Numbers of other excellent varieties, including No. 159 (S.S.), No. 22, and No. 37, have been propagated by fans, so that in about two years there will be enough of each to plant 1 acre and at the same time provide a bulk sample of fibre for commercial trials. These three are all characterized by great strength of fibre and apparently by resistance to disease. No. 37 in particular promises to yield a heavy crop.

Numbers of other promising varieties are now grown to mature bushes, and should be tested at a mill next season before propagating them further.

This aspect of the work—namely, the collection of promising plants—should not be regarded in the least as being complete. There is now available sound knowledge on the sources of desirable varieties, and as soon as financial considerations permit further collecting should be done. This matter is rather urgent, since the plants in these particular spots are rapidly being destroyed.

3. *Inbreeding of Varieties; Pedigree Seedlings.*—The testing of seedling plants from different varieties was the second aspect of the original scheme. The object of this part of the work was to find whether or not any of the better-quality varieties could be grown from seed with a reasonable chance of securing trueness to the type of the parent bush. It has already been reported that no flax plant has yet been found which can be considered to breed true from seed. The pedigree seedlings are now almost mature bushes, and the above statement can be amplified. In general it may be said that there is a very marked similarity between parent and offspring in such features as vigour and habit of growth and in date of flowering. Rows of seedlings from one parent show a marked uniformity in these respects, and usually can, in bulk, be readily distinguished from adjacent rows of seedlings from other parents. Closer examination, however, reveals considerable differences amongst seedling plants of an apparently uniform row. As an instance may be taken the date of flowering. Observations last year showed that in an area of one variety (Ngaro) planted out from fans, the one hundred or so flowering stalks reached the same stage of development within a total range of time of four or five days. On the other hand, within any one row of seedlings from a given parent, there was usually a range of about three weeks in the development of stalks on the various plants.

In other characters, such as vigour and habit of growth and colour of leaf edge, there are also differences to be found within each row of pedigree seedlings. Such differences will be noticed only on close examination, and to a casual observer it might well appear that these varieties breed quite true to type. Without careful milling-tests of hundreds of individual plants we cannot say to what extent these seedling plants are true to type in the most important feature of all—namely, fibre-quality.

The above conclusions regarding inheritance are true only so far as most varieties are concerned. Certain other varieties are characterized by a more obvious failure to breed true. These varieties include, unfortunately, the best fibre plants so far found. The seedlings show extremely wide variations in habit and vigour of growth, in colour, and in fibre-quality. Not 1 per cent. of the progeny could be said to resemble the parent. The extent of this variation naturally emphasizes the need for vegetative reproduction by fans if a uniform and high-grade crop is to be produced. At the same time, by repeated inbreeding, there may in the long-run be secured progeny of the required quality which will breed true from seed. Such work is being carried on, but results cannot be expected in less than another five years.

From another point of view also this inbreeding work is necessary. In order to build up hybrid strains combining all possible desirable features it is necessary, first of all, to secure as parent, plants for crossing varieties those which contain only certain inherent qualities. For instance, as one parent of a cross, a plant might be needed which could be relied on to confer disease-resistance and fibre-strength on all the offspring; as the other parent would be needed a plant which would throw only high-yielding seedlings. It is only by inbreeding and careful testing over many years that this stage can be reached. In addition, by careful testing of inbred plants it should be possible to find out the manner in which important characters are inherited. Such knowledge provides eventually the most reliable method of building up new hybrid strains. At present, for example, it is not known how fibre-strength is inherited. Strong-fibred plants often throw many weak-fibred seedlings, but it is not known if a weak-fibred plant can throw strong-fibred seedlings. Nor can the result of crossing a weak-fibred with a strong-fibred plant be predicted. All this information must be obtained by careful breeding, testing, and recording—a most laborious task when thousands of plants must each be tested and recorded separately.

Regarding the inheritance of certain characters such as leaf-colour, which can be studied without extra help or expenditure, steady progress is being made, and it is hoped that a paper on the subject may be published in the next year or two. The fact that Phormium plants rarely flower before the age of five years makes the work comparatively slow.

4. *Hybridization.*—The third section of the breeding-work is that concerned with the raising of new and superior plants by hybridization. This part of the work has been pushed forward most energetically and about twenty thousand seedling hybrid plants aged from one year to five years have been raised. These represent the best plants from a still greater number, for at about the age of two years all but some 10 per cent. of the best hybrid seedlings are destroyed. Twenty or thirty of the oldest hybrids are now ready to be tested and, if suitable, to be broken up and set out for a further test of yield and resistant to disease.

Some of the crossing has been done chiefly with a view to obtaining information on the inheritance of various characters—knowledge which will at a later stage hasten the work of producing superior hybrid plants. One type of hybrid which is very interesting and likely to be useful is that between *Phormium tenax* (the fibrous species) and *Phormium Colensoi* (so-called mountain flax). It has long been obvious that these two species must inter-cross in nature, but now well-grown plants resulting from artificial pollination of *P. Colensoi* by *P. tenax* have been raised. These plants are definitely much more vigorous in growth than other seedlings resulting from self-pollination of the same plant of *P. Colensoi*. In such features as leaf-edge and fibre-strength they appear to be roughly intermediate.