

GENERAL SURVEY, SOUTH ISLAND.

In the South Island the general soil survey has been confined to the completion of the mapping of the high country on the eastern side of the Southern Alps, a project which was commenced during the previous season primarily with the object of obtaining quantitative and qualitative data on soil erosion.

Soil types mapped during this survey were—

- (1) *Buff Loams*.—These are very fertile soils whose productivity is limited by low moisture conditions. They cover valley sides and bottoms of the parts of Central Otago where the rainfall is less than 25 in. and were originally covered with fescue and blue tussock. At present this is the type most severely eroded, and in many places now grows little more than scabweed and the desert poa (*Poa maniototo*). The texture of the topsoil ranges from a loamy sand to a coarse sandy loam.
- (2) *Grey-brown Loams*.—These are moderately-fertile soils occurring on the hill slopes and valley bottoms of the numerous areas in Marlborough, Canterbury, and Otago. The grey-brown loams are developed under a mixed fescue and poa tussock vegetation and an annual rainfall between 25 in. and 45 in. Topsoil textures range from coarse sandy loam to fine sandy loam.
- (3) *Yellow-brown Loams*.—These are soils of low fertility, and include most of the soils of the high-country runs above 3,000 ft. in altitude which are developed under an annual rainfall of between 45 in. and 100 in. approximately. The vegetation consists principally of danthonia tussock with some areas of *Nothofagus* forest. The textures of the topsoil range from sandy loam to silt loam.

Many analyses of soils taken on the ranges from Marlborough to Southland show that fertility levels correlate with effective rainfall. The buff loams of the lower slopes change through grey-brown loams to yellow-brown loams on the higher levels and correlate with percentage base saturation changes. About 80 per cent. base saturation in both topsoil and subsoil is characteristic of the drier soils, while 20 per cent. base saturation in the topsoil and 10 per cent. in the subsoil are typical figures of yellow-brown loams. Carbon and nitrogen figures have been used to show the extent of erosion in some cases.

LINEN-FLAX SURVEYS.

Surveys of potential linen-flax soils in the Balclutha and Clydevale districts have been completed and the results handed over to the Fields Division. Surveys are now proceeding in Southland, South Canterbury, and Ellesmere.

The analyses of soils from all areas have confirmed last year's conclusion that flax does well on soils of fairly low fertility, provided that the moisture relations are right and the nitrogen is in proper supply.

SUGAR-BEET SURVEYS.

In the Christchurch-Ellesmere district soils similar to those in the Orari-Temuka district, which from trials by the Department of Agriculture were judged to be suitable for the growing of sugar-beet, were found to occupy too small an area for the establishment of an industry. It is possible, however, that other acceptable soil types may be located if further field trials are laid down.

AERODROME SURVEYS.

Soil surveys and analyses have been made of many aerodromes, with the object of facilitating the Grasslands Division's policy in producing chewing's-fescue - brown-top swards on airfields. Advice has been given on the present level of fertility of the soils in order that fertilizing programmes may be designed to bring the fertility to the level required by these pasture plants. Over a period of ten years the Grasslands Division has established at Hokowhitu a good wearing turf of chewing's fescue and brown-top, and the soil investigations were commenced with the object of finding what soil changes had taken place in bringing this alluvial soil down to conditions favourable to these grasses. The Grasslands Division obtained best results with ammonium and iron sulphates and superphosphate. Analyses showed that starting with a soil of pH 6.2 and base saturation 70 per cent. to 75 per cent., changes in the topsoil had taken place to the extent of reducing the pH to 4.7 and the base saturation to 25 per cent. to 30 per cent. These differences were most marked in the top 1 in., while at 3 in. to 6 in. depth there was very little change. The carbon-nitrogen ratio was significantly higher on the acidified plots than on the controls.

SOIL CEMENT.

In view of the success overseas in the use of relatively small percentages of cement added to stabilized earth for roads and runways as a substitute for the more expensive foundations like concrete, investigations have commenced on the suitability of New Zealand soils for this treatment.

BASALT SCORIA AS A REVERTING MATERIAL FOR SUPERPHOSPHATE.

Basalt scoria as a reverting material for superphosphate was found effective, and the results were published in the *Journal of Science and Technology*, Vol. 23, No. 1B.

PHOSPHATE FIXATION.

Phosphate fixation proceeding to a marked degree in certain soils was investigated, and results show that alumina is the most active in fixing phosphate, followed by iron oxide. These absorbed phosphates are easily soluble in neutral ammonium citrate.

SOIL EROSION.

Soil-erosion surveys on the high country on the eastern side of the Southern Alps has now been completed. Erosion on the three main soil types is briefly referred to below:—

(1) *Buff Loams*.—By 1900 the buff loams had reached a state of extreme erosion, mainly through the action of wind. At present practically no topsoil remains to blow, but the subsoil and zone of weathered rock is being rapidly removed by gullying. This is well illustrated on the hillsides behind