Particular attention has been paid to the determination of mechanical analyses of soil-samples from known bush-sick areas. The analytical data of these soil-samples show that the soils are somewhat coarse in texture, falling into sand or sandy-silt groups. Although this correlation of somewhat coarse texture with incidence of bush sickness does not prove that all coarse-textured volcanic soils give rise to bush sickness, it does suggest that a coarsening of soil-texture aggravates the incidence of bush sickness on particular volcanic deposits.

Chemical Characteristics of Volcanic Deposits.

Fusion analyses of representative samples taken from the different volcanic deposits reveal marked differences in chemical composition. The Ngauruhoe, Tongariro, Tarawera, and Egmont showers are relatively high in lime. The Mairoa shower is very low in this constituent, and the Taupo, Mamaku, and Kaharoa soils occupy an intermediate place in regard to lime content. Ngauruhoe, Tongariro, and Egmont soils are high in magnesia, while the Taupo, Mamaku, and Mairoa soils are poorly supplied. Ngauruhoe, Tongariro, and Egmont soils show in the fusion analyses large reserves of phosphate, but the other volcanic deposits tend to be low in this plant-food, the Tarawera and Kaharoa soils being conspicuously low. One noticeable feature connected with the analytical data of the fusion analyses is the relatively low content of iron in the Taupo, Mamaku, and Kaharoa soils. The Mairoa, Tongariro, Egmont, and Tarawera soils are very much higher in iron, frequently containing three or four times more iron than the first group which has been mentioned. The analyses have shown that the low content of iron is associated with low percentages of titanium. It is interesting to note that the three deposits with low iron and titanium percentages are affected with bush sickness.

A number of soil-samples taken from the different volcanic deposits have been analysed by the conventional methods adopted for the study of soils. The results of the determinations show that in every case the top 0–3 in. of the soil is much richer in organic matter, nitrogen, and available plant-food than the underlying spits of the topsoil. Very frequently there is a drop of 50 per cent. in the percentages of plant-food constituents in the lower spits compared with the top 3 in. In a number of cases the spit taken at the depth of 3–6 in. frequently gave little better figures for available plant-food than the subsoil taken at a depth of 9–18 in.

The analytical data show that the Mamaku and Kaharoa soils are very low in available phosphoric acid. Typical samples of the Mairoa soils taken at Mairoa, fifteen miles west of Te Kuiti, also show a somewhat lower content of phosphoric acid. In all three cases the figures suggest that liberal treatment with phosphatic manures is desirable. Soil-samples from the Taupo deposit at Horohoro and Kopaki are comparatively well supplied with available phosphate. The highest percentages of available phosphoric acid were found in soil-samples taken at Te Kawa, Kihikihi, Pukeatua, and Tirau. The high percentage of available phosphoric acid in the Te Kawa – Tirau sector suggests that the soil is not derived solely from the Mairoa deposit.

With few exceptions, the supply of available potash is good in all the soils examined. In the case of the Kihikihi samples the percentage of available potash is astonishingly high. The lime-requirement figures show that many soils have a high degree of soil-acidity. Mairoa soils show the highest lime-requirement figures, being closely followed by soils in the Te Kawa, Kihikihi, and Tirau sector. The Kaharoa and Mamaku soils show the lowest lime-requirement figures, but even these suggest high unsaturation of this constituent.

Exchangeable bases have been determined in a selected number of the volcanic soils. The results of these analyses show that the top 0–3 in. of soil is much richer in exchangeable bases than lower spits in the topsoil or in the subsoil. In comparison with data for Nelson soils, the volcanic soils are high in exchangeable potash. This is particularly true of both the Kihikihi and Mairoa samples. A sample of the Taupo deposit at Horohoro, near Rotorua, is sharply differentiated from other volcanic soils by reason of its low content of exchangeable lime and magnesia. The percentage of exchangeable soda in this Taupo sample is higher than other soil-types, but the percentage of exchangeable potash tends to be low. Samples from other soil-types have much higher figures for replaceable lime and magnesia.

General.

In this report it has been possible to give only a brief outline of the detailed field-work which has been done by Messrs. L. I. Grange and N. H. Taylor, of the Geological Survey, who were seconded to the Reconnaissance Soil Survey. Mr. F. T. Seelye, of the Dominion Laboratory, has been responsible for the fusion analyses which are quoted in this report. Chemical and mechanical analyses have been undertaken at the Cawthron Institute by Messrs. A. H. Sim and L. Hodgson.

T. Rigg,
Officer in Charge of the Central North Island Soil Survey.

FOOD-VALUES.

The following work is carried out under Professor Malcolm at the Medical School of Otago University :—

Miss H. M. S. Thomson investigated the influence of varying proportions of lime and iodine in growth and reproduction of animals. She found that more iodine was required for successful pregnancy and lactation than for more maintenance and growth ; also that an excess of lime as well as a deficiency of lime had an unfavourable influence on the storage of iodine in the body.

Mrs. Airini Fisher, in feeding rats and pigs on diets rich in milk-sugar, such as whey, found that above a certain level of intake the sugar was excreted in the urine.