

attacked, and most of them destroyed by mildew. Wheat-scab has been the subject of laboratory-work, and it has now been demonstrated conclusively to be seed-borne. The hot-water treatment has proved effective in combating this under laboratory conditions. A second cereal-disease survey was conducted during the months of December, January, and February, most of the cereal-growing districts of Marlborough, Canterbury, Otago, Southland, and Wellington being covered. These surveys have brought to light valuable data relative to the distribution of diseases, their economic significance and dissemination.

Corticium disease of potatoes formed the subject of further experimental work. Clean seed secured as a result of last season's treatments has been sown with the diseased lines at Gore and Ashburton to ascertain the effects of the disease upon yield. In addition, further treatments with acidulated mercuric chloride were undertaken in order to secure clean seed for further experiments. Preliminary experiments in the control of this disease by the use of dusts gave such promising results that a comprehensive series of field experiments was undertaken at Ashburton and Gore. These have not yet been harvested, so that results are unknown meantime.

Dry-rot of swedes formed the major part of the research work carried out in the laboratory during the year, and results are at present being written up for publication in bulletin form. This work has proved that dry-rot is seed-borne, and has provided a control which under laboratory conditions has proved satisfactory. Field experiments based on this have been undertaken on approximately one hundred farms throughout New Zealand, where treated seed and untreated seed known to be infected with dry-rot have been grown.

Papers dealing with cereal-smut control experiments, corticium-disease control, and acacia gall fungus have been published by members of the staff in the *Journal*; in addition, numerous technical papers dealing with the systematics of New Zealand fungi have been published in New Zealand and foreign periodicals.

Routine work has been heavy, and has been confined chiefly to identification of potato, cereal, root-crop, and fruit-tree diseases. In addition, a considerable amount of work in connection with the isolation of various pathogens attacking weeds has been undertaken; this has been enforced principally on account of the growing popularity of the belief in "natural enemy" control.

Bacteriology and Physiology.

An investigation was made into the causes of an obscure disease that made its appearance last season in certain parts of the Motueka district—the blister disease of apples. Although the lesions which occurred in the fruits showed the presence of a fungus—*Coniothecium*—this parasite was found to be of merely secondary importance. Certain physiological irregularities had been brought about by unfavourable soil conditions, weather conditions, and orchard-management. After closely examining the circumstances in which affected trees were to be found, the conclusions reached were that the rooting-systems were feeble through shallow rooting due to an impenetrable pan, through root-injury in cultivation, and through lack of drainage. The remedy recommended was to raise the vigour of the trees by various means, such as drainage, manuring, thinning, hard pruning, &c., according to the circumstances involved. Another non-parasitic disease—brown-core of apples—which showed itself in the form of brownish masses variously distributed in the pith and cortex of apple fruit, was ascribed to similar causes, and was probably precipitated by the unusual weather conditions that preceded its appearance. There is little doubt also that the dying-back of Delicious and Sturmers that was unusually prevalent in this season was due to similar causes. There is no doubt that this investigation uncovered a group of conditions that have been insidiously operating against the orchardists on a very considerable area of country.

Samples of brown-cored apples of the 1924 picking were experimentally cool-stored at Motueka, but no increase or decrease in the numbers or the extent of the damaged masses of internal tissue was occasioned by the storage conditions. Such affected fruit stored equally as well as that from unaffected trees. In view of the difficulty of detecting the disease in some varieties exteriorly, this experiment indicated that there should be no falling-off in the condition of any affected fruits that inadvertently may have accompanied any shipments abroad.

During the year a large number of farmers have been supplied with cultures of bacteria which form the nodules on the roots of lucerne. Although no definite experimental areas have been laid out, growers have been requested to sow small control areas with untreated seed. In some localities the results have been very satisfactory, but in others, particularly in parts of Canterbury, no obvious advantage has shown up during the first six to eight months of growth, though there is every possibility that improvement will occur during the coming spring. Bacterial cultures sufficient for the inoculation of over 1,500 lb. of seed were grown and distributed from the laboratory.

A disease of swedes, known as mottled heart, has been particularly abundant for many years past in Westland, and a considerable amount of experimentation has been from time to time carried out on it. A further set of experiments established in December, 1925, gave some very important results, which are briefly as follows:—(1) None of the common artificial fertilizers exerted any deterrent effect upon the disease, which was very prevalent; (2) some of the fertilizers certainly increased the weight of the crop per acre, but this was commonly accompanied by a greater percentage and a greater intensity of the disease; (3) wood-ashes, on the other hand, gave very little improvement in weight per acre of crop; (4) wood-ashes, however, decreased or even eliminated the disease entirely, according to the quantities used; (5) the greater the weight per acre of swedes the greater the requisite quantity of ashes to secure a healthy crop. The experiments commenced in December, 1926, to ascertain what constituents of the wood-ashes were preventing the occurrence of the disease were entirely destroyed by floods.