

These data show very clearly the greater absorption on the heavier soil of lime, potash, and nitrogen. Magnesia and phosphate were absorbed in approximately equal amounts. This increased absorption is passed mainly into the leaves. On the heavier soil some very high figures for lime content were obtained—*e.g.*, ripe leaves contained up to 8 per cent. CaO, as against less than 3 per cent. on the medium sand. Magnesia, potash, and nitrogen in the leaves and nitrogen and lime in the stalks were relatively high, but potash was lower in the stalks on the silt loam.

NUTRITIONAL STUDIES

Tobacco plants were grown at the Institute in cylinders filled with a coarse river sand and fertilized with mixtures made from standard commercial ingredients to provide a complete 4-8-8 mixture at 1,200 lb. per acre, and mixtures with no nitrogen, no potash, no phosphate, double nitrogen, and double potash contents. Plants were also grown without any fertilizer. The latter, together with the no-nitrogen plants, made very poor growth, being yellow and stunted. Where no phosphate was supplied, the plants were stunted with leaves of deep blue-green colour which later developed a copper-brown coloration and a small number of light-chocolate coloured spots. The heavy nitrogen application produced the largest plants with dark-green leaves, while extra potash did not greatly affect the amount of growth. No deficiency symptoms appeared on the plants without potassic manures, as the river sand contained considerable reserves of this plant-food.

Tissue tests on the ends of the midribs showed relatively low potash and phosphate contents on the no-potash and no-phosphate plants. The extra potash did not appreciably increase the potash content, but markedly increased lime and magnesia contents. Probably because of their very restricted growth, the plants not receiving nitrogen showed relatively high soluble nitrogen figures; magnesia was low in these plants. Plants with no fertilizer gave only very small amounts of soluble nitrogen, low potash and phosphate, and normal lime and magnesia figures.

SOIL ANALYSES

Nitrate-N and ammonia-N were determined on a number of soil samples from the Tobacco Research Station. One interesting point was that the nitrate and ammonia contents under irrigation were lowest in a coarse sand, increased on a medium sand, and highest on a fine sand.

Urea gave relatively high soil-ammonia figures, in keeping with the green appearance of the plants on the urea-treated plots, as compared with those grown on plots receiving nitrate of soda or sulphate of ammonia.

DISEASE INVESTIGATIONS

This work has comprised surveys of tobacco-seedling beds and gardens in different parts of the district for mosaic disease, black root-rot, and angular leaf-spot. Studies on the incidence and spread of mosaic both in seedling-bed experiments and in the field were continued.

(1) *Mosaic Investigations.*—These have comprised a survey of mosaic in representative gardens throughout the tobacco-growing districts and a continuation of seedling-bed experiments with a view to securing more information on the incidence and transmission of mosaic.

(a) *Survey of Mosaic in Tobacco Gardens:* An examination was made, during the second and third weeks of January, of twenty-nine gardens belonging to growers at Dovedale, Stanley Brook, Riwaka, Umukuri, Motueka, Pangatotara, Orinoco, Graham Valley, Braeburn, and Upper Moutere. Five plots of two hundred plants each were examined in each garden. In the Dovedale - Stanley Brook sector, six growers had less than 10 per cent. initial mosaic, two had 15 per cent., and one had over 50 per cent.

In the Riwaka, Umukuri, and Motueka locality, eight growers had less than 10 per cent., two growers had 20 per cent., and three growers more than 20 per cent. of initial