

(8) *Wheat-variety Trials*.—Three of these were sown in Canterbury. The results indicate a superiority of Tuscan as far as yield is concerned. Some fundamental work on rate of seeding is being done this year which it is expected will greatly simplify and increase the accuracy of these trials.

(9) *Effect of Disease-control Measures on Yields*.—Four experiments on wheat, two on barley, and one on oats were carried out to test the effect on yield of using disease-control measures. The results are not regarded as sufficiently conclusive this season, and the trials are being repeated in 1929–30 season.

(10) *Oat-manuring*.—Four trials conducted in Southland demonstrated the advantage of super over less-soluble phosphates, and a considerable increase in yield resulted from the use of nitrogen as an adjunct to phosphate.

(11) *Potato-manuring*.—The number of trials in Canterbury was increased to twelve in the past season, and three have been laid down in Otago and Southland, and one in Auckland. These trials are not yet harvested. The general and highly-paying response from superphosphate leaves no doubt as to its advantages. Potash and nitrogen are both inconsistent in response, and in some cases both have given increases where used singly with phosphate, but when used together the result is no better than where either is used as a single addition.

(12) *Swedes and Turnips Manuring*.—Seventeen trials in the South Island and two in the North are under way. They aim at the determination of the effect of various manures in relation to germination and yield. The results of the previous season pointed very strongly to the advantages of super and lime in overcoming germination injury and in still maintaining the advantages of a readily available phosphate. Although scientifically the mixing of super and lime is a wrong practice, the results in practice are highly promising.

(13) *Lucerne*.—Experiments to test the effects of manure have been carried out in the North Island and Otago. While phosphates give good results almost invariably, the use of White Island fertilizer containing sulphur has been very beneficial to crops in Otago. In collaboration with the Mycological Section, various methods of applying soil and culture inoculations are under trial in an experiment in Canterbury, and in various places throughout New Zealand the use of the culture prepared at the mycological laboratory is giving excellent results. In some cases inoculation is so important as to cause the crop to fail entirely if it is not applied.

(14) *Rape*.—The work on rape has proceeded along the lines of previous seasons, and six trials were undertaken. Super, or a mixture of super and Ephos, are about equally effective. The top dressing of nitrate of soda at 1 cwt. per acre increases yield by about 15 cwt. to 1 ton, and may be considered just about paying. Farmers usually grow a superabundance of rape, so there does not appear to be any particular advantage in further stimulating yield, except where a shortage is likely to be experienced.

(15) *Peas*.—Work on peas has been conducted in two trials for the Field Mycologist. The object of the trials was to determine whether the reduction in incidence of collar-rot by using Semesan would materially affect the yield. Results are not yet to hand.

GENERAL REMARKS.

The energetic and careful way in which experiments have been conducted reflects greatly to the credit of the individual instructors concerned. Labouring under the temporary difficulty of insufficient technical assistance, many of these officers have had to devote long hours outside those ordinarily required of them to the work of experiments.

Grassland Investigations and Plant-breeding.

AGROSTOLOGY.

The transference of the agrostological unit from Wellington and the establishment as a member of the Plant Research Station at Palmerston North took place during the past year. Linked up intimately with the Fields Division extension and instructional service, conveniently placed in regard to the land, and facilitated enormously by car-transport, the outlook for extensive, sustained, and well-co-ordinated grassland research work never looked brighter. Two additional specialist officers have been added to the staff, and, in addition to these, Mr. William Davies, M.Sc., arrived on loan for two years from the Welsh Plant-breeding Station at Aberystwyth. Mr. Davies could not have come to New Zealand at a more opportune moment. We feel his sojourn in New Zealand will be of very great mutual benefit.

Broadly speaking, the threefold aim as a research station is—

(a) To know our grassland species and the exact niche into which each fits. Knowing the behaviour of each species and the requirements of each species, change in pasture-composition may be correctly interpreted. In other words, each grass and each clover is an indication of its own environmental conditions. Species vary in habitat requirement and rearrange themselves in definite small or large association types, each association a contributor to a great mosaic grassland complex, the outcome of variation in condition of the habitat.

(b) To know type or strain within the species. While we are apt to visualize the species as stable or fixed, and to assert replacement and displacement, rise and fall of association types in response to the environment, yet there is unquestionably a species-variation, possibly a product of the environment. Danish cocksfoot differs in colour and form and in persistency from Akaroa cocksfoot; Kentish Wild White differs from Lodino or commercial Dutch White; Hawke's Bay rye-grass differs in growth-form, palatability, and persistency from Southland rye-grass; broad red clover differs greatly in form, persistency, and time of flowering from Cornish Marl or Montgomery red clover. Are these variants exploitable? Can we, as it were, by type or strain selection widen the habitat-range of