

Tests have been made to determine the suitability of material for an earth dam intended for hydro-electric storage. Tests to date indicate a high degree of suitability for the purpose.

*Foundation Surveys.*—Exploring and testing soils for building foundations has formed the major part of the year's work. In view of the importance of this work it is intended that the Soil Bureau obtain modern equipment for carrying out the field-work quickly and efficiently. Soil exploration has been carried out to a depth of 85 ft., and large undisturbed soil samples have been obtained from a maximum depth of 50 ft. Well-boring equipment has been largely used for these purposes. Exploration has been carried out on a hospital and a factory site in Christchurch, on heavy building-sites at Lincoln, Otahuhu, and Longburn, and on a post-office site in Wellington South.

*Permeability Experiments.*—Tests were made in the laboratory to determine the rate of seepage through a block of country forming part of a reservoir storage system. Fairly good agreement was obtained with large-scale tests made by engineers in the field.

*Soil Stabilization.*—At the request of a county engineer, some soils from the Auckland district have been investigated for cement stabilization. One type containing a proportion of gravel and having a good grading curve gave satisfactory stabilization with 12 per cent. by weight of cement.

### SOIL BIOTICS

*Soil Plant Relationships.*—A study of the influence exerted by various native plant species on soil formation was commenced in the southern districts of the South Island, where the native vegetation has played an important part in determining the development of the soil types. Preliminary studies were made on—

- (1) The soils of the forest, tussock grassland, and the ecotone lying between, in South Otago and Southland ;
- (2) The soils of the beech (*Nothofagus menziesii*) forest and rain forest dominated by kamahi (*Weinmannia racemosa*) and rimu (*Dacrydium cupressinum*) in the Catlins District of South Otago ;
- (3) The strongly leached soils associated with the dominance of kaiwaka (*Libocedrus bidwillii*) in the Akatore district. A map showing the extent of the former forest vegetation in these parts, as determined from an examination of the soils, has been prepared for publication ;
- (4) The special soil and vegetation relationships of the Fiordland district as part of the scientific programme of the New Golden Hind Expedition. Forest is the main vegetation type, rainfall is high and temperatures are cool, chemical weathering of the rock is slow and little mineral soil is formed *in situ*, forest litter accumulates, and the forest soils have commonly a layer of surface peat 1 ft. to 4 ft. in depth overlying 2 in. to 8 in. of very strongly leached mineral soil. Skeletal soils predominate in this district, and landslides are of common occurrence. There appears to be an interesting relationship between soil development on steep rock faces and subsequent invasion of plants, reaching a climax in *Nothofagus-Metrosideros* forest. Later the trees, soil, and fissured rock mantle break away, exposing a fresh rock surface, on which the cycle commences anew.

*Glasshouse Soils.*—Investigation was continued on the problem of severe chlorosis in tomatoes (Potentate variety) growing under glass on the Hutt Valley alluvial soils. Soil analysis suggested that the trouble is associated with mineral unbalance caused by the application of potash, phosphate, and lime to successive crops in excess of the plant requirements. A study of the records of basal dressing and top-dressing over the past seasons confirms this picture, and suggests, in addition, that nitrogen has not always been adequate for the plant requirements. Analysis of the plant tissues showed that the chlorotic leaves were markedly low in magnesium and that the ratio potash/magnesium in chlorotic leaf tissue was more than seven times as great as in non-chlorotic tissues. Experiments on a wider scale than previously are being undertaken to determine whether the mineral unbalance in the plant can be redressed by supplying extra nitrogen and magnesium to the soil, or by the use of magnesium sprays on the growing crop.