

- (iii) The predominating method of spread of the fungi from the original point of infection out into the flesh proper has been traced.
  - (iv) Identification of the fungi involved in the recent phases of the work has been carried out. Among those of frequent occurrence are included species of *Alternaria*, *Phoma*, *Coniothyrium*, *Pestalozzia*, *Fusarium*, *Pleospora*, *Penicillium*, and *Periconia*; while in the group of rarer fungi occur *Sphaeropsis*, *Diplodia*, *Botrytis*, *Trichoderma*, *Hormodendron*, &c.
  - (v) The mode of occurrence in the fruit of all the fungi involved has been traced—i.e., whether they occur as solo fungi or as a dominant or a subsidiary associate when a group of fungi is present.
- The work being undertaken at present is mainly statistical and includes as its major lines:—
- (i) Determination of the percentage of the fungi occurring both in the district as a whole and in individual orchards, the fungi being reckoned—
    - (a) Together;
    - (b) As solo fungi; and
    - (c) As associated fungi in a group.
  - (ii) The determination of the parts first infected by individual solo fungi.
  - (iii) The correlation of variation in the structure of the fruit with the occurrence of the various solo fungi.

#### PHYSIOLOGICAL DISEASES.

##### PLANT DISEASES DIVISION.

*Bitter-pit.*—To test the possibility of bitter-pit being similar in origin to corky-pit a series of injections was carried out at Greenmeadows. Twenty-two chemical salts were injected into Cox's Orange apple-trees. Samples harvested from these trees were held in storage until pronounced pitting developed in the untreated lots, when all the samples were cut and examined. The figures showed wide variations from tree to tree, but no significant differences that could be ascribed to treatment. Borax again failed to give any control of bitter-pit.

*Corky-pit Control.*—Although the experiments of the 1935–36 season demonstrated clearly that boron salts would correct the corky-pit condition in apples, data were still required as to optimum quantities and frequency of application. Plots treated in the autumn of 1935 were allowed to remain without further dressing in the 1936–37 season. Unfortunately, several were rendered valueless through misunderstandings, as growers top-dressed them with additional borax. Two, however, remained on which the check trees showed fairly high percentages of pitting. In both cases the dressings applied in 1935 had apparently prevented pitting for a second year, as no more than 2 per cent. could be found on any of the treated trees. In commercial practice the borax treatment of corky-pit has proved most successful; wherever it was applied good control has been obtained.

##### CAWTHRON INSTITUTE.

*Boron Investigations.*—Studies in connection with the use of borax in the control of internal cork have involved a number of separate experiments dealing with—

- (a) The penetration of borax into the soil.
- (b) The intake of boron by the tree and the transmission of boron to the roots, leaders, foliage, and fruit.
- (c) The value of both top-dressing and spray methods of using borax in the control of internal cork.
- (d) The value of borax in the control of bitter-pit and tree-pit in Wolseley and Cleopatra varieties respectively.
- (e) The influence of borax applications on the amount of internal breakdown in the Jonathan variety of apples.

In brief, the experiments of the past season have confirmed those of the previous season in showing that two borax sprays of 0.25 per cent. give a complete control of internal cork. In three separate experiments no pit was found on trees receiving the borax sprays, while on control trees as high as 75 per cent. internal cork was found. The experiments have shown that borax used at the strength of 0.25 per cent. in conjunction with either Ialine, lead arsenate-lime spray, or with lime-sulphur-lead arsenate-lime spray is completely effective in the control of internal cork. Furthermore, large-scale tests at Annesbrook and the Research Orchard conducted on six different varieties of apples showed no detrimental effects either on the foliage or the fruit as a result of spraying the trees under commercial conditions with the combined borax sprays. The experiments have also shown that there may be a carry-over of the beneficial effect of borax injection or borax sprays into the following season, for trees which in the 1935–36 season received 2½ gm. and 5 gm. borax by injection, or alternatively received a 1 per cent. spray of borax, remained free of "cork" ailment despite the incidence of ailment in control trees to the extent of 46 per cent. The soil examinations have shown that borax top-dressings to the soil may penetrate to a depth of 30 in. in a period of twelve months. The examinations of the boron status of fruit soils from the main fruit-growing districts of New Zealand show that Auckland, Hawke's Bay, and Canterbury (Rangiora) are relatively well supplied with boron. Certain fruit soils from Central Otago, however, showed low amounts of boron. Here alkalinity in certain cases appears to accentuate the effect of boron deficiency on the trees.

Examinations of fruit from certain Otago orchards show a low boron status and the presence of typical "cork" trouble in the fruit.