

## REPORT OF THE PLANT RESEARCH STATION, PALMERSTON NORTH.

The activities of the Plant Research Station have been well maintained during the past year 1934-35. The appended reports of the several sectional heads outline the main features of the work, and afford a good indication of its wide scope.

As previously, the Department of Agriculture has had the co-operation of the Department of Scientific and Industrial Research in certain parts of the work.

A. H. COCKAYNE, Director.

### AGRONOMY SECTION.

J. W. HADFIELD, Agronomist.

The work of the Agronomy Section deals mainly with investigations and research bearing on seed and crop production. It is undertaken partly at the Plant Research Station, Palmerston North, and partly at the Government Pure Seed Station, Lincoln.

*Potatoes.*—Each year "seed" is raised and sold from the Pure Seed Station. The main objective is the production of pure and relatively virus-free "seed," and in this respect a satisfactory standard is being maintained, and there is a ready demand for the "seed" produced from the 10 acres planted annually. The 1933-34 crop was very satisfactory; the yield of the 1934-35 crop now about to be dug is relatively poor on account of the dry season.

Trials of local Manawatu lines of "seed" were again made, and afforded further evidence of the necessity for growers to purchase certified "seed."

A consignment of South American varieties of potatoes was received from the Imperial Bureau. These were planted rather late in the season, but sufficient "seed" will be secured to carry on. Importations were also made from the United States of America and Scotland.

*Wheat.*—As in the past, pure and smut-free seed wheat of the more important varieties has been raised and distributed by the Pure Seed Station.

A Pure Seed Station selection of Solid Straw Tuscan (13/28) has, for the fourth year in succession, out-yielded College Tuscan by 2 bushels per acre. Unfortunately this characteristic has not been maintained in general field trials. A new variety which has also outyielded College Tuscan is now under field trial for the first time.

Selection work in all varieties continues with the object of raising pure seed. This has been particularly important in the case of Cross 7. A very extensive yield trial of selections from Hunter's II has been continued.

*Oats.*—Steps have been taken to raise pure seed of a number of commercial varieties, and some seed is now for the first time available for distribution.

There is considerable variation to be found in certain varieties, particularly Algerians and Duns, and it will become necessary to test out these variants before seed is increased. This work is progressing in co-operation with the Crop Experimentalist.

Observational trials of a number of varieties of which little is known are being conducted at four centres. Some of these varieties have been imported from Australia. The trials may be regarded as preliminary to any field trials that may be conducted, and permit the elimination of a large proportion of the varieties.

Breeding-work has been commenced, and F2 seed has been harvested of crosses between some of the varieties possessing special characteristics.

*Lucerne.*—Yield trials have been laid down to compare Marlborough with Hunter River, South African, Tivcata, and Subtergrim. The two latter are varieties raised in New Zealand.

Breeding commenced in 1931, and satisfactory progress has been attained. By selfing selected individuals it has been possible to locate parents which have produced satisfactory and vigorous progeny to L2. There has been a steady loss in vigour and seed-production as selfing has advanced, but some families have retained a vigour equal to Marlborough and are extremely uniform in type. The work is progressing along three lines: (a) The parents which have produced the most vigorous inbred progenies—irrespective of type—have been seeded together. The resulting seed has been sown in an increase block and is being subjected to thorough roguing. The progeny of this increase block will give the first bulk selection in 1935-36. (b) Selected parents have been hand-crossed one with another, affording ninety separate crosses. These are to be grown out next season to determine the best combinations from which to build up a second selection. (c) The best of the L2 progenies are to be hand-crossed next season. This is the best breeding material available, and it should be possible to build from it a highly satisfactory type.

The pollination of lucerne is a matter of considerable importance, having as it has a direct bearing on seed production and heterosis. A study has been made of wind and various insects as possible agents in this respect. The great importance of cross-fertilization in its effect upon seed-production and the vigour of the resultant plants has been amply demonstrated. Of the pollinating agents the following have been compared: Humble bee, black honey bee, Italian bee, hybrid honey bee, Carneolan, and Caucasian. The Apiary Instructor, Palmerston North, has co-operated in these trials.

*Rape.*—Mother seed of the two types, Broad Leaf Essex and Giant, is produced each year for distribution to growers who are producing seed. That distributed this season is a blend of selected lines. Next season hybrid seed of the two most promising selections will be available, and following this will be the most promising selections from this cross. Thus an advance is being made each year.

Breeding of rape types is progressing. Crosses between the various types have been made of which F2 seed is available and also F1 seed of back crosses.

*Sweedes and Turnips.*—Investigations regarding varietal nomenclature has been completed and the results offered for publication.

Trials have again been undertaken to compare the yield and purity of New-Zealand-grown certified seed with that of imported seed.