

TREE PLANTING ON EAST COAST HILL COUNTRY



Typical results on land which has slumped below a road. Widely-spaced crack willows were planted to prevent further movement, and the hummocks have grassed over.

by a general system of preventive management. In such work the main objectives are:

First, the immediate prevention of sudden increases in the volume of water fed to a streambed, and hence the stabilisation of the streambanks. This is attempted by regulating the rate of movement of water through the loose soil cover by the formation of a good, compact cover of grass, made possible by spelling from grazing, sowing, good pasture-sward management, and later by further subdivision and controlled grazing. In severe instances of stream aggradation it may be necessary to give local protection to vulnerable streambanks and to control stream flow direction by the use of such physical means as groynes or tree planting in regions of the streambed; trees planted in the stream are also of some service to slow down the rate of flow within the banks.

Second, the local arrest of land movement—flowage and slumping—by the holding of slumping ground around the toes of slopes with widely-spaced trees, mainly willows or poplars.

Third, the ultimate consolidation of large areas above and around the fixed toes by the use of closely-spaced trees to form solid plantation blocks containing usually conifer or eucalyptus species.

Tree planting at Puketiti is thus intimately bound up with the special conditions arising from the nature of the country, and as a result a routine procedure has been evolved resulting from the experience of years. Though on each area a different combination of conditions may exist and the exact procedure suitable for each must be considered, the same principles are observed in any piece of erosion planting.

Existing Plantations

The formation of plantations on a variety of sites and under varying conditions has resulted in a valuable series of tree crops demonstrating different species, ages, and silvicultural systems throughout the area. However, though in general species which prove suitable for growing on Puketiti land will probably produce as satisfactory growth on much of the coastal hill lands of Poverty Bay, there are dissimilar combinations of altitude, soil, and aspect which must be taken into account when estimating probable production from other new areas on this coast. All early planting entailed experimenting with species and, though definite indications of growth and suitability of several species can now be observed, a great deal remains to be learnt from this area about methods of establishment (such as spacing and mixtures of species) and the management of plantations of introduced species, both evergreen and deciduous.

For purposes of description the tree crops may be best classified as pure plantations of one species and plantations of silvicultural mixtures of species. The species which occur on the area in sufficient quantity for judgment are listed as follows:—

Occurring as Pure Crops

Conifers: *Pinus radiata* (insignis pine or Monterey pine), *Pseudotsuga taxifolia* (Oregon pine), *Cupressus macrocarpa* (Monterey cypress or macrocarpa), *Sequoia sempervirens* (California redwood), and *Chamaecyparis lawsoniana* (Lawson's cypress or Port Orford cedar).

Broad-leaved species: Poplars (*Populus nigra* var. *fastigiata*, *P. alba*, and *P. serotina*), willows (*Salix vitellina*, *S. fragilis*, and *S. babylonica*), false or

spiny acacia (*Robinia pseudacacia*), and puriri (*Vitex lucens*).

Eucalypts: *Eucalyptus regnans*, *E. obliqua*, *E. gigantea*, *E. sieberiana*, and *E. saligna*.

Silvicultural Mixtures

Oregon pine with Californian redwood.

Oregon pine with eucalyptus species.
Cupressus macrocarpa with oak.

Cupressus macrocarpa with *Pinus ponderosa*.

Lawson's cypress with European larch.

Lawson's cypress with Oregon pine.
Lawson's cypress with *Pinus rigida*.

Lawson's cypress, Oregon pine, redwood, and native species (karaka, titoi, totara, kohekohe, olearia, and mahoe) with broad-leaved species of oak, some English beech, Australian blackwood (*Acacia melanoxylon*), silver birch, and a little elm.

Pure Plantations

Pinus radiata

This species was included in the earliest planting activities in the home plantation as odd trees or groups of trees among the general mixture of species employed. There are now some fine, massive trees of 40 to 50 years of age which are to be milled in the coming year. These old trees are growing chiefly on the upper slopes of ridges on the main brown sandy loam soil type, but growth apparently is equally good on the lower areas of grey-brown silt loam on clay loam.

In the younger plantations, formed on unstable mudstone slopes such as those in the Five River watershed area and Te Wake plantation, where the