

have been made with varieties of proved resistance. F_2 seed of thirty-three different crosses was raised last season, and arrangements have been made to study the F_2 segregates when grown on club-root infected land in Southland.

Brassica Crosses.—A series of interspecific crosses are affording interesting material, even though their economic possibilities are far from evident.

Lucerne.—The initial study of a large number of plants by means of inbreeding was concluded in 1933-34. The parent plants which consistently gave the best inbred progenies were crossed with one another in 1934-35, the object being to determine the most promising combinations. The F_1 progenies thus secured were studied during 1935-36, and from these the best plants from the best combinations were selected as basic material for strain building. They were grouped and transplanted into isolation blocks last season at Palmerston North, but, unfortunately, owing to the abnormal seasonal conditions virtually no seed was produced, therefore the seeding of these plants will have to be repeated next season.

As already mentioned, the initial study of the parental material necessitated inbreeding, which, owing to loss in vigour and extreme reduction in seed production, was possible in most plants for only two generations. Nevertheless, a high degree of uniformity was attained, and in certain instances was accompanied by little reduction in vigour, indicating the presence of relatively few undesirable factors. The most promising of the L_2 plants were then crossed with other desirable but unrelated L_1 plants, and these progenies have been grown during the last season. As might be expected, the majority have regained normal vigour and in many instances far surpassed in yield the open-pollinated Marlborough used as a control. It is hoped then, by further inbreeding and outcrossing conducted over a series of years, to eliminate most of the undesirable and generally recessive factors and synthesize into one strain the maximum of desirable and the minimum of undesirable factors. In such a strain self-fertilization would result in little, if any, deterioration, and the significance of this is appreciated when it is realized that self-fertilization occurs in the field to an appreciable extent.

Linen.—Owing to an Empire shortage of raw material for the manufacture of linen fabrics and cordage it has become desirable to investigate the possibility of growing linen flax and the manufacture of linen fibre and tow in New Zealand. Four trials were therefore laid down at Palmerston North, Lincoln, Leeston, and Timaru with Liral Crown, a variety bred for fibre production by the Linen Industry Research Association. Yields of straw and seed proved to be well up to English standards, and the trials indicate that production in New Zealand should be profitable, provided that the tests of quality and quantity of fibre in samples sent to England prove satisfactory.

Even if the establishment of manufacturing plants is not immediately undertaken the production of flax-seed for export offers prospects of a promising industry. In view of the dual possibilities ahead—namely, the production of fibre and seed—four tons of seed are now on order. It is anticipated that this quantity will produce enough seed in 1937-38 for the sowing of an area in 1938-39 sufficient to supply the requirements of a factory. Alternatively, the seed produced can be exported.

Vetches and Tares.—Owing to the damage caused by the black aphid, black tares are now rarely grown for seed, the price of which is therefore very high. An increase in the area in legumes is desirable in the grain-growing districts and in orchards, and therefore a new vetch now being multiplied and tested extensively throughout New Zealand is a welcome addition, because it has proved over a number of years to be immune to black aphid. In addition, it is more productive, retains its leaves longer than the black tare, and gives a satisfactory yield of seed.

Soya Beans.—Observational trials of fourteen varieties were laid down in six centres, and at Palmerston North a wider range of varieties were included in a yield trial. Yields of 30 bushels to 35 bushels per acre have been obtained in parts of the North Island and there are no serious difficulties in the cultivation of this crop. It is difficult, however, to visualize its economic possibilities in view of the cheaper production of linseed oil and the ample supplies of protein foods in New Zealand. The quantity likely to be used for baking and domestic purposes would be insufficient to warrant the erection of the necessary plant for processing the beans.

Onions.—Mother seed of several long-keeping varieties of onions is being raised for distribution, and it is anticipated that the general adoption of these varieties will help very materially in reducing the serious wastage that now occurs during storage.

BOTANY SECTION.

(Botanist: Dr. H. H. ALLAN.)

1. *Co-operation Routine.*—As in previous years, assistance has been given to all Departments requiring botanical information and also to the various Divisions of the Plant Research Bureau. The past year has shown the same interest in determination of both indigenous and exotic species, from all the sources previously enumerated, especially from Inspectors of Stock, Instructors in Agriculture, business firms, and educational institutions. Over four thousand specimens have been received and reported on. Considerable additions have been made to the herbarium, partly from the above-mentioned material, partly from collections made by the staff, and partly by exchange. We are indebted to various European and American institutions for material in exchange, and to the Auckland Museum. Of special interest have been a set of specimens of ragwort and allied species from the Royal Botanic Gardens, Kew, and a set of specimens from the Auckland Museum, illustrating some of the taxonomic work of the late Dr. L. Cockayne. Exchange of publications with individual workers has again provided much useful material for the working library. It is pleasant to state that, though many unrecorded weeds have been found by us or brought to our notice, no new weed of very serious importance has come before us this year. Work has been carried out at the herbaria of the Auckland, Wellington, and Dunedin museums in connection with special problems.