

SOIL CHEMISTRY

Soil Clay Minerals.—Work has been commenced on the differentiation of clay minerals present in New Zealand soils. This work is basic to soil classification and should do much to increase our understanding of soil reactions, particularly the reaction between the soil and added fertilizer. The technique at present in use consists of taking x-ray diffraction pictures of the powdered clay.

Soil Phosphates.—A start has been made in fractionating the types of phosphate occurring in soil. Both natural phosphates occurring in virgin soils and that occurring in soils which have been top-dressed are being examined. Phosphate fixation is one of the major problems of New Zealand agriculture, and an understanding of the mechanism of soil phosphate supply and fixation will help towards a more efficient use of fertilizers, whether it is brought about by altering the soil by such means as liming, or by changing the forms in which phosphate is applied to the soil.

Soil Corrosion.—Consequent on several requests being made for advice on the corrosiveness of soils an extensive investigation is being made on the factors involved in soil corrosion. While overseas data is useful as a first approach it is obvious that we must learn to solve our own particular problems. No estimation of single factors such as soil acidity, resistivity, water-holding capacity, differential aeration, and the presence or otherwise of certain bacteria is sufficient to assess the likely corrosiveness of a soil. The answer can be found only in the sum of these factors.

Advance data and a soil map have been provided for part of the proposed route of the pipe-line for the Wellington water-supply. Corrosion problems at Gisborne, Hastings, and Christchurch have also been investigated.

Kerikeri Orchard Soils.—Throughout the summer regular samples have been taken at Kerikeri by the Orchard Instructor and forwarded to Wellington for moisture analyses. Wilting-point determinations on these soils show that the orchards must have been close to wilting for a considerable period during the past abnormally dry season. In collaboration with the Horticulture Division, an attempt is being made to correlate the moisture holding power of the soil with different orchard practices.

Soil Fluorine.—A paper dealing with the fluorine content of New Zealand soils has been prepared for publication.

Lime Requirement of Soils.—Following the completion of the map showing the lime requirement of North Island soils a scheme for a Lime Advisory Service was drawn up detailing a method by which farmers could be advised of the lime requirement of their particular soils. The scheme received favourable comment, but it was decided that the operation of such a scheme was not the function of the Soil Bureau.

SOIL PHYSICS

Owing to numerous requests from civil engineers for soil-testing services, many of them of an urgent nature, the soil mechanics' work has almost exclusively dominated the work of this Division. It is intended, however, that with the increased staff recently appointed the work on soil tilth mentioned in last year's report will be considerably extended. Further samples have been obtained from deteriorated farms in Canterbury. North Auckland soil types will also be investigated for structure, porosity, and soil moisture data.

Wilting-point.—Methods of estimating the permanent wilting-point of soils by means of the freezing-point depression and dilatometer method have been tried on orchard soils from Kerikeri and soils from irrigation areas in Canterbury.

Earth Dams.—Control limits have been fully investigated for the proposed material at Lower Nihotupu. Particular attention was paid to the relation between moisture content and required shear strength of the placed material, and the effect of air voids on the ultimate shear strength of the bank. The Auckland City Council's officer in charge of the soil-testing work at the dam spent some weeks in the Soil Bureau laboratory studying methods of soil testing. The Auckland City Council has set up a well-equipped soil laboratory on the site of the dam. A member of the Soil Bureau staff is on loan to the City Council and is assisting with the soil-testing work as construction proceeds.