

PRUNING EXPERIMENTS.

In the Hawke's Bay area experiments have been laid down with a view to ascertaining the relative values of short and long lateral systems of pruning apple-trees.

At Huapai Orchard, where the trees were in an extremely impoverished and neglected condition, the entire orchard has been hard-pruned, the object being to bring the trees into good condition as rapidly as possible. The results are already most marked, and the orchard is now one of the most vigorous in the locality.

PLANT PROTECTION EXPERIMENTS.

I. *Entomological Studies.*

(a) *Biological Control.*—This work is carried out by the Entomology Division of the Plant Research Bureau, located at the Cawthron Institute, Nelson. The major activities in this branch of fruit work have been the distribution of *Aphelinus mali* parasite to orchardists in different parts of New Zealand; further studies of the *Aphelinus* parasite, particularly in relation to overwintering; and studies of the dryinid parasite of the apple leaf-hopper.

In connection with *Aphelinus*, preliminary experiments carried out last season showed that the use of winter oil definitely increased the mortality of the overwintering *Aphelinus* on apple-trees. It is probable, however, that the reduction in the overwintering population of woolly aphis by the spray is proportionately much greater. A short investigation of the parasites of *Tortrix postvittana* was made by Mr. L. J. Dumbleton during a visit to Tasmania. The object was to determine what varieties were present and their relative importance, and, if possible, to collect and ship to New Zealand supplies of any parasite deemed to be worth introducing. Eleven parasites of the larvæ and pupæ were reared from the material collected. The total parasitism of the larvæ was not more than 15 per cent., and of this the tachinid *Voriella uniseta* Malloch contributed 7 per cent. The parasitism of the pupæ was about 20 per cent., of which *Chalcis* sp. and *Xanthopimpla rhopaloceros* Krieger each contributed 8 per cent. A small number of puparia of the two tachinids were brought back to New Zealand and flies emerged, but attempts to breed the parasites were unsuccessful. No emergence of the pupal parasites was secured from the material which was brought back.

The most promising of these parasites are judged to be the tachinid larval parasite *Voriella uniseta* and the two pupal parasites *Chalcis* sp. and *Xanthopimpla rhopaloceros* Krieger.

In connection with the ecology of *T. postvittana* a study of the influence of temperature on the development of the apple leaf-roller has been made, together with other investigations bearing on the seasonal cycle and method of overwintering of the species in the field.

(b) *Chemical Control.*—Work on the maximum effective viscosity of oils for control of eggs of the European red mite has been completed by the Plant Diseases Division.

II. *Mycological Studies.*

(a) *Mouldy Core.*—In the studies of this problem at the Cawthron Institute at least thirty different fungi associated with diseased tissue have been identified and their frequency of occurrence alone, or in conjunction with other fungi, assessed.

The Plant Diseases Division is conducting studies on Delicious apples from early, mid-season, and late pickings held in cool store to ascertain to what extent the fungous hyphæ present in the core cavity and calycine sinus develop into mouldy core. The percentage of infection did not increase with keeping up till July, although the degree of infection became greater. From August onwards the percentage of the disease increased steadily.

(b) *Eye-rot.*—At least twenty fungi of frequent occurrence in affected apples have been identified by the Cawthron Institute, and their power of invasion relative to that of the predominating fungus *Botrytis cinerea* has been determined. The relative percentage of the fungi under examination in comparison with *Botrytis* and other members of the group has likewise been assessed.

(c) *Silver-leaf.*—Young apple-trees grown at the Havelock North orchard have been inoculated with strains of the silver-leaf organism isolated from apple branches, and when the disease is established measures for its control will be tested.

(d) *Apple-canker.*—Two species of canker-forming fungi, *Physalospora obtusa* and *Nectria galligena*, have been inoculated into small trees at the Mount Albert area with a view to providing materials for testing the efficacy of several new types of wound dressings.

(e) *Crinkle of Granny Smith.*—In Hawke's Bay an endeavour is being made to ascertain if this disease is transmissible by grafting, which if successful would indicate the disease as being of virus origin.

(f) *Black-spot.*—The Cawthron Institute has maintained the usual notification service in regard to date of ascospore maturity for the benefit of Nelson orchardists.

III. *Spraying Experiments.*

At the experimental orchard in Havelock North a comprehensive series of spraying experiments, designed to modify and improve existing spray programmes, has been completed, and results are being tabulated and published in the *Orchardist*. Attempts have been made to find a better place in the programme for summer oils; to develop an oil for summer use which would be safe to apply with sulphurs or lime-sulphur; and to modify the current programme used for control of black-spot of pears.

Fruit russet is being studied in relation to modification of the spray programmes.

Modified spray programmes for control of black-spot and powdery mildew at the Huapai Orchard were rendered inconclusive by very low incidence of disease on check trees.