

has been valuable in supplying such information as has been necessary on aerodrome advisory work. Trials with various substitutes for fertilizers both to promote plant growth and to further acidify soil are now under way. It has been shown that the mixing of seed and certain fertilizers prior to sowing is detrimental to the establishment of grasses.

PLANT DISEASES DIVISION, OWAIRAKA, AUCKLAND.

Director: Dr. G. H. CUNNINGHAM.

I. PLANT DISEASES INVESTIGATIONS.

(1) *General*.—Four new fungus diseases and three new insect pests have been isolated during the year. The causal organism of blind-seed disease has been identified as *Phialia temulenta*. About sixty strains of the ergot fungus have been isolated from high-yielding ergometrine lines received from Great Britain. These have been applied to commercial rye with a view to ascertaining the factors influencing production of the alkaloid. Inoculation tests have also been made with varieties of wheat and barley, with negative results.

(2) *Potato Diseases*.—A line of the variety Dakota Red has been found to carry a necrotic virus in masked form and in addition two sap-transmissible viruses which cause a chlorotic and ring-spot condition of tobacco. Lines of several varieties of virus-free potatoes are being bulked in an insect-proofed glasshouse for further virus studies.

(3) *Legume Diseases*.—Thirty varieties of dwarf and runner beans were sown and inoculated with bacterial wilt organism (*Bacillus medicaginis*) to enable selection of resistant varieties. Tests of pea-mosaic resistance were carried out with crosses of Greenfeast rogue peas in the glasshouse. Lines which appeared to be resistant were then grown in the field for selection of type and earliness.

(4) *Linen-flax Diseases*.—Detailed surveys of the linen-flax crops for presence of disease have been made. Five major diseases, all seed-borne, are well established—namely, wilt (*Fusarium lini*), rust (*Melampsora lini*), pasmo (*Sphaerella linorum*), browning (*Polyspora lini*), and seedling-blight (*Colletotrichum*). The last has so far been found in only two seedling crops. Pasm has proved to be common throughout on the introduced weed *Linum marginale*. Linen-flax seed stored in the South Island has been found infested with Tyroglyphid mites. A survey has been made to ascertain sources of infestation and enable methods of control to be worked out.

(5) *Small-fruit Diseases*.—Tomato Leaf-mould: Seed of the variety Vetomold resistant to this disease has been grown under controlled conditions and sent out to commercial growers in different parts of the Dominion. The variety Bay State has been further rogued and selected seed grown on a commercial scale. Seed of a further new Canadian selection has been received and grown in pots under glass. Both Vetomold and Bay State are being tested in the field against the standard round variety Kondine Red for quality and yield trials.

Passion-fruit Diseases: A block of thirty-two passion plants have been established to enable control studies to be made with brown-spot (*Alternaria passiflorae*) and grease-spot (*Phytophthora passiflorae*).

(6) *Miscellaneous Diseases*.—Suspected Virus of Rhubarb: Attempts have been made to transfer infection from rhubarb to the same host by two species of aphides, leaf-rubbing and hypodermic injections, so far without success.

Beet Virus: The disease has been identified as *Beta Virus 2* of Smith. It has been transmitted to all varieties of silver-beet and red-beet obtainable in the Dominion, and also to sugar-beet and spinach.

Copra Insects: A survey has been made of the insect pests present in copra imported from certain Pacific islands as pig-feed. Three insects were found to be prevalent therein—namely, copra-bug (*Necrobia rufipes*), saw-toothed grain-beetle (*Oryzaephilus surinamensis*), and red flour-beetle (*Tribolium castaneum*). All were able to maintain themselves and breed in copra throughout the year under New Zealand conditions.

Carrot rust-fly: A life-history study has been commenced of this pest, which causes considerable losses to market-gardeners in Auckland Province and virtually precludes growing of carrots by private gardeners.

(7) *Fruit-tree Diseases*. (See Fruit Research report, p. 16.)

II. PLANT PROTECTION.

(1) *Therapeutant Testing*.—Copper Sprays: Experiments have been undertaken in field and orchard to ascertain the relative values of copper oxychloride, copper oxide, and Bordeaux mixture in the control of late-blight (*Phytophthora infestans*) of potatoes and tomatoes.

Seed Dusts: Trials in control of pre-emergence damping-off of Greenfeast peas have established the superiority of cuprous oxide dusts over the organic mercury dusts at present used.

(2) *Therapeutant Disease Control*.—Carrot Rust-fly: Significant results in control of this pest have been secured with broadcast dressing of crude naphthalene. Less effectual was derris dust.

Onion-mildew and Thrips: Significant increases in yield have been secured in all treatments. The most effectual proved to be Bordeaux mixture plus summer oil plus nicotine sulphate.

Cabbage Diamond-back Moth and White Butterfly: Two programmes of control were tested, derris dust versus nicotine sulphate and wetter spray. Unlike previous seasons, white butterfly caused most injury, there being few larvae of diamond-back moth in evidence. The nicotine sulphate treatment failed to give control.

(3) *Improvement in Spray Programmes*. (See Fruit Research report, p. 16.)

(4) *Certification of Therapeutants*.—All certified materials have been retested during the year. It is pleasing to note that in every case the certified standard has been maintained. One or two products have been withdrawn by the manufacturer or agent owing to shortage of supply.

III. TIMBER PRESERVATION.

(See Timber Protection Research report, p. 20.)

IV. POMOLOGY INVESTIGATIONS.

(See Fruit Research report, p. 16.)