

out, being then 5 inches high. On the 1st of August, *Manunu* had four or five leaves of an average height of 9 inches. *Parekoritawa* (variegated) had as many leaves, which were stronger, being 1 foot in length and half-an-inch broad, but there were no signs of variegation. *Huhiroa*, same number of leaves, but weaker and membranous, and not more than 4 inches long. *Takaiaapu* and *Raumoa*, leaves 5 or 6 inches larger, and a-quarter of an inch broad. *Atiraukawa* and *Korako*, same as *Huhiroa*.

300 sets, of fourteen varieties, from Mr. Hulke's nursery, at New Plymouth, were planted in April, after having been out of the ground for nearly three months, and they are now beginning to sprout; but 100 sets from Wanganui, planted a little later, in very wet ground, have not yet made a start.

At St. John's College, near Auckland, there is a quantity of *Rataroa*, one of the strongest varieties of *Tihore*, procured by Bishop Selwyn, from the East Cape, some twenty-five years ago. It was planted in a gully, which had been drained; the upper part was quite dry, but a small stream of water flowed from springs lower down. All the sets have multiplied greatly, and now form large bushes, with as many as 100 fans; but there are rarely more than six perfect leaves on each fan, the seventh and eighth being quite unfit for manufacture. The leaves of those sets that were planted in the moister ground are very much longer and stouter than the others, reaching a length of 8 and 9 feet, whilst those in the driest parts, and by the side of the hill, are barely 3 feet high. There does not appear to be any difference in the quality of the fibre, and both large and small leaves are stripped with equal facility by the Maoris. The more luxuriant leaves have a deeper and richer green colour, but in shape and colour of the edge and keel they remain alike.

As this plantation afforded a good opportunity for making experiments as to the strength and quantity of fibre, from leaves of different ages, a Native was employed to dress some of the flax; the leaves were cut for him, and kept in separate bundles, so that they should not be mixed.

STRENGTH OF FIBRE FROM LEAVES OF DIFFERENT AGES.

After stripping and cleaning, some of the hanks were boiled in soap and water for an hour, without improving the appearance and texture in any way; some were washed and rinsed in warm soap and water for a few minutes, and this both softened the fibre and improved the colour; others were soaked in cold water (repeatedly changed) for different periods, from twelve hours to five days; but the longer they were kept in soak, the worse the colour became.

A few of the centre immature leaves were stripped, and the fibre was very white, soft, and silky, equal to any of the best samples of Native-dressed, which have probably been prepared from young leaves of this kind, and could not, therefore, be obtained in any quantity, even if the natives were disposed to supply it. On being tested for strength, twisted tightly into a double strand in the usual manner, it was found that the fibre of these half-grown plants bore a greater average strain than any of the others, as follows:—

Centre leaf; breaking strain	...	...	...	...	...	81
1st. pair leaves	„	...	...	...	...	70
2nd. „	„	...	...	...	...	72
3rd. „	„	...	...	...	...	78

As it was impossible that these immature fibres could be as strong as those that were fully grown, it was conjectured that their softness had enabled them to bear a greater torsion, and the strands were then tried without being twisted at all; and though the young fibre proved, as was expected, to be the weakest, yet the whole of the strands bore a considerably greater strain than when in their twisted state, so that it was found necessary to reduce the fibre to one-half, as the spring balance then in use, which weighed up to 300 lbs. only, was not strong enough to break the full quantity of 20 grains to 1 foot. The result was, that an untwisted, single strand, of 10 grains to a foot, broke as follows, the results, as in former cases, being reduced to the standard of Manilla, equal to 100.

Fibre of centre immature leaf; breaking strain	...	...	...	...	104
1st. pair of leaves	...	...	...	...	122
2nd. „	...	...	...	...	116
3rd. „	...	...	...	...	113

Since then, a different adjustment has been made with the machine, and double strands of Native-dressed *Rataroa*, slightly twisted, have borne the following strain before breaking:—

1st pair of leaves; breaking strain	...	...	...	...	104
2nd. „	„	...	...	...	104
3rd. „	„	...	...	...	110

These are averages of many trials. The maximum strain was 129, showing that some of the *Phormium* is far stronger than Manilla, or any other fibre of the hemp class.

Another trial was made with fibre of the same variety, stripped by White's machine, with the following result:—

1st. pair of leaves; breaking strain	...	...	...	...	87
2nd. „	„	...	...	...	79
3rd. „	„	...	...	...	81

QUANTITY OF FIBRE IN DIFFERENT AGED LEAVES.

To ascertain the relative quantity of fibre, seven leaves of each growth were taken from the same plants, weighed, and passed through White's stripping machine.

1st. pair leaves, weighing 16 oz., gave 4 oz. of fibre	...	25 per cent.
2nd. „ „ 20 oz., gave 4½ oz.	...	22 5 „
3rd. „ „ 12 oz., gave 2½ oz.	...	18.7 „

As these fibres were not thoroughly cleaned, and a great deal of vegetable tissue still adhered to them, this experiment only showed that the relative quantity was greatest in the youngest leaves; and a more exact trial was made in the laboratory with leaves of the *Manunu*, which gave from the half of the

1st. leaf, weighing 50.1 grammes, 7.77 grs. of fibre	...	15.51 per cent.
2nd. leaf „ 60.0 „ 10.50 grs. „	...	17.18 „
3rd. leaf „ 54.3 „ 8.30 grs. „	...	15.28 „