(4) Potatoes.

(*a*) *Manuring:* (i) *Early Potatoes, Pukekohe District.*—The results of the 1930 experiments at Pukekohe were published in the *Journal of Agriculture* for April, 1931. The results in the main confirm previous season's work. The use of sulphate of ammonia up to 4 cwt. per acre has proved beneficial. Potash, on the other hand, does not seem to be a very important factor, and there are indications that the large quantities of phosphate applied to the early crop could be cut down to a certain extent without reducing yield significantly. These trials are to be continued with certain modifications.

(ii) *South Island Manuring Experiments on Main-crop Potatoes.*—Eight trials were sown in 1931. There has been a considerable reduction in the number of these over the past two years, chiefly through lack of finance.

(*b*) *Certified versus Commercial Seed-potato Trials.*—Three experiments have been laid down, using several varieties. These trials are, however, more in the nature of demonstrations, as facilities did not permit of large-scale experiments involving a number of replicated plots.

(*c*) *Source of Origin of Seed-potatoes Experiment.*—These trials are being continued. In 1930 and again in 1931 seed from eight different sources was put under trial at Rangiora. The yield from the 1930 sowings was very poor, and only small differences between the various lines of seed were recorded. One line was significantly lower than the control.

(*d*) *Potato Variety Trials.*—Results of trials conducted in the 1930–31 season were published in the September, 1931, *Journal*.

About thirty varieties of potatoes are being grown in the present season in ten different districts in simple single-plot trials to determine what varieties are most suited to particular districts. Yield, resistance to disease, and cooking-quality are being determined. This work is being done in collaboration with the Agronomist.

(5) Swedes and Turnips.

(*a*) *Manuring.*—A summary of the results of experimental work over seven seasons was published in the *Journal* for March, 1932. The advantages of using super plus carbonate of lime in equal parts, providing a safe means of overcoming serious germination injury and thereby increasing yields, have been amply demonstrated.

Eight trials were laid down in 1931 as compared with thirteen during the previous season. Present and future work aims at increasing the efficiency of superphosphate by trying out various super-slaked lime mixtures against super plus carbonate of lime. The work of the Mycological Section of the Plant Research Station indicates the desirability of this from point of view of combating club-root.

Investigations into various aspects of germination injury by manures are being carried out at the Plant Research Station's area.

(*b*) *Effect of Liming and Manuring on Club-root.*—Seven trials are being carried out in collaboration with the Mycologist to determine the effect of liming and manuring on club-root.

The marked effect of burnt lime in combination with basic slag on club-root control was demonstrated on two experiments in the 1930–31 season. The experiments in the present season are designed to investigate the best method of applying burnt lime and carbonate of lime in various quantities. In one trial, super, basic slag, super and carbonate of lime, and super and slaked lime are being sown on limed and unlimed ground on the same plots for a number of years.

(*c*) *Varieties in Relation to Club-root.*—At the Gore Experimental Area a number of varieties of swedes and turnips are under trial to determine their resistance to club-root.

MYCOLOGY SECTION.

G. H. Cunningham, Mycologist.

This report gives in condensed form, an account of the work performed by all sections of the Mycological Laboratory during the past twelve months. Despite the curtailment of finances and of travelling-expenses, an increased volume of work has been produced, consequent upon the greater demand made upon the services of the Laboratory by agricultural workers.

(1) Brassica Diseases.

(*a*) *Club-root* (Plasmodiophora brassicæ).—A considerable number of resistant strains of swedes, turnips, and rape, procured from Canada, Scotland, Denmark, and by selection at the Plant Research Station area, have been grown on heavily infected soil. From these, plants apparently immune to the disease were selected and seeded under controlled conditions. This seed has again been sown in infected soil for further immunity trials.

Further work with field control of club-root by liming has been undertaken, attention being paid in this work to the effects of time of application upon control secured. It has been demonstrated in the field that a satisfactory control may be secured, even on heavily infected land, if 30 cwt. per acre of burnt lime is applied three months in advance of sowing the seed, and if seed is sown with 2 cwt. of basic slag, or a 3 cwt. mixture of superphosphate plus hydrated lime.

Experiments conducted during the winter months under glass have led to the production of two satisfactory methods of combating club-root in small gardens or market gardens, where growers are faced with the problem of growing continuous crops on infected soils.

(*b*) *Dry-rot* (Phoma lingam).—Many experiments conducted during the year have led to the production of a modified seed-disinfection method which it is hoped, will give complete disinfection of lines infected with this disease. The process is a hot-water treatment, now modified so that seeds are immersed for fifty minutes in water held at 124° F. It would appear to be effective, since in the many hundreds of thousands of seeds tested (from a line averaging about 15 per cent. infection) no dry-rot fungus has appeared. Furthermore those field areas sown with seed treated in this manner have remained free from infection. Seed of six varieties of swedes and turnips have been grown to maturity from seed treated by this method. The plants, which have remained disease-free throughout, have been seeded, and the seed, when tested, was likewise found to be clean. A portion of this seed is being utilized for bulking purposes, the remainder has been forwarded to certain British seedsmen who intend utilizing these clean nucleus lines for production of seed for this market.