

*Aerodrome Surveys.*—The soils of all aerodromes in New Zealand have now been examined to obtain information on their physical and chemical properties. This information has been used by the Aerodromes Branch, Public Works Department, and the Grasslands Division, Plant Research Bureau in the selection, construction, and maintenance of many of the airfields within New Zealand.

The main conclusions are—

- (i) Drainage is of paramount importance in the maintenance of a firm and stable surface under all climatic conditions. Drainage properties, therefore, are an essential consideration in the selection and construction of airfields:
- (ii) Where the rate of percolation is insufficient to remove water from the soil surface layers, surface drainage must be installed. The most satisfactory drains for this purpose as shown by Public Works Department trials are trenches filled to the surface with permeable material. Subsurface drainage alone is inadequate:
- (iii) Except in dry climates, where a shallow layer of topsoil is essential for the conservation of moisture, the most satisfactory soil surface for grassed airfields is obtained from a soil of sandy loam texture in which topsoil and subsoil are blended together in the surface 2 in. or 3 in. and there is no topsoil below this depth. For drainage purposes the best subsoil is sand:
- (iv) The turf developed under a mixture of brown-top and Chewing's fescue, which the Grasslands Division has shown provides the best grass surface for airfields in New Zealand, requires soil conditions of strong acidity, low lime content, and a plentiful supply of nitrogen, phosphate, and moisture.

*Soil Erosion.*—The soil-erosion maps prepared from the survey of the high country of the South Island have been supplied to the district committees of the Soil Conservation Council and the information obtained from the surveys explained.

Plots several acres in extent have been fenced on Molesworth (Awatere Valley), Te Akatarewa (Waitaki Valley), and Mount Edwards (near Lake Tekapo). In conjunction with the Botany Division, experiments are being conducted on these plots to devise methods of minimizing soil loss.

*Pot Experiments.*—Preliminary trials with indicator plants have shown Virginia stock (*Malcolmia maritima*) to be an excellent lime indicator, and catchfly (*Silene gallica*), staggerweed (*Stachys arvensis*), cudweed (*Gnaphalium* sp.), catsear (*Hypochaeris radicata*), and cornflower (*Centaurea cyanus*) good phosphate indicators. These plants are especially suitable as indicators, because under adverse conditions there is continuous slow growth of tiny plants. This means a wide range of growth response can be obtained and allows of several classes to evaluate response. Virginia stock can absorb a high amount of lime. When growth is poor, the lime content of the plant is 1.4 per cent.—an amount equal to that of good pastures—and when lime is added to the pots in which the stock is growing the percentage of lime in the plants increases to as much as 5.6 per cent. Our main soil types have been tested with Virginia stock and some disagreement with chemical analyses obtained. These anomalies will be investigated to see whether they are due to a deficiency of soil elements or to some shortcoming in the chemical methods.

A trial was made of suckling clover to find the changes in nutrients with the addition of fertilizers. These conditions arose as a result of these experiments:—

- (i) On soils of low fertility the application of lime plus phosphate increased lime from 1.1 per cent. to 1.7 per cent. and phosphate from 0.5 per cent. to 0.8 per cent. in the clover:
- (ii) On some soils of moderate fertility the lime content of the plants is 1.7 per cent. and the phosphate 0.6 per cent., and is not increased by top-dressing with fertilizers containing these elements.
- (iii) On some soils of low fertility the application of lime alone depresses the phosphate from 0.5 per cent. to 0.3 per cent.

From this it can be seen that nutrient content must be taken into account in assessing response of suckling clover to top-dressing. Further experiments on similar lines are now laid down on the same soils with suckling clover, rye-grass, and white clover to ascertain whether the uptake of nutrients by rye-grass and white clover is similar to that for suckling clover.

*Fluorine Survey.*—Estimations of fluorine in soils are being undertaken at the request of the Nutrition Committee of the Health Department, which is interested in the claim that fluorine controls the incidence of dental caries.

*Soil Mechanics.*—The survey of soils to determine their suitability for soil cement as a surface for runways, roads, &c., has been completed and an account written for publication. Several types of soil have been reported as suitable.

Appropriate tests of materials available for the proposed Nihotupu (Auckland) earth-dam were made.

With the Railways Department tests were carried out to estimate the probable settlement of piers of the proposed Waltham Road (Christchurch) overbridge.

Muds suitable for use in drilling were surveyed in the Gisborne district.

Likely shrinkage and expansions in tunnels for fuel storage were estimated.

Tests to provide data for calculation of pressure against a retaining-wall were made.

A shrinkage problem in connection with pottery clay was investigated.

Failure of existing bitumen aprons on aerodromes has been investigated, and shown to be due to the fact that soil conditions are such that shear strength of the soils is insufficient to carry loads transmitted to it.

*Miscellaneous.*—Chemical reports have been supplied on the progress of reclamation of Kaipara Harbour soils.

Analyses have been made of soils for the growing of vegetables both in New Zealand and on Pacific islands.