

The recent alluvial soils are derived from sediments of mudstone, sandstone, and limestone laid down on the flood plains of rivers within comparatively recent times. They range in texture from heavy clays to sands and stony gravels. Where the soils are still within the zone of flooding they are very high in lime and other plant nutrients and little response is obtained from artificial fertilizers. Where, however, they have been removed from the zone of flooding for some time a certain amount of leaching of plant nutrients has occurred and a slight response from phosphate top-dressings may be obtained.

Three other minor groups of soils are recognized. They are—

*Meadow* soils, which are poorly drained and acid ;

*Organic* soils, which are peaty and of fairly high fertility ; and

*Saline* soils, which are found on salt areas recently reclaimed from the sea.

#### HAWKE'S BAY BULLETINS AND LAND-TYPE MAP.

Now that the writing-up of the work is well in hand, attention has been given to presenting soil information in a form which can be easily understood and appreciated by farmers and others. It has been found that the individual farmer requires to know the main soil types on his property before the soil map can be of reasonable practical value to him. Soils are shown, therefore, by means of sixty-nine colours and hatchings. Maps showing so many types are too detailed to be of reasonable practical value to administrative officers and others who are concerned with the district in a more general way than the individual farmer. To provide for this section of the community a *land-type map* is being constructed under the guidance of the farm-management branch. All soil types and phases are grouped into about thirty *land types*. Each land type includes soils having a definite range of slope and range of fertility. The general character of the land in any part of the province can be seen at a glance from such a map. The pumice areas, range country, steep country, gorges, good rolling hills, light terraces, heavy fertile flats, &c., stand out conspicuously.

#### CHEMICAL WORK AT THE CAWTHRON INSTITUTE.

Sir THEODORE RIGG, Officer in General Charge.

##### INTRODUCTION.

During the past year routine analyses of soil samples collected by the pedologists carrying out soil surveys in Hawke's Bay, North Auckland, and Waipa County have formed the principal part of the work undertaken in the soil laboratory. Determinations of available plant-food, base-exchange capacity, and base saturation have been made on a large number of samples. Mechanical analyses for the designation of textural types have likewise been carried out on a wide range of soils.

Podsolization of highly leached West Coast soils has been further studied, and data bearing on the podsolization of recent sands at Westport are included in this report.

In view of the importance to soil surveyors and agricultural instructors of chemical tests which would give a reliable indication of the plant-food content of soils under field conditions, considerable attention has been given to the careful examination of Bray's method for estimating phosphate and Spurway's method for estimating potash in soils. The data presented in this report show that both methods have considerable value in discriminating between soils containing a low or good supply of these plant-foods.

A great deal of time has been spent by the chemical staff in assembling information for the soil-survey reports dealing with the Heretaunga Plains, Banks Peninsula, Westport, and the tung plantations of North Auckland.

#### SOILS OF THE HERETAUNGA PLAINS.

During the year the chemical analyses of soil samples from the Heretaunga Plains have been completed, and in collaboration with the pedologists responsible for the classification and mapping of soils the results have been written up as a section of Bulletin No. 70, "Land Utilization Report of the Heretaunga Plains."

The chemical analysis show that the soils of the Heretaunga Plains, for the most part, are highly fertile. Available plant-food is notably high and there is a satisfactory base saturation, seldom being less than 40 per cent. and sometimes reaching 100 per cent. Soils of the Hastings and Pakowhai series—used extensively for fruit—are outstanding in available plant-foods and base content. In these soils the percentage of available phosphoric acid and potash seldom falls below 0.040 per cent., while the pH values range between 6 and 7, indicating that the soils are neutral or only slightly acid. Determinations of plant-food in the subsoil show that the soils have a natural high fertility, due to the very recent origin of the deposits.

The Pakipaki and Ngatarawa soils may be quoted as exceptions to the high fertility of Heretaunga Plains soils. In these soil groups available phosphoric acid tends to be low and the supply of potash is only moderate.

In the Farndon and Meeanee series the reaction of the soils is frequently alkaline, and high content of soluble salts in some interferes with optimum crop production. These soils in the past have been under tidal influence, and, although few are now affected by fluctuations in the sea-water level, soluble salts from sea-water inundation still persist in the soils.

The problem of improvement of these soils appears to be largely a matter of thorough leaching and of under-drainage. There is no evidence that calcium has been displaced from the clay complex by the action of sea-water. On this account the structure and drainage qualities of the soil have not been seriously affected, and soils of high fertility should result as soon as the soluble-salt content has been reduced to a satisfactory level.