Studies on the use of boron in the treatment of physiological diseases of apples have been continued by the Cawthron Institute and the Plant Diseases Division, and there are indications that the use of borax is likely to have still wider application—*e.g.*, in parts of Central Otago. Attempts to control storage-pit and tree-pit by the use of borax were unsuccessful.

Mottle-leaf of citrus, which was suspected to be due to zinc deficiency, did not respond to zinc treatments. Promising results were obtained with manganese, however, and these are being followed up with field trials.

In regard to fruit cold-storage investigations, overseas shipments were arranged to test the influence of position on tree, pre-cooling, and different types of wrapper on storage disorders. A very successful " no-dunnage " demonstration shipment on a modern refrigerated vessel was also arranged.

Experiments on the CO_2-gas storage of two varieties of apples—Ballarat and Washington—were undertaken in the experimental gas-store attached to the Dominion Laboratory. It was found that, on the whole, the gas-stored fruit kept in better condition than the corresponding control fruit stored in air.

An investigation of the behaviour of asparagus and green peas in cold storage in air and in CO_2 also gave interesting and useful results.

COBALT INVESTIGATIONS.

Research relating to the use of cobalt in the treatment of bush-sickness and similar diseases has been continued during the year under the general direction of a Cobalt Committee representative of the Department of Scientific and Industrial Research, the Department of Agriculture, and the Cawthron Institute. Investigations in the North Island were conducted, as before, by the Department of Agriculture, and those in the South Island by the Cawthron Institute. The results as a whole have amply confirmed the value of cobalt either as a top-dressing or in the form of a salt lick in curing these ailments, and attention is now being directed towards a detailed survey of the cobalt status of New Zealand pastures with a view to delimiting the area likely to be affected by cobalt deficiency.

The following brief remarks give some indication of the scope and results of the work carried out in the South Island by the Cawthron Institute with the co-operation of the Department of Scientific and Industrial Research.

At Glenhope, Nelson, sheep very seriously affected with bush sickness not only completely recovered, but have been maintained in perfect health when grazed on a typical unhealthy pasture top-dressed with superphosphate containing 2 lb. of cobalt chloride per acre. In another district the use of a salt-bonemeal lick containing 15 oz. of cobalt chloride per ton has enabled ewes with lambs to be carried successfully for two seasons.

It has been shown, furthermore, during the past year that cobalt drenches have given wonderful results in overcoming ailment in calves grazing pastures established on pakihi land, a discovery of primary importance for the successful development of these lands. An interesting feature which arose from the analysis of pakihi pastures was the low copper content of certain samples from peaty soils, suggesting that on certain areas copper supplements in addition to cobalt may be required to give the optimum effect.

In addition to the analysis of pastures from Westport and Southland, preliminary work has been done on selected pastures in Ashburton County.

Laboratory experiments on the production of cobaltized fertilizers from commercial salts and oxides and from ores and concentrates of cobalt have shown that there is no difficulty in preparing a cobaltized superphosphate in which practically all the cobalt is in a water-soluble condition.

As mentioned previously, a significant result of spectroscopic investigations at the Dominion Laboratory is that the cobalt content of cow's milk varies appreciably in different districts.

PHORMIUM RESEARCH.

The flax-breeding work at the Easton area and the Massey College area has been maintained during the year, and multiplication of the special varieties and hybrids has been remarkably good. Cutting and milling tests of varieties grown on the Massey College area this year have given very interesting results. For example, the average leaf yield of a hybrid plant (13K × S.S.) cut two years after the previous cutting was 182 lb. per bush. Translated into tons per acre, this would be equivalent to 30 tons per acre in two years if 370 bushes per acre could be grown. Such a yield is about twice as much as is considered an excellent yield at present, and if it could be realized in practice would greatly reduce growing-costs. Such yields are only likely to be obtained when vigorous selected hybrid plants are used under favourable growing-conditions. Milling tests of the fibre produced from various hybrids also gave very satisfactory results. For example, of ninety-four samples of Ngaro × S.S. hybrids only eleven were awarded grading-points of 89 or less. For comparison, it should be noted that the grade of which most is exported is " high-fair," graded at 65–69 points.

A reconnaissance soil survey of phormium areas in several districts was carried out, from which it was possible to make the important generalization that the best phormium areas have a high soil fertility and a low water-table. The relationship between high water-table and unthriftiness has already been recognized by growers.

An investigation of insect pests of phormium was continued, special attention being given to the leaf-eaters. The grass-eating habits of the larvæ indicate that control of these pests could most probably be obtained if the grass could be replaced by a cover-crop during the two main breeding seasons of the year.