

(b) *Cereal Diseases.*

(1) *Rusts*.—On behalf of the Agronomy Division 114 oat hybrids and selections and 54 introduced varieties were examined for susceptibility to the rusts *Puccinia coronata* and *P. graminis*. Similar work on wheat was undertaken for the Wheat Research Institute, 325 selections and hybrids being examined for susceptibility to *Puccinia graminis* and *P. elymi*.

(2) *Smuts*.—Mass inoculations with *Ustilago tritici* were carried out on the 325 wheat selections to ascertain for the Wheat Research Institute their susceptibility to this smut. Attempts are being made to ascertain what physiologic races of this fungus are present in New Zealand. Studies have been made of the influence of date of sowing and soil temperatures on incidence of smuts of oats, wheat, and barley on the mature crop.

(3) *Maize Beetle*.—Owing to attacks on germinating maize-seed by the beetle *Clivina rugithorax* in Hawke's Bay numerous tests of repellents are being undertaken. For the purpose were used several tars, naphthalene, paradichlorobenzene, orthodichlorobenzene, and turpentine, with some of which were incorporated lime or paris green. Studies are also being made of the effects of these products on germination of the seed, several—recommended as repellents overseas—causing considerable injury.

(c) *Grass Diseases.*

(1) *Blind-seed*.—Low germination of rye-grass has been found to be due to a fungus, a species of *Helotium*. Samples of seed from Sweden, Ireland, Scotland, Wales, England, and Tasmania have been found to contain similarly infected seeds, which carry the disease from season to season. Experiments are being conducted to ascertain the longevity of the fungus in infected seeds under various conditions of drying and storage, as this may be a factor in control. Over three hundred plants of various strains and hybrids of rye-grass produced by the Grasslands Division have been inoculated with the fungus in an endeavour to find a factor for resistance to the disease that may be incorporated into the best agronomic strains.

Several other related fungi have been isolated during the progress of this investigation, and are being studied with a view to ascertaining if they, too, are harmful to rye-grass. Likewise the rye-grass endophytic fungi which are present in the tissues are being studied with a view to ascertaining if they are factors in inducing nutritional disorders in stock.

(2) *Ergot*.—A simple and effectual means has been evolved for testing grass strains for relative resistance to ergot. Numerous strains of the fungus have been obtained in culture and are being used for the purpose.

(d) *Potato Diseases.*

Work has been commenced to ascertain the identity of the numerous virus diseases present in New Zealand. It has been found that a mild mosaic of Dakota Red may, when transferred to certain other varieties, induce severe streak.

(e) *Legume Diseases.*

(1) *Bacterial-wilt of Bean*.—Trials have been continued for resistance to this disease. Selected varieties which showed promise last year have been sown at Owairaka, and are being considered not only for resistance to this disease but also for yield and type.

(2) *Bean-mosaic*.—Tests of the effects of this disease on yield have shown that early season infection caused a reduction of 66 per cent., 72 per cent., and 78 per cent. respectively in three varieties tested.

(3) *Pea-mosaic*.—Eleven newly introduced varieties of field peas were tested for immunity to this disease, one being immune. Numerous crosses were tested for the Agronomy Division.

(4) *Pea Leaf-spot*.—This recently introduced disease has proved to be of bacterial origin. Identification, means of dissemination, and control measures are being studied.

(5) *Pea-streak*.—It has been ascertained by numerous host-range studies that, in addition to numerous members of the Leguminosae, this disease also attacks several species of the Cucurbitaceae, or marrow family.

(6) *Lucerne Nodule Organism*.—Cultures of the lucerne nodule organism, sufficient to inoculate 107,640 lb. of lucerne-seed, have been distributed to farmers scattered throughout the Dominion.

(f) *Vegetable Diseases.*

(1) *Carrot Soft-rot*.—A disease of carrots, producing foetid decay of the roots, has been found to be of bacterial origin. The organism has not yet been identified.

(2) *Onion-smut*.—A survey of the onion-growing areas has shown that the fungus *Urocystis cepulae* is present only in the Marshland (Canterbury) area, and there limited to about 100 acres. Experiments were conducted on the infected areas to work out an effectual control and ascertain the longevity of the organism in the soil. The formalin-drip process gave adequate, but not complete, control, and will become current practice next season.

(3) *Yellow-dwarf*.—This serious disease was recently discovered in the Marshland area, and its virus origin proved experimentally. Examinations have been made of all onion-growing areas, but the disease has been found only in one area outside Marshland, in seed onions grown from Marshland-raised plants. Attempts are being made to eradicate the disease from the onion crops of New Zealand.

(g) *Timber-preservation Investigations.*

From numerous specimens forwarded by the State Advances Corporation have been isolated the common wood-rooting fungi causing decay of dwellings. The most common cause of decay is the fungus *Poria ferruginosa* (see page 82).