

REHABILITATION OF NATIVE FOREST AFTER MINING IN WESTLAND

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ABSTRACT

Rehabilitation techniques for native forest were investigated at an open cast coal mine site in cut-over beech (*Nothofagus*) forest on alluvial river terraces at Giles Creek near Reefton, Westland. Annual precipitation at the site is 2900 mm and soils are dominantly Allophanic and Acid Brown Soils. The survival and growth of twelve nursery raised native woody species, and natural regeneration, were examined in three covering treatments consisting of (1) overburden gravel, (2) mixed forest soil, and (3) layered forest soil. Underlying gravels were either not-ripped or ripped to a depth of 80 cm.

Survival of bare-root and container-grown plants 4.5 years after planting was better in gravel than in mixed and layered soil, largely because of poor survival of beech species in forest soil. However, plant growth in overburden gravel was minimal because of nitrogen deficiency. Height growth after 4.5 years in layered soil was nearly twice that in mixed soil, the better growth in layered soil being due to improved drainage and improved nitrogen nutrition. Poor survival of the beeches in forest soil is attributed to root-rot pathogens. Ripping of underlying overburden gravel had no influence on plant survival or growth in any of the three covering materials.

In the fifth year of the trial, ground cover in the two soil treatments was 38-40 %, but cover in overburden gravel cover never exceeded 1 %. Tall growing adventive rush (*Juncus* sp.) dominated in mixed soil, reflecting poor drainage, whereas native and adventive herb species dominated in layered soil. Few native species, especially woody species, were introduced from the original forest through soil replacement. Research is required to determine optimum timing of earthmoving operations in relation to natural seed dispersal.

Additional Giles Creek field trials, and glasshouse trials, showed that nitrogen was the major deficient element for plant growth in overburden materials containing little or no soil or organic material. Positive responses to phosphorus were obtained in gravels and mixed soil, but not in material containing fine sandstone associated with the coal seams.

Seeding was found to be successful for establishing pioneer shrub species, such as karamu and manuka, at Giles Creek.