White-flowered mutants found in a crop of sweet blues have been grown on, and have proved to be low in alkaloid. These are being grown on again for comparison with the sweet blues for fodder-production and alkaloid content. If equal in these respects, their potential value lies in the fact that the difference in flower colour would greatly simplify certification in the future.

### Linen Flax

*Pure-seed Production.*—Nucleus areas of Liral Crown, Liral Prince, and Stormont Cirrus were grown during the past season. In all cases the seed sown was hot-water treated to free it from disease. A continual output of seed raised from single plant selections appears to be a matter of the greatest importance to the industry, for the following reasons:—

(i) The present improved varieties are of very recent origin and are not fixed:
(ii) High seed-production appears to be antagonistic to production of high quantity and quality of fibre:
(iii) In a mixed population the high-seed-producing plants must rapidly increase in numbers in relation to those that produce few seeds but much and good fibre. Therefore, continual selection of fibre types is essential.

*Variety Testing.*—This is being continued on a diminished scale, because the varieties Liral Crown, Liral Prince, and Stormont Cirrus (in order of increasing value) appear to be as good as anything in sight, and seed of these is being increased as rapidly as possible for distribution. Further, it is believed that any improvement must be in the direction of resistance to disease.

*Breeding.*—The dominant requirement is for a variety that is resistant to rust. Rust seems likely to be a serious limiting factor in flax-production, and is, so far as one can judge at present, by far the most important disease in the country. Other diseases that must be considered in any programme of breeding for resistance are browning (*Polyspora lini*), wilt (*Fusarium lini* and possibly other fusaria), seedling blight (*Colletotrichum lini*), pasmo (*Sphaerella linorum*), and *Phoma* spp.

Many crosses have been made between the best fibre varieties and Rio, a seed variety that is immune from rust and highly resistant to browning and wilt.

None of the first crosses appear to be worth considering as a fibre flax. Some back crosses to fibre varieties made last season are at present under test by the Plant Diseases Division, and if satisfactory from the disease point of view will be further tested for fibre-production. Many additional back crosses have been made this season, and will be tested next season.

*Manurial Trials.*—Advice received from England strongly suggests the possibility that microscopic examination of sections of flax stems and/or fibre specimens may be a valuable guide to fibre quality. With this in view a series of field plots were laid down to test the effect on quality of N, P, K, Ca, boron, magnesium, and manganese. Unfortunately, the season was so dry that growth was extremely poor and the average height of the plots at harvest was only 14 in., so that no useful results can be expected.

A further experiment was laid down in pots in a glasshouse, using two parts of soil to one part of quartz sand, and the same nutrients as above. An additional pot trial was laid down using pure washed quartz sand, and the same nutrients plus sodium chloride, zinc, copper, and iron. The results are not yet available.

*Weed Control.*—In the variety trial twenty-six plots were sprayed with a 2 per cent. Sinox (sodium dinitro-ortho-cresylate) solution at approximately 100 gallons per acre, and four plots were left unsprayed as a control. The plots were drilled on the 15th November, the spray applied on the 6th December, and counts were made of the number of plants per foot of row on the 23rd December. There was no reduction in the number of plants in the sprayed plots compared with the controls. The control of fat-hen, on the other hand, was most striking. By harvest, a considerable number of weeds had appeared in the sprayed plots from germination after spraying, but the extent of control can be gauged from the total crop yield of 20·2 cwt. per acre on the sprayed plots, compared with 11·2 cwt. on the unsprayed plots.

Sinox has no toxic effect on the ground (this is confirmed by other experiments here and by American reports), and thus will not prevent the development of weeds that germinate after spraying. Unfortunately, in heavily-infested land fat-hen continues to germinate throughout the season, so that complete control by spraying cannot be expected. Nevertheless, the advantage to the crop of freeing it from weed competition in the early stages is so great as to make spraying with Sinox an essential part of our flax-production programme.

The cost of materials for spraying at the above rate works out at £1 5s. per acre.

### Linseed

Work on linseed has been limited to developing a pure line of Rio from the Division's rather mixed material by single-plant selection, and to producing an equally disease-resistant variety but with longer straw by crossing it with long-strawed fibre varieties.

Forty-five varieties and selections from Australia were grown in a nursery for observations on disease resistance. Unfortunately, from this point of view, the season was not favourable, and no disease developed.

### Lucerne

Intensive breeding-work on lucerne has been temporarily suspended and efforts have been directed mainly to testing and increasing the first pedigree strain known at present as Strain B. Favourable reports on the behaviour of this strain have been received both from within New Zealand and from overseas. A seed-increase area of approximately 10 acres was grown during the past season by Lincoln College.

Additional observations were recorded on the spreading species, *Medicago glutinosa*, and selections were made for the development of a mass selected strain.