

An extensive series of treatments has been undertaken with a view to providing nucleus lines of wheat seed free from wheat-scab, and barley free from barley-stripe ; but as yet no successful treatment has been evolved.

Attempts at procuring take-all infection in the field, with a view to conducting persistence experiments, have not been successful, this being the third season in succession that negative results have been secured.

A commencement has been made with studies of biologic specialization of the cereal rusts, together with their methods of perpetuation, as a preparatory step to working out methods of control.

Potato Diseases.—Selections made by the Agronomist of most commercial lines of potatoes have been grown on the station farm, so that by the practice of roguing we could render them free from certain diseases, as virus diseases, wilts, and early blight. All lines were treated before planting so as to render them free from corticium-disease. Many high-yielding lines were secured, but it is not possible to determine whether they are disease-free until they have been grown a second season. In addition, lines of commercially disease-free tubers have been secured from Scotland, England, and Ireland, and are at present being grown on the farm.

A commencement has been made with persistence studies on corticium-disease, approximately 1 acre being sown with infected tubers with a view to infecting the soil. Further experiments will be conducted in successive seasons to ascertain the period this organism remains in the soil, and, if so, whether any soil-treatment will tend to lessen this period or eradicate the disease.

Pea Diseases.—Selections made by the Agronomist of all garden peas cultivated in the Dominion have been grown on the farm. These were treated for collar-rot before being sown, and subsequently have been rogued repeatedly for this disease. Collar-rot was not eliminated by this method, however, so that a second sowing was made with selected seed. This second lot, if free from the disease and if it remains so, will supply sufficient clean seed for bulking.

Brassica Diseases.—Further work this season has been carried out with dry-rot, our objects being (1) to improve the technique of testing for the disease in seed ; (2) to prove that the disease is seed-borne (for this purpose a special insect-proof series of cages has been erected) ; (3) to improve the method of treatment whereby diseased seed could be rendered dry-rot free ; (4) to determine whether the disease carries over in the soil from one season to the next.

All attempts at perfecting a seed-treatment have so far failed, so that work is now concentrated on the production of disease-free lines of seed.

Club-root experiments have been designed to extend over a period of seven years. This work consists of (1) experiments to determine the period the disease persists in the soil ; (2) whether any manurial, rotational, or cultural practice will lessen this period of persistence ; (3) whether any brassicas are resistant or immune ; (4) whether brassica weeds are hosts of the organism (and thus tend to carry the disease over indefinitely) ; (5) evolution of a technique for certain detection of club-root in the soil ; (6) experiments to determine whether club-root is carried with the seed.

Other Investigations.—Lucerne-nodule organism : Considerable attention has been paid to the improvement of methods whereby lucerne-seed may be efficiently inoculated with the lucerne-nodule organism prior to sowing, and work conducted on the effects of manures on the organism has led to considerable modifications in the practice of establishing lucerne stands.

Fireblight : Owing to the outbreak of fireblight in the South Island, considerable additional work has had to be carried out with this disease, leading incidentally to the establishment of several previously unrecorded hosts.

Pine-disease : The cause of the dying of *Pinus radiata* throughout the Dominion has been under investigation, leading to the isolation of an organism common to all diseased trees. Experiments are at present under way to determine whether such is parasitic, and, if so, its method of dissemination.

Linseed-rust Control : Experiments, unfortunately unsuccessful, were conducted during the year to procure a treatment for the elimination of rust of linseed, which has been proved elsewhere to be carried with the seed. Further work is in progress.

Field Crop Investigations.

This work has for its objective crop and pasture improvement by the use of better seeds. The term "better seed" is used to cover freedom from disease, varietal purity, improved strains, and strains suited for particular purposes or environment. The organization falls into two closely associated divisions. On the one hand is the raising of improved seed for distribution, and on the other the organization for wider distribution from farm to farm and the certification of the seeds of those crops conforming to certain standards.

PRODUCTION OF IMPROVED SEED.

Seed of all the main farm crops is being raised by adopting pure-line selection. The work is carried out in close co-operation with the Mycologist, who undertakes the elimination of those diseases amenable to control, and the reduction of others by roguing and the selection of disease-free lines. Nothing in the way of cross-breeding is being undertaken in the initial stages of this work, the view being held that there is ample scope for improvement in the standard varieties of proved value for local conditions.

Potatoes.—Commencing with tuber units of the more important varieties, there is now available sufficient seed for the planting of several acres. These selections will be multiplied as rapidly as possible and distributed to selected growers, who in turn will pass the seed into commerce, and be followed up by certification. Each year a fresh series of tuber units is being selected to replace the lines going into commerce, so that there will be a steady output annually of pure and healthy seed. Of