

Improvements.

Owing to decreasing pressure in the spray pipe-lines approximately 1,600 ft. of $\frac{1}{2}$ in. piping has been replaced by $\frac{3}{4}$ in. pipe, and has resulted in facilitating the spraying with increased efficiency. The fencing of the orchard to exclude rabbits and hares has been completed.

2. BOTANICAL INVESTIGATIONS.

Stocks.—(a) Apples: A further block of approximately 1 acre at the Plant Research Station has been planted with 119 trees received from the Research Orchard, Nelson. These consist of the varieties Cox's, Delicious, Jonathan, and Sturmer on Northern Spy and East Malling stocks.

Growth records of the trial blocks of apple-trees on several East Malling stocks and the Northern Spy stock which were established nearly three years ago indicate that with one exception the East Malling stocks are, up to the present time, superior in vigour to the Northern Spy. Obviously, until the trees reach bearing-age rootstock influence can be judged only from the aspect of vigour. Other equally important factors such as influence on cropping and on the quality and colour of the fruit will be investigated when the trees commence to crop.

Trees of Cox's, Delicious, Gravenstein, Jonathan, Sturmer, and Red Statesmen have been raised on their own roots, and will be used for comparison with trees of the same variety growing on East Malling and Northern Spy stocks.

(b) Peaches: So far there appears to be little difference between trees on the three stocks being tested, although Brompton seems slightly superior. The plum stock seems to have a dwarfing influence on the peach.

(c) Plum and cherry: Additional material from East Malling has been propagated and budded to furnish material for trials.

"Strain" Investigations.—The varieties now being investigated for possible strains comprise Cox's, Sturmer, Delicious, Jonathan, and Granny Smith. Fruit of the three first-named varieties should be available for study next summer. It is hoped that among the many strains of Delicious now under trial a type may be discovered having a closed calycine sinus and consequently less susceptible to "mouldy core." Four red strains of Cox's and twelve red strains of Delicious are under trial.

Root-wounding Experiment.—During 1932 an experiment was laid down at the Research orchard, Nelson, to ascertain whether the development of fibrous roots by apple-trees on Northern Spy stock could be increased by mechanical injury to the roots, and, if so, whether such treatment resulted in increased vigour to the trees. Three trees each of the varieties Statesman and Dunn's were selected and treated with (1) open scalloped incisions, (2) notches, and (3) tongue clefts. It was found after three years that in no case had there been any development of fibrous roots at or in the region of the wounds made. It would appear that wounding of roots in the manner described is of no benefit to trees so treated.

Walnuts.—Twenty trees of the varieties Wilson's Wonder, Franquette, Freshford Gem, and Kelvin have been planted at the Station. With the exception of Kelvin these varieties are reputed to be resistant to bacterial blight (*Pseudomonas judlandis*).

Filberts.—Trees of *Corylus maxima* do not appear to be thriving, except in the Auckland District.

3. ENTOMOLOGY.

Woolly Aphis.—An estimation of the amount of parasitism throughout the season by *Aphelinus* has been made from material forwarded by Orchard Instructors. The factors influencing the fluctuations in populations of aphis and *Aphelinus* are complex, and little progress can be made in the elucidation of this matter without more precise work on the reactions of both insects to climatic conditions. Preliminary experiments showed that the use of winter oils may materially reduce the overwintering population of *Aphelinus* but would probably reduce the aphis population to a proportionately greater extent.

Pear Midge.—Routine estimations of parasitism by *Misocyclops* showed that about 10 per cent. of the first-brood larvæ were parasitized at Auckland. As in the previous season, there was no evidence of parasitism of first-brood larvæ in Nelson. In Hastings the parasite was present but parasitized only 1 per cent. of the first-brood larvæ.

Leaf-roller Caterpillar.—Field work has been carried out in Central Otago during the past season, using bait traps. The results of catches confirm the results of rearings of leaf-roller larvæ taken from damaged fruit. These indicate that *Tortrix excessana* is the numerically dominant species. Of sixty-two adults reared from several localities and different fruits, 82 per cent. were *T. excessana* and 12 per cent. were *Ctenopseustis obliquana*. *T. excessana* is a native species with a wide range of food-plants. It normally overwinters as a larva on evergreens, and has at least two and probably three broods during the year, fruit-trees being subject to infection as soon as they come into leaf. At present the most promising method of control is the development of a stomach poison, arsenical or non-arsenical, which does not injure the leaves.

Leaf-hopper.—A shipment of 1,250 cocoons of the Dryinid parasite *Aphelopus typhlocybae* were received from the New York Agricultural Experiment Station in November, and a total of 370 adults emerged. Of these, 240 were liberated in the field and the remainder used in the laboratory to ascertain whether the parasite could develop successfully on the leaf-hopper. A number completed development on the hopper and spun their cocoons in the soil, proving that there was no inherent inability of the parasite to develop on *Typhlocyba froggatti* (Baker). It is hoped to secure a further supply of material during the coming season.