

foods such as hay or turnips, and its use is indicated especially in two directions: (1) As supplementary winter fodder, replacing root crops, which demand much time and trouble in cultivation and are very uncertain; and (2) as a balancing ration for wastefully and perhaps injuriously protein-rich young grass pasture, which in the case of highly top-dressed rye-grass-white-clover pastures in the Waikato may contain from 30 per cent. to 35 per cent. protein in the dry matter. It has a further valuable use as a reserve succulent fodder for periods of drought, as was well illustrated during the recent hot dry summer, when the deep-rooted pampas on the Hauraki Plains was green and thriving while surrounding grass paddocks were brown and bare, and the milk-yield of a dairy herd being fed pampas scarcely dropped at all. It has been demonstrated that the plants yield and recover better if fed at six-monthly intervals, so preventing flowering, rather than at yearly intervals. Considerable mortality has occurred among root-cuttings distributed for planting, due both to frost and drought, and it is deemed advisable to strike cuttings before planting out. A better method is to plant seedlings. Seed is at present scarce, but a little was threshed from plumes gathered at Whangarei and gave a 72-per-cent. germination. Seed is also obtainable from Sutton and Sons, England, and some from this source has germinated well in New Zealand.

IODINE INVESTIGATION.

A further 100 samples from the Westland District and 35 from Marlborough have been collected and prepared for analysis. These should complete the sampling of the South Island. A few (eighty) samples collected the previous season have still to be analysed as well as those taken this year.

The lick experiments in Southland are being continued. In order to make the interpretation of these results more conclusive, samples have been taken from healthy areas to estimate the extent of seasonal variations in the size and iodine-content of lamb thyroids.

The investigation in the North Island, apart from some analyses, has been left over until the South Island has been completed.

SOILS.

The analysis of soils in connection with the survey of littoral lands has been continued at the Soil Laboratory, Fairlie Terrace, Wellington. A further series of soil and water samples was collected at Napier in April, 1934. A water sample from the north end of the lagoon contained 0.34 per cent. of sodium chloride, and a sample from the south end 0.14 per cent. sodium chloride. Previous samples taken from the lagoon in May, 1933, contained over 3 per cent. sodium chloride, so that a considerable reduction in salinity has occurred. The salt content of the soils was not on the whole high for soils of this type, indicating that the mechanical texture of the soils was sufficiently coarse to allow rapid drainage. The reaction varied from pH 7.3 to 8.5, and chemical analysis showed the usual high amounts of available plant-food. An area of Crown land desired by the Hospital Board was found by field inspection to consist of two distinct formations: On the east side a strip of raupo swamp through which some fresh water from a creek flows, and on the west side a raised mud flat, fairly dry, and growing chiefly salt-weed (*Salicornia*). Analysis of samples of the two formations revealed distinct differences in texture and chlorine-content, as the following data shows: E/62, east side (raupo swamp), fine sandy loam, 0.12 per cent. Cl. E/64, west side (mud flat) loamy silt, 0.32 per cent. Cl. Further samples from the Richmond Block showed the marked effect of excess of sodium and magnesium salts on the fertility of the soil. E/66, representative of sterile patches, contained 0.59 per cent. Cl and 0.033 per cent. Mg, while E/68, from fertile areas growing maize and potatoes, contained only 0.14 per cent. Cl and 0.008 per cent. Mg. Magnesia extracted by citric acid was twice as high in the former as in the latter soil. There was no appreciable difference in the reaction or texture of the two types.

A series of soils was collected also from the Limestone Island Reclamation, Lower Harbour, Whangarei. In general, the soils growing rushes and tall fringing mangrove were found to be heavier than those growing stunted mangrove or small herbs (salt-weeds), and the richest soils were those fringing the creek and growing tall mangrove. The soils taken under other plant-associations were much poorer and lighter in texture. The larger portion of the area consists of fine sandy soil, which at present contains an abnormally large percentage of magnesium salts, but these should be speedily leached out on reclamation owing to the porous nature of the soil. The fact that the subsoils are coarser than the topsoils would assist the process. The soils of Limestone Island resemble those of the upper harbour in being very low in available phosphoric acid (see annual report, 1934). This deficiency can, however, easily be remedied by the application of superphosphate or other quickly acting phosphates. On the whole, the physical composition of Whangarei Harbour soils appears to be favourable to rapid drainage.

An interesting investigation was carried out on some glasshouse soils from Nelson. Trouble had been experienced with cloudy fruit in tomatoes, and to a lesser extent with mildew and virus diseases. It was suggested that excessive application of ammonia sulphate may have caused the trouble. As would be expected with soil of this type, the available and total plant-food was present in very large amount. The amounts of ammonia and nitrate were not, however, excessive. The outstanding feature was the high amount of magnesia extracted by hydrochloric acid. Carbonate was present in all the soils, which had a slightly alkaline reaction. Attention was drawn to the fact that the potato (a member of the same family as the tomato) is highly sensitive to alkaline soil conditions.

Previous surveys of Hauraki Plains soils have been confined chiefly to the coastal regions, where the effects of infiltration of sea-water on the fertility of the soils were investigated. In the period under review opportunity was taken to extend the survey further inland. The areas from which samples were taken for analysis varied in character from silts with little or no peat covering to deep peat land. Very little manure has been applied to the pastures, since Hauraki Plains soils as a whole have been found to be exceptionally well supplied with plant-food. Mechanical analysis showed, with one exception, a preponderance of fine silt and clay particles in the inorganic portion of the soils. The