

In general, it was difficult to determine the effect of phosphate or potash applications upon growth and yield, and indications were that wide variations occurred.

Applications of lime to lemon-trees in the Auckland District produced yield increases of up to 35 lb. per tree, which is in advance of similar good results secured last season. In Hawke's Bay the colour of Delicious apples was improved slightly by the application of lime, though no similar effect was observable in Nelson trials.

BOTANICAL INVESTIGATIONS.

Nine types of Northern Spy apples have been isolated and worked on to a drawing stock in order to speed up the date when comparisons will be possible. Studies have commenced on the root systems of Northern Spy in comparison with other varieties, and attempts will be made to ascertain what part the relative amounts of fibrous and large roots may exert upon differences in tree yields.

The stocks secured from East Malling have now been increased in order that they may be tried out in various districts throughout the Dominion.

MYCOLOGICAL INVESTIGATIONS.

Black-spot.—While the incidence of this disease has not been serious in recent years it has been shown that the use of a lime-sulphur spray applied to dead leaves at specified times was responsible for a very large reduction in the amount of fruit infected from this source. Tests revealed the fact that strains of black-spot secured from Dougherty and Cox's Orange Pippin apples possess a greater degree of virulence than those from other varieties of apples. Black-spot was also shown to be capable of development at the temperatures at which fruit was held in cold storage.

Investigations are still proceeding on the types of fungi responsible for wastage during cold storage, and inoculations have been made at regular intervals in order to reach a complete understanding of the activities and nature of the particular fungi concerned.

Experience with the lime-sulphur sprays now used in accordance with their polysulphide content has shown that these sprays are very completely effective in the control of mildew disease in districts such as Central Otago, where, previously, the trouble was very pronounced.

ENTOMOLOGY.

Investigations have been continued in connection with codling-moth, leaf-hopper, bronze beetle, leaf-roller, and red-mite. With codling-moth it now seems definitely established that the calyx infection is not of practical importance, and that only one generation of this insect occurs normally in New Zealand, and though in certain districts a second generation does at times appear this would seem to possess very little real significance in its effect upon fruit.

Emergence of the moths now appears to take place between the last week of October and the end of February and that these are present in maximum numbers generally about mid-December.

The leaf-hopper has been found to be parasitized to some extent by a local insect, and this is now being followed up. The life-history of the two species of red-mite occurring in New Zealand has now been almost completely worked out, and this will provide useful guidance towards devising measures for its more complete control.

Investigations with bronze-beetle control have now reached a stage when fairly definite recommendations can be made. Lead arsenate applied at the strength of 2 lb. per 100 gallons of water effectively poisons the beetle, especially if the coverage is complete, and the efficacy of this application is increased if oil is used in association with the arsenate.

CITRUS INVESTIGATIONS.

A survey of the various areas suitable for citrus investigation in the Auckland Province is being continued, and the information so gathered will shortly be put together as a comprehensive report. Trees developed on special stocks at Herd's Nursery, Onehunga, have been planted throughout most of the citrus-growing areas, and later on their yields will indicate how successful are these new varieties in different localities. A lease of 2 acres for a trial area at Mount Albert, Auckland, has been secured, and on this further details trials in connection with citrus grown on various stocks will be conducted.

PUBLICATIONS.

The following publications, embodying the results of various research workers, have been published during the year:—

Journal of Science and Technology—

Influence of CO ₂ on Internal Break-down in Sturmer	L. W. Tiller, XIV, No. 1.
Codling-moth Investigations	L. J. Dumbleton, XIV, No. 2.
Apple Leaf-roller	L. J. Dumbleton, XIV, No. 2.
Apple and Pear Black-spot	B. E. Parham, XIV, No. 3.
Relation of Storage Temperature to the Overseas Carriage of some Further Varieties of New Zealand Export Apples	L. W. Tiller, XIV, Nos. 4 and 5.
The Toxicity of Arsenates	W. Cottier, XIV, No. 5.
The Determination of the Distribution of Particle Size in Lead Arsenate Sprays	P. J. Clark
Verticillium Wilt of Tomatoes and Potatoes in New Zealand	E. E. Chamberlain } In the press. and R. M. Brien }