

to maintain superiority over all the others. Omission of potash is causing increasing deterioration. Trees receiving only nitrogen remain in distinctly worse condition than control trees as regards growth, foliage quality, cropping-capacity, and fruit colour.

(b) *Minor Element Studies*.—The Cawthron Institute has finalized the method of making colorimetric tests on the ash skeleton of apple leaves. The method can be used for diagnosis of actual deficiencies as well as for ascertaining the distribution of minerals within leaf tissues.

Further improvements in trees suffering from magnesium deficiency have been noted by the Institute on the plots established in 1939 to test the efficacy of soil dressings of magnesium compounds. Where treatments have been repeated in two successive years the results have been more marked. This is especially so with magnesium sulphate, and is probably due to the fact that the sulphate leaches from the soil more rapidly than the carbonate or than dolomite. Dolomite has given the most consistent results, and need not be used at more than 12 lb. per tree, whether used in one lot or split into two successive lots of 6 lb. Three or four years may elapse before control can be expected in seriously-affected orchards.

(c) *Rootstock Trials*.—On the 3-acre block controlled by the Plant Diseases Division the most vigorous of the Malling stocks have maintained their initial lead over Northern Spy, although trees on the latter stock have to date given higher yields of fruit. Similar results obtain at Appleby, where M12 and M15 have given better growth than Northern Spy, with M1 slightly inferior to Spy. Fruit yields have also shown relationships inversely correlated to the growth responses.

(d) *Varietal Trials*.—Recording of the pomological characteristics of the varieties in the Owairaka collection of the Plant Diseases Division has been continued, so as to provide the industry with data that will safeguard against the planting of unsuitable varieties.

(e) *Plant Protection and Therapeutant Testing*.—Further successful trials with modifications of the normal spray programmes have been made at Havelock North by the Plant Diseases Division, although difficulty has been experienced with the Dunn's Favourite variety owing to its extreme sensitiveness to lime-sulphur sprays and its susceptibility to black-spot. Leaf injury may be caused by late applications of lead arsenate, even when not combined with sulphur sprays, but the use of 3 lb. hydrated lime to each 1½ lb. lead arsenate has been shown to reduce the damage. Experiments have been continued in Auckland, Hawke's Bay, and especially at Appleby to test the effect of various sprays and other factors on the incidence of ripe-spot (*Neofabraea malicorticis*). Results to date suggest that fruit maturity and storage conditions are the main factors influencing the development of this disease. Summer applications of Bordeaux largely control the trouble on the Sturmer variety, and although a small amount of skin blemish is incurred, the eating quality of the fruit is not impaired.

The Cawthron Institute has devoted much time to the establishment of the codling-moth parasite, *Ephialtes candatus*, obtained from Canada. Two lots of larvæ have been reared from New-Zealand-bred material.

STONE-FRUIT

(a) *Peach*.—The Plant Diseases Division is continuing observations on those varieties in its collection that are already in bearing, and a few of these show some commercial promise because of their early ripening season. The trials show clearly, however, that the varieties now grown commercially are of outstanding merit and that new varieties are not likely to be accepted unless possessing exceptional qualities. Observations on both brown-rot (*Sclerotinia fructicola*) and leaf-eurl (*Taphrina deformans*) show certain varieties to be definitely more resistant to the diseases than others. Tests on crown-gall suggest that it has no marked effect on peach.

(b) *Plum*.—*Bacterium pruni*, bacterial-spot of plum, has now been found to be widespread throughout the Dominion, and spray experiments for its control are now in progress.

SMALL FRUITS

Raspberry.—Preliminary Plant Diseases Division trials on bud-moth, leaf-spot, septoria-spot, and cane-wilt show that lead arsenate has given good control of bud-moth and that Bordeaux mixture has given good control of cane-wilt and septoria-spot. On a new area a single programme is being tested to assess the economic value of spraying, using a spraying unit developed specially for the purpose. The bacterial trouble known as crown-gall does not appear to have had any effect on raspberry.

CITRUS

(a) *Rootstock and Varietal Trials*.—At Oratia the Plant Diseases Division has planted 1½ acres in trials of Washington Navel orange and Lisbon lemon on sweet and sour orange, citronelle, and *Poncirus trifoliata* stocks. Stock influence is already marked in the two-year-old trees, and Washington Navel on sour orange (*Citrus aurantium*) has shown stunted growth and profuse blossom. Thirty-eight sweet orange, six mandarin, and five grapefruit varieties, all on a selected sweet-orange stock, have been planted at Owairaka.

(b) *Mycological and Allied Studies*.—The Plant Diseases Division has found the variety Poorman to be susceptible to citrus canker under field conditions. An intensive study is being made of the so-called mycorrhizal fungus associated with the roots of citrus trees, to ascertain its relation to tree vigour and cropping.

MISCELLANEOUS

Spray experiments have been continued at Auckland on the control of grease-spot and brown-spot of passion fruit.

The Fruit Research Officer and the Chemical Engineering Section of the Dominion Laboratory have devoted much time to the dehydration of apples, and the Department is at present responsible for the design and supervision of a large modern apple-drying plant in course of erection in Hawke's Bay.