

in the North Island. Such preliminary trials permit the immediate elimination of much unpromising material. Anything of promise is further evaluated over a wider range of conditions by the helpful co-operation of the Fields Division of the Department of Agriculture.

(2) *Plant Breeding*.—Plant breeding in any crop is undertaken only after an exhaustive study of the material available in New Zealand, and as far as possible, in overseas countries. Such preliminary work leads not only to the selection of suitable breeding material, but also to the recommendation and distribution of superior varieties and strains already in existence.

In the main, the breeding technique follows that adopted by other plant-breeding stations, but has necessarily to be moulded to local requirements and to the facilities available.

(3) *Pure Seed Production*.—The purification and distribution of existing varieties and of material introduced or raised by the Division is a very necessary and important phase of crop improvement. Such material serves as foundation stock for increase and distribution under the Government scheme of seed certification. Whereas in the past activities have been more specifically confined to the purification and distribution of standard commercial varieties, attention is now being diverted to a more useful phase—namely, the distribution of varieties of proved merit not previously grown in New Zealand. This is due directly to the plant breeding and plant introduction activities of this and other Divisions.

Although the demand for seed is always far in excess of what can be produced it is nevertheless intended to adhere strictly to the production only of nucleus stocks of the highest standard of purity. The co-operation of the Canterbury Agricultural College in once growing these nucleus lots, and subsequently of the Department of Agriculture in its certification scheme, permit of an ideal organization of controlled distribution.

FIELD CROPS.

Wheat.—This Division is concerned only in the multiplication and distribution of pure seed wheat. This is raised from single plant selections, which are multiplied individually for two seasons to ensure non-segregation, and then bulked. The control of loose and stinking smuts by means of hot-water treatment is an important factor.

Activities have now been almost entirely diverted from the distribution of standard varieties to that of new introductions. New wheats now being increased include Tainui and Taiaroa—two early spring varieties selected from Portuguese wheats by the Wheat Research Institute—and Ben Cubbin, a variety introduced from West Australia by a New Zealand farmer, which has gained popularity in the Oamaru district. Also included is Lin Cabel, an Argentine variety propagated by this Division, which, owing to its outstanding performance, is to be increased as rapidly as possible. In field trials it has either equalled or exceeded in yield the standard variety Solid-straw Tuscan, and its baking quality is exceptionally good. A farinograph report on seed raised by this Division at Lincoln last season indicated its quality as being superior to any New-Zealand-grown wheat previously tested and equal to the best wheat grown in Canada.

Reselections of Hunters I and Hunters II have been made with a view to distribution under certification. Hunters II has been released this season, and Hunters I will follow next season.

In view of the interest in vernalization, trials were undertaken this past season with two spring and two autumn wheats, each of which was vernalized for eleven, eighteen, and twenty-five days and sown in late spring. In all cases maturity has hastened in proportion to the length of vernalization, but the extent to which this was induced by twenty-five days' treatment was insufficient to be regarded as having any economic significance.

Oats.—Pure seed of Gartons Abundance, Resistance, Algerians, and Duns has been raised and distributed.

Observational trials of twenty-eight varieties, mostly recent introductions, were carried out at three centres, and the same series was grown in a hand-sown replicated yield trial at Lincoln. Field trials of six promising varieties were undertaken at Lincoln and in five other centres by the Fields Division. In addition, the variety Resistance was grown on ten farms in Southland for comparison with the farmer's own variety. Resistance is a winter variety raised by the National Institute of Agricultural Botany, Cambridge, and introduced in 1925. In all trials it has outyielded every other variety, and owing to its winter hardiness and strength of straw it promises to become a very important variety for the South Island. It is yet too early to suggest that it might entirely replace Gartons Abundance as the standard white oat, owing to the somewhat higher proportion of husk to kernel and a correspondingly lower bushel weight. Anthony is a new variety of promise resembling Resistance, but less susceptible to rust.

Black Supreme has given consistently good results and is likely to become a popular black oat. There is no demand for Ruakura, although it is proving an excellent rust-resistant parent for breeding purposes. Lampton is highly resistant to rust and smut and is being used as a breeding parent, but in other respects fails as a commercial oat. Certain Algerian selections recently introduced from New South Wales are showing promise.

Breeding work has been confined to Ruakura $\times$ Lampton, Ruakura $\times$ Gartons, and Ruakura $\times$ Algerians. F_4 seed is now being threshed from segregates of these crosses, some of which are showing distinct promise. Selections within these segregates are being carried out at Palmerston North and Lincoln independently for North and South Island conditions respectively. The selection of an oat suitable for the North Island is restricted to one that can be grown profitably in the seed-producing districts.