(*c*) *Cereal diseases.*

(1) *Oat-rusts.*—Plots of 135 strains of oats produced by the Agronomy Division were grown at Palmerston North for studies on their resistance to the rusts *Puccinia coronata* and *P. graminis*. Most showed resistance to one or more strains of *P. coronata*, of which there would appear to be two present in the Dominion. None was immune. Infection by *P. graminis* was slight and irregular, consequently it was not possible to secure accurate observations. Collections of the rusts were sent to the University of Sydney for identification of the strains.

(2) *Wheat-rusts.*—A survey of the position regarding distribution of the rusts *P. graminis* and *P. elymi* was made in Otago and Canterbury provinces.

(3) *Barley diseases.*—The annual disease survey of the barley crops of Canterbury was completed. Smut was absent from crops grown from seed of New Zealand origin, and a trace only was found in one imported line. During the course of the survey records were secured of the percentages of other diseases present—namely, leaf-rust, barley-stripe, and mildew.

(4) *Halo-blight of Oats.*—This disease was found in crops grown in the Manawatu and at Lincoln. The organism has been isolated and found to be *Bacterium coronafaciens*, which is responsible for the disease in other countries.

(*d*) *Potato diseases.*

Two bacterial diseases, mattery-eye and black-leg, have been studied, and morphological, cultural, and physiological reactions made of the causal organisms. The former is now known to be due to *Bacterium solanacearum*. the latter to *Bacillus atrosepticus*.

The masked virus present an Aucklander tall-top and short-top has been transmitted to tobacco, Turkestan tobacco, petunia, and Devil's thorn apple.

(*e*) *Legume diseases.*

(1) *Bacterial-wilt.*—A large number of imported and local varieties of French beans have been grown at Palmerston North and Auckland for tests of resistance to this disease. Seed from several lines showing resistance has been selected for multiplication.

(2) *Bean-mosaic.*—The same virus has been found responsible for mosaic of runner and dwarf beans in New Zealand. It is seed-carried, approximately 30 per cent. of seed from diseased plants being infected. The virus would appear to be " Phaseolus Virus 1 " of Smith.

(3) *Pea-mosaic.*—Tests have shown that of thirty-three garden varieties of peas eleven proved immune, and of ten field peas only one was immune to this disease. Reactions of the virus show it to be " Pisum Virus 2 " of Smith.

(4) *Nodule Bacteria.*—Cultures have been supplied to farmers sufficient to threat the following quantities of seed: Lucerne, 96,000 lb.; while clover, 1,665 lb.; lupins, 6,400 lb.; and peas, 12,320 lb.

Work has also been undertaken, in collaboration with the Fields Division of the Department of Agriculture, on the effects of different strains of the legume organism on establishment of white clover.

(*f*) *Fruit-tree Diseases.*

Work undertaken during the year is covered under a separate report. (See " Fruit Research " report, p. 40.)

(*g*) *Small-fruit Diseases.*

(1) *Tomato diseases.*—A bacterial disease of field and glasshouse plants, previously confused with verticillium-wilt, has been found to be due to the bacterium *Aplanobacter michiganense*, an organism of American origin.

The host range of spotted-wilt in New Zealand has been extended to include twenty-one species belonging to seven families of plants. It also produces a serious disease of lettuce in the Hutt Valley. The physical properties of the virus have been determined, showing that it is identical with spotted-wilt occurring in other countries.

(2) *Passion-fruit Diseases.*—A disease of bacterial origin, known as grease-spot, has been investigated and the pathogenicity of the causal organism proved. The organism has been named *Phytomonas passiflorae*.

A disease known as brown spot has been found to be due to the fungus *Alternaria passiflorae*, recently described from Queensland material.

(3) *Tobacco diseases.*—A method has been evolved for sterilizing smoking-tobacco carrying tobacco-mosaic, which may be spread by smokers from prepared leaf to plants growing in the field. The virus is destroyed without detriment to the flavour by subjecting tobacco to steam treatment in an autoclave for fifteen minutes at 10 lb. pressure.

The host range of tobacco-mosaic in New Zealand has been extended to include eleven species of the family Solanaceæ and one of the Compositæ. It has been found to be " Nicotiana Virus 1 " of Smith.

(4) *Cucumber diseases.*—The host range of cucumber-mosaic has been extended in New Zealand to nineteen species belonging to four families or plants. The physical and other properties show the virus to be identical with " Cucumis Virus 1 " of Smith.

(5) *Hop diseases.*—Inoculations were carried out with material taken from diseased hop roots secured from Nelson and Palmerston North. Positive results were obtained both from direct and soil inoculations. The fungus responsible is *Phytophthora cactorum*, the first record of its attacking hops.

(6) *Onion disease.*—Onion-smut due to the fungus *Urocystis cepulae* was to be found to be prevalent in Marshlands district of Canterbury. A survey of the position showed the disease to be present in sixteen properties. It would appear to have been introduced with imported onions four or five years ago.