## PAKIHI SOILS RESEARCH.

FOURTH ANNUAL REPORT OF INVESTIGATIONS CONDUCTED BY THE CAWTHRON INSTITUTE.

During the period under review the experimental plots of pasture and of *Phormium tenax* laid down in previous years have been continued.

Several new series of pasture plots have been established at Sergeant's Hill in order to test further points connected with the reclamation of pakihi land. In addition, a commencement has been made at Sergeant's Hill with the establishment of a small dairying-farm. Ten acres of an initial area of 25 acres leased from Mr. C. Lemon have been sown in grass according to the methods and treatment recommended by the Institute.

As a result of the success which has been obtained in the Westport experiments, several farmers have sown in grass areas of their own pakihi land. One block of 33 acres, adjoining 6 acres of pasture established by the Cawthron Institute on what was locally known as Wood's Farm, has been sown by Mr. E. Skilton, who recently purchased this property. At Onekaka, between Takaka and Collingwood, Mr. F. G. Gibbs has sown an area of 75 acres of pakihi land. Officers of the Cawthron Institute have acted in an advisory capacity to Mr. Gibbs in the preparation and treatment of the land prior to pasture-seeding. The area at Onekaka was sown towards the end of March, and a good strike of grasses and clovers has been obtained. On the drier portions of the property, where discing was carried out in order to secure a suitable seed-bed, perennial-rye has made excellent growth.

### Pasture Experiments.

The plots which have been established during the last four years are still making satisfactory growth, and heavy cuts of hay have been taken from many plots during the summer. All established pasture plots receive a top-dressing of 2 cwt. superphosphate per acre in July. Where hay has been repeatedly cut and removed from the land, sulphate of potash at the rate of 1 cwt. per acre has been given in addition to superphosphate, in order to maintain the potash supply of the soil.

The grazing of established pasture on pakihi land has effected a wonderful improvement in the textural qualities of the soil. The spongy peaty layer has consolidated in a remarkable way, and the soil has improved greatly in aeration and drainage qualities.

The following data for soil-samples taken to a depth of 6 in. from untreated pakihi land and from grazed three-year-old pasture illustrate the great difference in textural properties which has resulted from the establishment of pasture and its grazing by stock :—

| — | Untreated Pakihi Soil (in Native Vegetation). | Pakihi Soil in Pasture (grazed for Two Years). |
|---|---|---|
| | Per Cent. | Per Cent. |
| Water content* .. .. .. .. .. | 58·2 | 40·7 |
| Loss on ignition .. .. .. .. .. | 21·8 | 11·7 |
| Relative weight of dried soil (equal volumes) .. .. | 100 | 151 |

* Samples taken, 10th June, 1932.

### Preparation of Seed-bed.

The experiments have continued to show the success of surface treatment without resort to ploughing in the preparation of the seed-bed. Where the soil is deep and moist, simple burning of the pakihi vegetation, followed by the distribution of lime and fertilizer and double harrowing with an improvised set of harrows, has enabled an excellent stand of grasses and clovers to be obtained.

Where the soil is somewhat thin and the surface is hard and dry, discing in order to obtain a shallow mulch has given better results in pasture establishment. The experiments have shown the desirability of delaying seeding until the surface is sufficiently moist to secure rapid germination of the seed and a quick strike of the young plants.

### Use of Lime.

The experiments continue to show the importance of applying at least 1 ton of ground limestone per acre in the treatment of the land. In so far as the initial establishment of pasture is concerned, no great advantage over the 1-ton application of ground limestone has been observed by the use of 2 tons of ground limestone per acre. On the other hand, plots treated with $\frac{1}{2}$ ton only of ground limestone per acre are inferior to those treated with the 1-ton application, using 5 cwt. superphosphate in each case in the manurial treatment of the land. Plots treated with only 5 cwt. of ground limestone per acre plus the standard amount of superphosphate are poor compared with plots treated with the larger amounts of lime. The response, however, even with this small amount of lime is surprisingly good.

### Use of Phosphatic Manures.

The experiments have shown the supreme importance of liberal phosphatic manuring in the treatment of pakihi land. The best results have been obtained by the use of 5 cwt. of basic slag or of superphosphate per acre in conjunction with liming at the rate of 1 ton of ground limestone per acre. Plots sown with only $2\frac{1}{2}$ cwt. of phosphatic manure instead of the standard 5 cwt. dressing have resulted in a comparatively poor growth of grasses and clovers.