BACK BOX

Bringing back the bush

Six years ago, a group of sand-mining companies, frustrated by problems of sand dune revegetation, approached CSIRO with a request for help. The group—the Rutile and Zircon Development Association Ltd (RZDA)—had been spending more than a million dollars a year on revegetation. Despite this expenditure, some projects were proving unsuccessful and were rousing further public opinion against sand-mining.

The main problem was the difficulty in getting a representative sample of native woody species, particularly the banksias, to return to the mined areas.

Previous work by Professor Ray Specht, now of Queensland University, and Dr Richard Groves of the CSIRO Division of Plant Industry had shown that such Australian species were adapted to grow and reproduce in soils low in nutrients, especially nitrogen and phosphorus. But the companies were putting high levels of nitrogen and phosphorus onto mined areas in order to establish a ground cover quickly and thereby prevent wind erosion. Perhaps this could be responsible for the poor regeneration of some of the native plants.

It was decided that the best way CSIRO could help would be by research into the regeneration of the dominant species of rear-dune areas, particularly their reaction to fertilizers. So in 1971 Dr Groves began a project to

Banksia serrata

investigate growth and survival of three species—black butt (*Eucalyptus pilularis*), sweet wattle (*Acacia suaveolens*), and saw banksia (*Banksia serrata*)—when given high levels of both nitrogen and phosphorus.

All these species grow widely throughout coastal New South Wales and the coastal lowlands of Queensland, and the banksia and wattle occur in Victoria as well. They usually grow on acid leached soils, low in phosphorus and nitrogen, and represent a wide group that makes up the sclerophyll shrublands of eastern Australia.

Dr Groves and Mr Kazys Keraitis of the Division began a series of pot experiments, growing seedlings of all three in sand culture for 3–4 months. They gradually applied four levels of phosphorus (0, 5, 50, and 100 parts per million) and three levels of nitrogen (0, 25, and 250 p.p.m.) in various combinations.

Within 3–4 months after germination, the banksia seedlings became intolerant of a combination of high phosphorus and high nitrogen levels, the wattle seedlings died at high phosphorus levels irrespective of the amount of nitrogen, and the eucalypts were intolerant of high phosphorus alone, but those with high levels of both phosphorus and nitrogen flourished.

The banksia's apparent intolerance of phosphorus and nitrogen could be due to an imbalance between those two elements. The levels of other nutrients may also be significant in counteracting the effects of high phosphorus levels.

The rate of leaching of nutrients from the root zone has a considerable influence on the response to high fertilizer levels. Dr Groves' experimental conditions represented areas, such as in southern Australia, where leaching is slow compared with the relatively rapid leaching in the sand masses of north-eastern Australia, where summer rainfall is higher.

As a result of his work, Dr Groves has put forward a number of suggestions on the best way to revegetate a mined area. He recommends that the area should be burnt first to release the banksia seeds.

He admits that some nitrogen and phosphorus must be applied to establish a ground cover quickly, but thinks they should be added in a balanced slow-release fertilizer with the amounts substantially reduced from the usual high agricultural levels. He also suggests that one way of overcoming the problem of having to apply high fertilizer levels would be to use native grasses as the ground cover, since they too are adapted to low-fertility soils.

But Dr Groves says that, even if the sand-miners were to revegetate rear-dune areas successfully, many of the problems of the coastal region would still remain unsolved. Sand dune erosion is due not only to sand-mining but also to lack of planning and zoning, to cattle-grazing, and to indiscriminate use of the areas by the public.

Survival and growth of seedlings of three sclerophyll species at high levels of phosphorus and nitrogen. R. H. Groves and K. Keraitis. *Australian Journal of Botany*, 1977, **25** (in press).

The effect of fertilizers on sclerophyll (heath) vegetation—the problems of revegetation after sand-mining of high dunes. R. L. Specht. *Search*, 1975, **6**, 459–61.