

FERTILITY.

(1) The more fertile the soil the more vigorous and healthy is the flax. Good alluvial soils in particular appear well suited to flax.

(2) The fact that flax will grow naturally on an area is not evidence that it can be grown satisfactorily for milling.

(3) In a number of areas the height of the water-table was not sufficient to explain the poor growth of flax observed. Soil samples subjected to chemical analysis for available P_2O_5 and K_2O (1 per cent. citric soluble), pH, carbon, nitrogen, and C/N ratio indicated that lack of phosphate was likely to be an important factor in these cases.

Phosphate fertilization is not an accepted method in flax culture, but in view of Sir Theodore Rigg's success in inducing good growth of flax by the means of phosphates on the poor pakihi soils of the West Coast (private communication) it can be concluded that the more extensive use of phosphates is justified. The use of such phosphatic fertilizers may be the means of utilizing areas for commercial flax-production that have hitherto not been regarded as payable propositions. In planting flax phosphate placed in the hole is likely to be most effective, especially when the phosphate fixing power of the soil is high.

(4) In the following table have been set out some figures typical of good and poor flax soils:—

No.	Locality.	Available		pH.	Carbon.	Nitrogen.	Carbon Nitrogen Ratio.	Growth of Flax.
		Phosphate.	Potash.					
2181	Mungaroa	0.004	0.014	3.3	50.4	1.57	32.0	Poor.
2165	Tahuna	0.002	0.025	5.3	1.9	0.21	9.0	..
2175	Roto Aira	0.009	0.02	6.3	2.6	0.17	15.3	..
2177	Massey College ..	0.035	0.03	5.1	2.4	0.22	10.9	Good.
2157	Maori soil, Maungatapu	0.068	0.083	7.6	5.8	0.42	13.8	..
2179	Martinborough ..	0.049	0.03	6.9	1.6	0.13	12.3	..

From the above it will be seen that available K_2O , pH, C, N, C/N do not appear to vary significantly, but there is considerable difference in phosphate figures.

A distinction needs to be drawn between soil conditions necessary for the growth of swamp flax and conditions necessary for the growth of selected Maori varieties. The selected varieties appear to need more fertile and better-drained soils for satisfactory growth. The best flax seen grew on pumice land near Tauranga, where Maori cultivation had raised the soil fertility (Sample 2157).

CHEMICAL WORK AT THE CAWTHRON INSTITUTE, PERIOD 1937-38.

Sir THEODORE RIGG, Officer in General Charge.

INTRODUCTION.

During the past year routine analyses of soil samples collected by the pedologists in connection with soil surveys now in progress in Hawke's Bay, North Auckland, Banks Peninsula, and Westport have constituted the most important part of the work undertaken in the chemical laboratory. The analyses have included determinations of available plant food, base status, and texture.

The data obtained by the chemists have been of considerable value to the pedologists in classifying the soils of the different districts and in delimiting their boundaries.

In view of the fact that soil classification in the surveys has not been finalized by the pedologists, it is not possible at this stage to correlate the data with the soil types and to discuss the results in detail. Certain aspects of the chemical work on the Hawke's Bay and North Auckland soils are, however, presented in separate statements by Dr. Dixon, and are appended to this report.

In addition to the routine analytical work associated with the conduct of the soil surveys, special investigations have been carried out on tobacco soils of the Nelson district and on Phormium soils in the North Island.

In co-operation with Mr. N. H. Taylor, special studies have been undertaken concerning the influence of forest litters on soil type and the role of compound soil particles in the aeration and drainage qualities of the land.

WESTPORT SOILS.

In collaboration with the pedologists, laboratory studies have been made on typical samples representing different types of pakihi land and the recent alluvial soils of Westport.

All soil samples from the pakihi lands have shown the characteristic features of mature humus-iron podsols. The A horizon of these soils is greatly leached of lime and phosphate and is markedly acid, having a pH value ranging between 4.0 and 4.6. The B horizon likewise has a poor lime status, but iron and organic matter are present in notable amounts.