

SAMOAN SOILS.

A considerable number of soil samples has been received in connection with Dr. Grange's soil survey of Samoa. The soils, with few exceptions, belonged to the silt loam and clay loam textural groups. Available phosphoric acid was generally low in both topsoils and subsoils, an outstanding exception, however, being a sample from an alluvial flat at Solosolo which had the high value of 0.091 per cent. available phosphoric acid.

The soils appeared to be adequately supplied with nitrogen, and the C/N ratios were better than those indicated by Trinidad workers for successful cacao production.

The pH values ranged from 4.9 to 7.3.

SOILS AFFECTED BY SOLUBLE SALTS.

During an examination of soils in Central Otago associated with certain pitting troubles of apples, attention was drawn to the possibility of high soluble salt content interfering with the normal development of the fruit trees. Several samples from areas associated with poor growth and "die-back" effects of trees were obtained, and these have been examined in the laboratory with a view to determining the cause of infertility. The chemical analyses showed that high salt content and in certain cases alkalinity were responsible for the detrimental effects noted in fruit trees. This has led to a widening of the scope of the investigations to include soil samples from the Oamaru and Blenheim localities, where the presence of soluble salts was likewise suspected of being connected with poor crop production.

Some of the chemical data obtained in these studies are shown in Table III.

TABLE III.—SOLUBLE SALTS IN SOME SOUTH ISLAND SOILS.

Locality.	Depth of Sampling.	Total Salts.		Cl.	SO ₄ °.	HCO ₃ °.	Ca°.	Na°.	pH.
		In.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	
Alexandra	0-6		1.29	0.11	0.74	0.01	0.18	0.07	3.8
Conway's Gully ..	0-6		0.29	0.01	0.02	0.11	0.01	0.05	8.5
Blenheim	0-6		0.43	0.20	0.00	0.02	0.00	0.14	5.8
Otekaieke	0-3		1.60	0.28	0.45	0.06	0.04	0.19	8.7

The data show a wide range not only in the percentages of total salts, but also in the amounts of individual salts present in the four soils. It is interesting to note that the samples from Conway's Gully and Blenheim contain much lower percentages of total salts than those from Alexandra and Otekaieke. The detrimental effects on crop production in the first-mentioned soils appear to be connected with the presence of sodium bicarbonate in one case and sodium chloride in the other.

COBALT SURVEY OF NEW ZEALAND SOILS.

The spectacular results which have been obtained from the use of cobalt chloride for stock in localities affected by ailment of the bush-sickness type suggested that ailment was caused by an actual deficiency of cobalt in the soil. On this account it was considered desirable to estimate the amount of cobalt contained in the more important soil types of New Zealand. For the purpose of the investigation samples were available from the soil surveys of the Department of Scientific and Industrial Research and the Cawthron Institute in different parts of New Zealand. During the progress of the investigation particular attention was paid to soil samples from all localities in New Zealand where stock ailment of the bush-sickness type was known to occur.

The results of the analyses, using concentrated hydrochloric acid for the extraction of the soils, showed a fairly good correlation of low cobalt supply with soils definitely associated with stock ailment. The Glenhope soil, Nelson, and the Kaharoa and Taupo soils of the Rotorua district, all contained less than 2 p.p.m. of cobalt on the dry soil, in contrast to an average cobalt content of approximately 12 p.p.m. for a wide range of Taranaki soils. The Morton Mains soils, however, gave higher figures (4 p.p.m. to 5 p.p.m.) than might have been expected considering the proved beneficial properties of cobalt supplements for stock on these soils.

Furthermore, certain soils which hitherto have not been associated with stock ailment gave some very low figures for cobalt. The pakihi soil of Westport is an illustration of these departures from the general correlation. This soil, which so far has not been associated with stock ailment, was found to contain less than 1 p.p.m. of cobalt, resembling very closely the Glenhope granite soil in cobalt status.

The results which have been obtained suggest that availability of soil cobalt must be a factor of importance in determining the incidence of stock ailment. Further elucidation of the position is likely to be dependent on the devising of chemical methods for the estimation of available cobalt in soils.

GENERAL.

Dr. J. K. Dixon has continued in charge of the soil laboratory and has been responsible for much of the work included in this report. He has been ably assisted by Messrs. A. C. Harris, M.Sc., L. Hodgson, K. Frater, and J. T. Corder. Miss E. B. Kidson, M.Sc., working under the technical direction of Dr. H. O. Askew, has been responsible for the cobalt surveys of New Zealand soils.