

successful forest-production. All these works can only be carried out at a properly equipped forest experiment station. During the year, therefore, a 5,000-acre area in Westland suitable for the purpose was dedicated, demarcated, and a preliminary internal survey was made. A tree-nursery site was located, and proceedings taken to acquire same. It is hoped that funds will be provided to permit of the active operation of this centre of intensive scientific study and research.

SAND-DUNE RECLAMATION.

A pressing and important economic problem is the reclamation and bringing into productivity of the several hundred thousand acres of New Zealand's coastal wandering sand-dunes. The menace of these useless sand-wastes to contiguous fertile lands along the west coast of the North Island is serious and actual. During the year a sand-dune reclamation experiment station was established by this Service at the mouth of the Rangitikei River, about nine miles north of Foxton. The chosen area contains about 2,000 acres of west-coast littoral, and may be considered typical of the North Island condition. During the year the area was fenced, 35 acres of wandering dunes were planted with marram-grass, 250,000 stool-shoots were set out in a suitable nursery, and several small nursery plots were established throughout the area and sown down with marram-seed. A large variety of cuttings, seeds of shrubs, several hundred Douglas fir, *Pinus insignis*, and *Pinus ponderosa* were planted in order to ascertain the species suitable for usage as protective belts. Definite forms of foredune fences for the fixation of the sand-dunes were established, and costs of construction have been carefully kept. As a result of this sand-dune reclamation work (which will be continued for three or four more years) the Service will be able to present a definite procedure of construction, cost, method, and result for the purpose of bringing into national production at least 300,000 acres of land which to-day is not only worth nothing, but is ever encroaching on the most fertile and valuable agricultural lands in the North Island.

ECONOMY IN AFFORESTATION.

Notching versus Pitting.

Experiments in more direct methods of planting in the Rotorua region plantations have been successfully performed during the year. It was found that the substitution of notch planting for pitting (adopted experimentally over several hundred acres) will result in the lowering of establishment costs by 15s. per acre (a direct saving of at least £6,000 per annum in the annual North Island planting programme). A comparison of results indicates that the trees have succeeded as well, if not better, by the notching method than by pitting. This system is commended to private tree-planters.

Direct Sowing.

Direct-sowing experiments were continued during the year at Kaingaroa Plains Plantation, where 50 acres were sown with the following seeds: *Pinus insignis*, *P. ponderosa*, *P. Murrayana*, Douglas fir, *Cupressus Lawsoniana*, *Sequoia sempervirens*, and *Eucalyptus obliqua*. As in the previous year, a grain-drill was used, but a more careful adjustment was made to the conditions by removing all the coulter with the exception of one at each end, spaced 7 in. apart. This ensured the seed entering the ground more evenly, and the result was that a better germination was secured. The results by this method were satisfactory only with *Pinus insignis* and *P. ponderosa*. This experiment will be continued, and an autumn sowing of *Pinus insignis* will be tried. The cost of seeding was £1 5s. per acre for labour and material.

EXPERIMENTAL PLANTING OF EUCALYPTUS GIGANTEA.

In 1917 an experimental area of this tree was planted on the pumice plateau (Kaingaroa). Its establishment has proven successful, and demonstrates that this very valuable eucalypt timber-tree is suitable for planting in districts of low winter temperature. It is recommended to private planters accordingly.

TIMBER-VOLUME TABLES AND MILL STUDIES.

In order that greater accuracy might be secured in standing-timber estimation, valuation, and appraisal, a programme of merchantable-tree measurement under actual exploitation conditions was begun during the year. The resultant tables will give the actual out-turn in volume of all merchantable trees from the lowest size cut up to the maximum size, and for each commercial species—rimu, matai, miro, totara, and white-pine. This project will be completed during the current calendar year. Mill studies have been undertaken in the various Dominion timber regions for the purpose of determining the actual out-turn in sawn forest-products from trees and logs of various dimensions and species subjected to varying methods of conversion. The co-operation of the milling industry has been secured in the preparation of this data, and the results (which will be of great practical value in logging and milling operations) will be made available to the public on completion.