on pasture establishment on silicious sands

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In the central coast areas of New South Wales, large scale development has been occurring in some locations (e.g. Nelsons Bay) with subsequent denuding of hind dune areas. The sands in these areas have low water holding capacities (<2% gra^{y} at pF 2.0) and, coupled with extreme acidity, low plant nutrient status, susceptibility to wind and water erosion makes plant establishment difficult and survival limited.

Various soil surface treatments are available to assist in the establishment of commercial crops and pastures. However, there is no information on their effectiveness in this situation.

Methods

A factorial trial of two replications and three treatments - Ca-bentonite (10 t ha-^{1}), starch-polyacrylonitrate (1.5 t ha^{-1}) (1) and hay (8 t ha-1)(2). The control and each treatment was sown with a cover crop of sudax (8 kg ha-1) plus green couch (10 kg ha^{-1}), rhodes grass (8 kg ha-^{1}), N.Z. white clover (5 kg ha^{-1}), red clover (2 kg ha^{-1}) and fertilised with diammonium phosphate (300 kg ha^{-1}); 18%N:18%F). Plots were 45 m^{2}, sown in late November in the Nelsons Bay area. Since ground cover is essential to soil erosion control, % cover was used as the discriminatory criterioA for the trial. Four quadrats (50 cm x 50 cm) were taken from each plot to ascertain % cover.

Results and discussion

All treatments and interactions were non-significant at both 5% and 10% levels of probability. Under the control condition plant production was so low that in excess of a 30 fold increase in ground cover would be needed to achieve 70% where erosion control is effective. This 70% figure was established for black earth soils (4) and may be inadequate for the more erodible sands.

From the trial it appears soil ameliorants active in increasing soil moisture storage may have little effect on pasture establishment. When costs (Table I) are considered it is clear that their use is unlikely to be viable.

Table I: Cost comparison of different revegetation methods.

Cost Method:	Control	Bentonite	Starch-F	Hay	Turf (2nd grade)
$ m^{-2}	.20	.90	3.00	1.50	1.20

(NOTE: Labour and Machinery costs included: 1985 costs).

In practice, it may be better to use inexpensive conventional methods of seed and fertilizer broadcasting to gain an initial plant establishment. From a soil conservation point of view the hay at least gives a short lived initial cover, although hay use may exacerbate the water repellent nature of sand by stimulating microbial activity. If there is a critical area, (e.g. inlet areas adjacent to urban drainage systems), turfing is by far the more effective alternative as the pasture is actually transplanted to the site. In conclusion, although the theoretical basis of advances in technology is apparent, the practical application of advanced techniques may be limited.

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