Management guidelines for dune use

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Fertiliser programs for dune vegetation

Introduction

Coastal dune soils have low levels of plant nutrients. A significant proportion of the total nutrient pool can be held in plant tissues, such as the leaves and stem and in leaf litter and are efficiently recycled by the plants. Native dune plants often have specialised adaptations that allow them to grow effectively in low fertility sands. Some plants such as wattle and she-oak convert nitrogen in the air in the soil to nitrate which the plants can use and which adds to soil fertility.

Depleted nutrient levels can occur in dune areas where the vegetation has been damaged or removed and in bare sand areas created by sand nourishment or wind erosion. Fertiliser applications will be a necessary part of any dune rehabilitation program to provide nutrient levels that will ensure satisfactory plant growth.

Fertilising can also be a useful method for increasing the rate of spread of pioneer dune-stabilising plants over bare areas. This reduces the need for conventional revegetation and minimises the time required to achieve stability against wind erosion.

Recommended fertilising programs

1. Cover crops (cereal rye, sorghum)

   A complete fertiliser with an approximate nutrient ratio of N:P:K 15:4:11 plus trace elements, should be applied at planting at 300kg/ha and repeated eight weeks after planting if necessary.

2. Sand spinifex grass

   Sand spinifex grass *(Spinifex sericeus)* will respond satisfactorily to a fertiliser containing only nitrogen. No other nutrients are required. Nitram® (ammonium nitrate, 34% N) is the preferred form to use.

   Two fertilising strategies can be used depending on the problems. If existing stands of sand spinifex grass have been moderately damaged or need a boost in vigour, a single application of Nitram® at 200kg/ha is recommended. If a site is seriously degraded or the sand spinifex grass is required to spread into adjacent bare areas, then Nitram® should be applied at 1200kg/ha split into four equal applications over the year. The first and second applications should be given to all plants but successive applications applied in strips to the

The effect of nitrogen fertilizer on the growth of sand spinifex grass. The grass to the right of the steel pickets has had its growth rate and vigour boosted by nitrogen fertiliser while the area to the left has been left unfertilised.

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edges of swards or the 'front' of growing sand spinifex grass runners. This will prevent an unhealthy overgrowth in the older areas.

3. Broadleaved herbaceous dune plants

   For dune plant communities dominated by goat's foot convolvulus *(Ipomoea pes-caprae)*, the recommendation for sand spinifex grass can be used.

   Leguminous plants such as beach bean *(Canavalia rosa)* and beach vigna *(Vigna marina)* will benefit from an application of fertiliser at planting. Approximately 20g of a 5/6 month slow release complete fertiliser (typical NPK analysis of 15:4.8:10.8 plus MgO and trace elements) applied around the seedling would be ideal. The root nodules should then be able to contribute to the nitrogen requirements of the plant, but application of 200kg/ha of superphosphate with molybdenum may be needed if nodule development and plant growth are not satisfactory.

4. Horsetail she-oak and wattle seedlings

   Generally no fertiliser application is recommended for these plants as they obtain nitrogen from nodules on their roots. However, some nursery stock which have not acquired the necessary micro-organisms to produce nodules may be slow to nodulate in the field. If tree seedlings of these species appear to lack vigour six months after planting onto the dunes, then fertilise as per the recommendations for cover crops with 50g of complete fertiliser broadcast in a circle within 300mm of the stem of the seedlings at three month intervals, or use a slow release fertiliser as shown below.

5. Tree and shrub seedlings in general

   Most tree and shrub seedlings require a high nitrogen complete fertiliser to stimulate early growth. Slow-release fertiliser pellets are an ideal way to supply nutrients to the tree seedling, while reducing the problem of stimulating competing grasses. Two 20g fertiliser pellets (NPK of 20:4.3:4.1) should be placed beside the root ball at planting and no deeper than 100 mm in the hole.

   Fertiliser application as for cover crops can be used after 18 months if required with 50g broadcast in a circle within 300mm of the stem of each seedling as required.

Slow release fertilisers

Ordinary mineral fertilisers are the cheapest source of concentrated plant nutrients and if used correctly in relation to adequate soil moisture and rainfall, will give satisfactory results in most situations. However, the coated slow-release fertilisers such as Osmocote® and Nutricote® are particularly useful for supplying the nutritional needs of young plants with small root systems. These plants have a limited capacity to extract nutrients from regular fertilisers which can be rapidly leached down the sand profile and away from their root zone. Slow release fertilisers based on urea formaldahyde, methylene urea or isobutylidine diurea are expensive and not well suited to dune conditions. They are only recommended when supplied in pellet form and applied sub-surface.

Problems with fertilising

Over-fertilising can be a serious problem causing the production of excessive vegetative material. Fertilising should be used to achieve predetermined objectives Fertilisers containing phosphorus should be used cautiously, as phosphorous levels can build-up in the sand and encourage weed invasion. It may also be toxic to some phosphorous-sensitive native plants such as banksia and wattle.

The nitrogen component of fertilisers tends to be very soluble and heavy rainfall can quickly leach them from the relatively shallow root zone of young plants. This risk can be reduced by splitting up the fertiliser application and applying it when weather conditions are suitable, such as during periods of showery weather.