

VII. Fruit and Fruit-tree Investigations.

(a) Sprays.—A comprehensive series of field experiments is being conducted with a view to improving the spray control of our major orchard diseases. For the purpose 676 experiments, concerning thirty-three district investigations, were handled during the year.

Analyses are being made of commercial sprays with a view to making operative the Fungicides and Insecticides Act of 1927. In this connection the sulphurs and lime-sulphurs have been dealt with, and completed accounts published in the *New Zealand Journal of Agriculture*.

(b) *Fruit-rots in Store*.—A second season's survey of all rots found in cool stores has been completed. The fungi responsible have been isolated, identified, and are now being inoculated into fruits to determine their pathogenicity. A study has been made of the factors which enhance or inhibit fungous attack, with a view to working out methods of reducing losses.

The serious losses experienced in lemons in the curing-sheds at Tauranga led to an investigation being made into methods of handling and storing fruits. Recommendations made were adopted and losses materially reduced.

VIII. Cheese Moulds.

An investigation into the possible role played by fungi in producing discoloration of cheese has been in hand for the past twelve months. This has necessitated a critical investigation of species and strains of those fungi found in association with discoloured areas. So far it has been ascertained that one strain of *Penicillium* is more or less directly involved in one type of discoloration.

IX. Silage Investigation.

Experiments have been initiated to ascertain the effects of various organisms on the preparation of grass silage. Preliminary work has shown that it is possible to alter the quality of silage by means of artificial inoculation. Attempts are being made to work out a technique whereby this may be made use of in farm practice.

X. Forest-tree Diseases.

(a) *Die-back of Pines*.—During the year investigations were made of a serious outbreak of disease in many of the afforested areas in the Dominion. It was found that the disease was due to two species of fungi (at present but tentatively named) attacking trees weakened by snow, frost, or as a result of growing in unsuitable soils or localities. It would appear that both are species of exotic fungi, probably introduced to nurseries with the seed, and from these to the field during the process of blanking.

(b) *Mycorrhiza*.—The economic significance of mycorrhizal fungi has been experimentally demonstrated. In experiments it was found that very material results were secured when *Pinus radiata* was grown in soil infected with certain fungi, as species of *Rhizopogon* and *Boletus*. Further experiments are in progress to determine the effects of four species of fungi on several different species of forest-trees, and methods of propagating and introducing these beneficial fungi into nursery soils.

AGROSTOLOGY SECTION.

Strain in pasture-plants dominated the work of this section during the year, and the improvements of strain have already been widely recognized both by the seed trade and by farmers.

In view of the fact that seed of pedigree strains is at first comparatively scarce, it would seem necessary to conserve lines of mother seed, in order to increase as rapidly as possible the supplies of high-grade seed.

Comparison of New Zealand rye-grasses with those derived from overseas indicates that the quality range in the Dominion is exceptionally wide, and that there occurs local types much superior to anything under test at Aberystwyth, and also other much inferior to the worst grown at this Welsh Seed Station.

Observations during the year showed that it is a comparatively safe practice to retain the seed for certification from lines once removed from permanent strains. No deterioration has been evidenced as a result of this practice, and, indeed, this fact should be utilized to exploit as far as possible all the available seed-growing areas of the Dominion.

The continuation of strain-selection work is being designed with a view to securing elite pedigree strains, and it is at present regarded as of utmost importance to continue the segregation of separate strains with a view to effecting general improvement of existing certified lines by both culling and selection.

The introduction of the ultra-violet-light method of differentiating true perennial rye-grass has rapidly speeded up the detection of true lines and the consequent work of seed-certification. Field trials have proved beyond question that a very complete correlation exists between ultra-violet tests and those conducted in the field.

Certified rye-grass grown in all parts of the Dominion has invariably given results markedly superior to those in general use, no matter what type of soil or climatic conditions prevail in the locality.

Investigations of cocksfoot indicate that there is a good deal of uniformity of type occurring with the New Zealand lines, and comparisons between New Zealand strains and those of Denmark show that the former are markedly superior from the pasture-yielding point of view.

Two hundred and fifty lines of *Agrostis* are under test in connection with certification, and have demonstrated the purity of New Zealand brown-top and the absence of contamination with red-top.