

In the present state of our knowledge it appears that varieties with inherently fine fibre are likely to produce a smaller crop of leaf and fibre per acre than coarser-fibred varieties. This is because the fineness of the fibre in the blade of the leaf is related to leaf thickness, each undamaged fibre strand running from the upper surface to the lower surface of the leaf. Fine-fibred varieties therefore tend to be thin-leaved varieties, and, unless more leaves are produced, there must be a lower yield per acre. It is on such points as this that fundamental research is needed concerning the structure and growth of *Phormium* leaves.

In the milling tests of plants of group (a) mentioned above, very interesting results were also obtained, although it must be realized that the purpose of this section of the work (inbreeding) is not to provide immediate supplies of plants for commercial work. The aim is to choose good plants in each generation and to self-pollinate them generation after generation until we find plants which produce seedlings only of the desired type. By suitable crosses between such selected seedlings we should obtain hybrid seedlings which will be vigorous in growth and uniform in type. The improved varieties of the distant future are likely to be bred in this way, just as they have already been in older-established crops.

On the whole the inbred varieties noted above produced seedlings with a general resemblance to their parent plants. A large proportion of the seedlings were inferior to the parents, and a very small proportion equal or superior. These few good seedlings are retained for inbreeding in their turn. Seedlings of variety No. 212 yielded the best coloured fibre which we have seen from *Phormium*; but the plants themselves showed in some cases 100 per cent. mortality when broken up for propagation. This is obviously a case in which it will later be necessary to combine the good colour of these plants with the greater vigour of others.

After the milling tests of the above three types of plants were complete, those bushes which had given good results were broken up for propagation. Three acres were planted at the Easton area from this source, and others were set out in the College area. The bushes rejected after milling tests were given to a flaxmilling firm for removal to a commercial area.

Growth of plants newly set out at the College this year has been just as phenomenal as of those at the Easton area. Many single "fans" set out in September have already produced four, five, or six younger fans.

This year again there are a considerable number of bushes (hybrids and pedigree plants) which need to be tested and propagated.

PEDIGREE-PLANT WORK.

A student was engaged as temporary assistant in the summer with a view to carrying out an intensive programme of self-pollination and cross-pollination. Unfortunately, no flowers were produced by any of the bushes involved. Only three varieties, including No. 56 and No. 273, produced flowers. All except those on No. 56 were destroyed, and slightly over 3 lb. of seed was obtained by natural self-pollination of eight inflorescences on this variety. As all the bushes of No. 56 in the College area have been propagated vegetatively since 1928 from one plant, we have here very complete evidence that this variety of *Phormium tenax* is definitely self-fertile.

The 3 lb. of seed from No. 56 and 12 oz. from bushes of No. 273 in another district have been sown to produce plants for immediate commercial requirements. About 100,000 seedlings should be produced.

It would be of great practical value for breeding work if one could forecast years of scanty flowering in *Phormium*. The Maori was accustomed to associate abundant flowering of this species with drier summers, and the Maori had every reason to take careful note, as he used the nectar from the flowers. From statements made by flax-millers in 1928, the summer of 1925-26 resembled that of 1936-37 in the scarcity of *Phormium* flowers. The suggestion of some relation to a supposed eleven-year weather cycle is obvious.

Interesting results have been noted in the growth of *Phormium* after cutting. Some bushes hook-cut in the usual manner in September, 1935, had grown again by March, 1937, to a height of 9 ft., and were apparently ready for cutting again. Thus in eighteen months from cutting a new crop was ready, instead of at the usual cutting interval of three or four years. The possibility of cutting more frequently and securing greatly increased yields is a very attractive one. There were, however, four conditions in the above case which are not always met with in combination, namely:—

- (a) The plants were hybrids and were likely therefore to grow rather more vigorously than many others.
- (b) The land was fairly clean—i.e., there was no growth of tall fescue, &c., to compete with the *Phormium*.
- (c) Cutting in spring and summer months promotes better regrowth than cutting in autumn or winter months.
- (d) The original cutting was probably not so severe as is often the case in commercial areas, where the cutter is paid for the weight he cuts, and therefore includes as much fleshy leaf-base as possible.

Similar rapid regrowth has, of course, been recorded in commercial areas, but the above case is given as a specific example to indicate the possibilities of increased yield, and the need for systematic and prolonged yield trials under various conditions of growing and cutting.

COLLECTION OF VARIETIES.

The collection of plants of new varieties for propagation has already been mentioned in connection with the Easton area. Only some ten new varieties (Nos. 301, 302, 303, 310, 311, 312, 313, 314, 315, and 316) were collected, but in several cases hundreds of roots of each were secured. In addition to securing new varieties, large numbers of plants of other varieties (S.S., No. 273, No. 56, No. 22, Pare-taniwha, &c.) were procured. It is a pleasure to record the fine spirit which prompted so many property-owners to denote their plants for removal in the course of this work.