

RESEARCH ON FIELD CROPS

Oats.—Lodging in oats is a serious defect of the chief milling varieties, especially under the high-rainfall conditions in Southland, where they are principally grown. An older breeding project in which Resistance was used in combination with New Zealand standard varieties has not proved successful. More recently S. 172, a specially short and stiff-strawed oat from the Welsh Plant Breeding Station at Aberystwyth, has been used as the lodging-resistant parent. In future, selection will be carried out both at Lincoln and in Southland.

Breeding for resistance to the oat rusts, which frequently cause considerable damage to oat crops over wide areas, has been intensified.

Barley.—The barley experiments were transferred from Lincoln to a leased area at Ellesmere, where conditions are more typical of the barley-growing areas. Work on the re-selection of Research barley has been continued, as has been the selection work on the hybrid material from crosses of Scandinavian and English barleys.

Rape.—The demand for club-root-resistant rape has continued to increase. A higher-yielding, earlier-maturing club-root-resistant strain is the objective of a selection programme in the cross, club-root-resistant \times Broad Leaf Essex. Twenty-three plants of the desired type were selected from a heavily club-root-infected area at Winton. This strain is not yet fixed either for type or for resistance.

From a cross between club-root-resistant rape and aphid-resistant swede, 2 out of 78 plants survived a heavy aphid attack, and they will be used to build up a rape that is resistant to aphid as well as club-root.

Kale.—The hybrid between giant chou moellier and thousand-headed kale again performed creditably in trials at Gore and Lincoln, giving a higher leaf-yield than either parent, and a stem-yield comparable with that of giant chou moellier. A population derived from the crossing of leafy chou moelliers gave a high leaf-yield and good total yield in both localities. Both these hybrids have also shown great promise in observational trials; the results of the Department of Agriculture trials this season will finally decide which of them will be distributed to farmers.

Swedes.—The cross Calder \times Danish Giant shows promise of high yield and tolerance of dry conditions.

The mechanism of field resistance to aphids exhibited by Calder and Sensation is being investigated. Aphids reproduce more slowly on resistant varieties, which, however, succumb if the initial infection is abnormally heavy.

Potatoes.—The glasshouses for potato research at Lincoln are nearing completion. They will be used for the production of virus-free seed of standard varieties and for the breeding of new varieties immune from, or at least resistant to, blight (*Phytophthora infestans*) and virus disease.

Several potato varieties imported from Scotland and from the U.S.A. have remained free from late blight in trials at Pukekohe when standard varieties alongside were quickly killed by this disease. Their yield and quality are very promising.

Dormancy-inducing hormones applied to tubers were highly successful in retarding sprouting, but are still rather expensive for general application.

2, 4, 5-trichlorophenoxyacetic acid applied to the foliage during flowering induced dormancy in the tubers, but when strong enough to have any worthwhile effect also reduced yield and had a deleterious effect upon tuber shape.