

MOULDY-CORE INVESTIGATIONS.
PLANT DISEASES DIVISION.

A survey was made of 118 orchards in the Auckland district to determine the incidence of mouldy core in Delicious apples and to discover any factors affecting the disease. As a result of the survey the following facts became evident :—

- (1) The disease is widespread throughout the district, no part being free or even nearly so.
- (2) Affected apples ripen prematurely and drop off as the crop approaches maturity. In the case of two orchards, one earlier than the other and both picking on the same date, the earlier one will have had a greater fall of affected fruit and therefore a smaller percentage of mouldy core.
- (3) In any orchard the highest percentage of mouldy core is found on the parts having the poorest drainage.
- (4) Mouldy core was found in a number of varieties other than Delicious. In every case it was associated with an open calycine sinus.
- (5) It is uncertain how far small amounts of mould in the core will develop under storage conditions. To ascertain this a number of cases of Delicious have been placed in the cool store and will be examined at intervals during the year.

Samples were sent regularly to the laboratory at Palmerston North for isolation of the fungi present at various stages of maturity of the fruit. At intervals during the season windfall apples from the trees subjected to injections of chemicals were examined for mouldy core.

Reports concerning the incidence of mouldy core in Delicious in the Auckland orchards indicated that nutrition might play a part as a predisposing cause. Accordingly a series of injections was made on orchards affected with mouldy core. The crop was picked early in March and cut for examination. Relatively high percentages of mouldy core were found in all the samples, there being no significant differences between treatments.

Pruning.—A small block of Delicious trees were subjected to four different pruning treatments—viz., (1) spur-pruning ; (2) severe cutting back of leaders ; (3) light pruning of leaders ; (4) unpruned. No correlation was found between degree of mouldy-core infection and pruning treatment.

Pollination.—An experiment was carried out on Delicious to determine the influence, if any, of the pollinating variety on the morphological characters of the resulting fruit, with particular reference to the calycine sinus. Delicious, Cox's Orange, Dougherty, Granny Smith, Statesman, and Sturmer were used as pollinators. Owing to weather conditions delaying the application of pollen a very poor set was secured and only a few mature fruits were obtained. An examination of these yielded the results tabulated below—

Pollinating Variety.			Structure of Sinus.			Mouldy-core Infection.
Cox's Orange	..	..	Fairly narrow	..	..	Slight.
Dougherty	..	..	Wide	..	..	Severe.
Granny Smith	..	..	Fairly wide	..	..	„
Statesman	..	..	Wide	..	..	„
Sturmer	..	..	No fruit available.			
Delicious	..	..	„			

It will be seen that Cox's Orange was the only pollinating variety which showed any significant effect on the structure of the sinus and the degree of mouldy-core infection. These results cannot, however, be regarded as conclusive owing to the small quantity of fruit available for examination. It is proposed to repeat this experiment next spring.

CAWTHRON INSTITUTE.

The investigations on mouldy core of the Delicious variety of apple during the year 1936-37 have largely been concerned with an inquiry into the correlation between the range of variation in the botanical structure of the apple fruit that occurs in typical orchards of the Nelson district and the method of invasion of the fruit by the fungi responsible for mouldy core, together with the mode of their subsequent spread within the fruit. The work has included the following phases :—

- (i) An examination has been made of large numbers of infected fruit with reference to the range in structure of the calyx and of the channel that leads from calyx to pip-chambers. This has proved that within the limits of the types occurring in this district, though the open-type calyx and the wide channel naturally afford a less obstructed path for the entry of the fungi, yet the closed calyx, whether associated with a wide or a narrow channel, does not confer on the fruit immunity from infection. Further, a wide type channel was found to be more frequently associated with the open-type calyx. Nevertheless, the narrow channel preponderated in the total number of infected fruit in the experiment.
- (ii) A detailed investigation has been made to determine the part of the fruit that is first liable to become infected. Contrary to what might be expected, the deeper-seated tissues in a large majority of instances proved to be the original point of infection.

The information secured in this phase of the research throws light on the question of the stage of development at which the fruit becomes infected.