

White clover : One hundred and four lines sown in spring, 1928, have been regularly mown throughout the year. Owing to volunteer white clover appearing everywhere throughout this area, there was little difference to note for the first year of the trial. After January of this year, however, the volunteer type, together with many poor-recovery and low persistent lines, failed badly, and at the time of writing there are marked contrasting types showing up. A small percentage of lines, many from Hawke's Bay, are outstanding. These showed good summer production and very rapid recovery after autumn rains. It would appear we are on the verge of important disclosures in regard to white-clover types from varying sources of origin. A further 800 commercial lines from all over New Zealand were sown out during the year.

Red clover : One hundred and four lots sown in spring, 1928, have been regularly cut. The weekly cut has eliminated virtually all the broad red and other non-persistent types, and the outstanding success of the Montgomery red-clover type in persisting under this treatment offers great hope in the possibility of ultimately working up a good persistent grazing type of red clover.

Field Research.—3,590 plots of perennial rye-grass, 216 cocksfoot, 393 white clover, 401 red clover, 200 connected with rates of seeding, and 1,220 of miscellaneous grasses and clovers are now sown down. These are sown on the main leading soil-types throughout New Zealand and extend from North Auckland to Southland. A special area at Gore, and one at Lincoln, in Canterbury, have been chosen for particular trials of rye-grass strains to study the particular behaviour of the different rye-grass types when grown in Southland and Canterbury respectively, and to compare these with the same lines grown at the central research area at Palmerston North.

Regrassing experiments on secondary-growth country : (a) The experiments on regrassing secondary-growth country have been continued, and some additional 25 acres have been sown. Brown-top, crested dogstail, Lotus major, white clover, and *Danthonia pilosa* still show up clearly as the most suitable species for all classes of secondary-growth country.

(b) Hard-fern control by spraying has been continued, but the wet summer made extensive operations difficult. The originally sprayed areas (approximately 100 acres) are comparatively free of hard-fern. An additional 50 acres have been treated.

(c) Comparative manurial trials are being continued, and some 50 acres were dressed during the year.

MYCOLOGY SECTION.

(1) *Cereal Diseases.*—(a) Smuts : Work during the year has been confined to bulk treatments by the hot-water process for elimination of loose and covered smuts of barley, wheat, and oats. An investigation was carried out to determine whether loose smut was more prevalent in plants grown from apparently healthy seed taken from smutted plants than from those developed from seed taken from contiguous, non-smutted plants. Results showed no appreciable differences in percentages of infection between the two lines. Several new seed-disinfectants were tried out during the year, but none showed promise of being better than any of those in general use.

(b) Wheat-scab : Twenty-two different seed-treatments were conducted during the year to determine whether this disease (which preliminary laboratory work showed to be seed-carried) could be controlled. All failed owing to secondary infections occurring in the plots.

(c) Stripe disease : Forty-eight experiments on control of this disease were conducted on the Plant Research Station farm. Although several of these treatments prevented seedling-infection, all plots became infected subsequently from air-borne spores. Further studies in dissemination are therefore necessary before attempts at control on a field scale become possible.

(d) Black-end : Experiments to determine the cause of this condition, whether it was seed-carried, and a possible control by seed-treatment, were carried out at the Station farm and at Ashburton. The cause is still under investigation, pathogenicity studies being under way in the laboratory ; the disease has been proved to be carried with seed ; control experiments failed in that only partial success was met with, owing to only a few possible treatments being tried.

(e) Rusts : Preliminary field studies have been commenced with a view to determining whether any races of oats grown in the Dominion show promising indications of being resistant to physiologic forms of black rust and crown-rust, thirty-two plots being sown on the farm. Certain of these show varying degrees of resistance, but little work can be carried out until the rusts have been studied from a physiological form viewpoint.

The present position with regard to cereal diseases is that smut-elimination on a field scale has proved practicable. With all other diseases under investigation, it has been found that a detailed study of each under laboratory conditions is necessary before field experiments on control can be undertaken with any degree of confidence. Such work is only possible when an officer is detailed for this series of investigations.

(2) *Brassica-diseases.*—(a) Dry-rot : In the past four seasons seed-treatments have proved satisfactory in the laboratory, yet apparently failed when applied on a field scale. The reasons for this have been the subject of considerable investigation during the past twelve months. It was thought that possibly the technique for testing the presence of the dry-rot organism in the seed was faulty. Consequently, three different tests were utilized—the standard method, which consists of sowing seeds in lots of 100 on culture media in petri dishes ; the "Copenhagen" germinator method, which consists of sowing seeds in lots of twenty-five on sterile blotting-paper covered by glass cloches and kept moist in this germinator ; sowing seeds in lots of 100 in sterilized soil kept in sterilized tins in the glasshouse. In testing the standard method 500,000 seeds were tested, in the soil method 60,000 seeds were tested, and in Copenhagen germinators 20,000 seeds were tested. All were from