

previous cutting. The average leaf-yield was 182 lb. per bush. The leaf was of good length and was remarkably free from dead, diseased, or short leaves. The regrowth from August to date (31st March, 1938) has been quite as good as previously, and it appears that the above yield can be maintained unless disease interferes.

It is interesting to consider the implications of this yield per bush. The bushes in question are in one row and are spaced approximately 6 ft. apart (centre to centre). In the two years of their regrowth they had a row of bushes at about the same stage of growth some 11 ft. away on one side. On the other side were young plants within about the same distance (11 ft.). It is therefore difficult to assign any definite spacing to these plants.

A yield of 182 lb. per bush every two years would be equivalent to 30 tons per acre in that time if 370 bushes per acre could be grown—allowing for a spacing such as 6 ft. 6 in. by 18 ft. This is a spacing which should be ample to reproduce the above results in growth.

Such a yield (30 tons) per acre each two years is about twice as much as is considered an excellent yield at present, and if it could be realized in practice would greatly reduce growing costs. As pointed out in last year's report, these results are likely to be obtained only when vigorous, selected hybrid plants and other conditions are combined. These problems need systematic large-scale experiments if progress is to continue.

The second cutting trial, though only a rough one, illustrates the part played in leaf-yield by one of the factors—namely, hybrid vigour—concerned in the previous test. A long row was planted some four years ago with unselected seedlings of S.S., of Ngaro, and of hybrids (Ng. $\times$ S.S.) from the crossing of these varieties. When they grew in size and began to crowd one another, the seedlings were thinned out to about 3 ft. apart, this thinning having in some measure the effect of culling. When cut the leaf from each bush was weighed and the following results were obtained :—

Twelve S.S. seedlings averaged 74 lb. of leaf each.

Fifteen Ngaro seedlings averaged 107 lb. of leaf each.

Fourteen hybrid seedlings averaged 138 lb. of leaf each.

There were no sufficient differences of soil or other conditions to explain these variations in yield, and one can only conclude that the hybrid plants grow more vigorously than the others.

Where fibre-quality is concerned, the milling-tests gave most satisfactory results, though it must always be realized that only the better bushes, as indicated by hand-stripping tests, are usually submitted to milling-tests.

The following table shows the grading figures allotted to ninety-four samples of the Ngaro by S.S. hybrids, and to thirty-eight samples of Ngaro seedlings. All grading was done by Mr. E. W. Sutton, mill-manager to Messrs. Ross, Rough, and Co., Ltd.

GRADING POINTS AWARDED TO SAMPLES OF FIBRE FROM HYBRID AND INBRED BUSHES.

				98 Points.	93-96 Points.	90-92 Points.	89 Points or less.
				Bushes.	Bushes.	Bushes.	Bushes.
Ng. $\times$ S.S. hybrids	..	..	..	13	37	33	11
Ngaro seedlings	..	..	..	4	12	13	9

For the sake of comparison it may be noted that the grade of which most is exported is "high-fair," graded at 65-69 points.

All the hybrid plants which gave fibre grading at 95 or better have been broken up and set out for vegetative reproduction. A considerable number of them were sent to Westport for growing on pakihi land in manurial trials carried out by the Cawthron Institute.

The high-testing Ngaro seedlings are being kept for further inbreeding and crossing experiments in an endeavour to raise still better hybrid plants.

Growth in general has been good at this area. There is at present extreme congestion because of the large number of plants now ready for setting out from the nursery stage. These include 20,000 two-year-old hybrids of Ngaro and S.S.

BREEDING-WORK.

At the request of the Flax Plan Industrial Committee intensive crossing of Ngaro by S.S. was carried out. The amount of flowering on Ngaro was exceptionally low, there being about fifty inflorescences on 20 acres. Flowers on these stalks were emasculated by hand and then pollinated with S.S. pollen collected by Mr. Alfred Seifert's permission from bushes of that variety near Shannon. Altogether some 14 lb. of seed was procured in this way, and a test showed that there were nearly 38,000 seeds to the pound.

Cross-pollination was also carried out as indicated below, the amount of seed being shown also :—

Variety 156 by Ngaro	..	..	..	..	9 oz.
Variety S.S. by Ngaro	..	..	..	..	1 oz.
Variety 273 by 56	..	..	..	..	Small quantity.
Variety 156 by 317	..	..	..	..	"
Variety 156 by 56	..	..	..	..	"
Variety 317 by 56	..	..	..	..	"

From open pollination 40 lb. of seed was obtained from fifty bushes of Variety 273, and 11 lb. from eighteen bushes of Variety 56.