

corroded, discoloured, and weakened; and in the latter, done such violence to by abrasion and waste, while the gum is but imperfectly removed, that much deterioration is the effect, if not utter uselessness, except for paper pulp.

It would be superfluous here, however, to detail the several modes of treating the *Linum* for the separation of its fibre; suffice it to say, that to dissolve the gummy substance surrounding the fibre in order to detach the latter intact, or nearly so, and render it fit for manufacturing purposes, is the great object of all who desire to produce an article possessing the necessary conditions of fineness, flexibility, and strength. This is also the main difficulty with the *Phormium*, for the relative organic differences already described interpose greater obstacles in the way of attaining with the latter so speedy a result as is experienced with the former.

The real question, therefore, is, what is the best process, as a whole, for producing from the *Phormium tenax*, with the least waste and expense, a clean, soft, and flexible fibre, unimpaired in its strength, of good colour, and of an average length of four and a quarter feet? Such are the conditions of the quality of an article that will be safe and profitable to export to Europe, and by which, no doubt, the merchants of New Zealand will be guided in their dealings with it.

To realize such a result, the following process will be found economical and effective:—

*Proposed Method of treating the Phormium tenax.*

1st. Cut the leaves from four and a half to five feet long. There is no necessity to cut them longer as they will dress to four and four and a half feet, long enough for any manufacturing purpose; they are also more easily scutched and hackled than if longer; besides, the plant is economized, and left with sufficient portions of the old leaves to nurture the young ones coming on.

2nd. Immediately, if possible, but at latest within twenty-four hours after being cut, the leaves should be subjected to compression, either through rollers, or by percussive action under stampers—a combination of both is the best—which in no way injures the fibre, but greatly assists in breaking up the parenchyma, and furthering its decomposition in the next operation.

3rd. If the climate of New Zealand was less liable to extreme fluctuations of temperature, particularly between day and night, the common *retting* process adopted with the *Linum*, causing by slow and regular fermentation a gradual decomposition of the gummy nitrogenous compound cementing the fibres, would be equally efficacious with the *Phormium*, but it will be found to suit the latter only in the summer months, for the frequent variations of temperature experienced, while this method was lately attempted, have obliged its abandonment in favour of steeping in wooden vats under cover.

To carry on, therefore, the process uninterruptedly throughout the year, a series of vats or ponds, according to the quantity to be operated on, and under cover, are necessary, wherein the flax is to be immersed in warm soft water, maintained at an average temperature of 90° until fermentation has subsided, and the gummy matter appears of easy separation from the fibre. This will take from six to nine days, and require careful attention, *but the value of the fibre, and the profit it yields*, depend more on the manner in which it is performed, than on any other of the operations necessary for its preparation.

It may be here supposed that these two last operations are both tedious and costly, but in the end they will be found neither the one nor the other. They are besides equally practicable and advantageous, whether in the case of one acre or 1,000, as will be pointed out hereafter. It is surprising, however, they should be so much overlooked, and stripping drum machines used instead, that not only mutilate and waste the fibre, but leave much glutinous matter behind in a state highly conducive to spontaneous combustion, and which no subsequent dressing will sufficiently remove. Similar means have hitherto failed to effect the same purpose with the *Linum*; and how much more are they likely to fail with the *Phormium*, where the cellular and fibrous tissues are in far more intimate union?

4th. On taking the leaves out of the steeping vats or ponds, rinse them in a running stream, or under a *douche* of water.

5th. Spread them on grass to bleach from ten to fourteen days, and then hang them under cover, if weather damp, on rails or wire ropes, for three or four days to dry.

6th. When thoroughly bleached and dried, pass them through bruising rollers, or under stampers, to loosen any remaining portions of the gum or epidermis.

7th. Scutch. This process is effected by a different machine, less liable to ravel the fibres and convert so much of them into tow, than the one in general use.

8th. Rough hackle, if better quality required.

9th. Fold in hanks of equal weight.

10th. Pack in bales of two hundredweight, and press same as wool.

*Applicability of the Process to Small and Remote Settlers.*

There is a class of small and, in many cases, remote settlers throughout the Colony, having a few acres of flax on their sections, who might profitably employ themselves and their families in the preparation of its fibre at leisure times, now spent by many of them in enforced idleness. To enable such persons to *produce three pounds of dressed flax per hour per individual employed*, which by a little skill and arrangement should be easily attained, an apparatus costing from £6 to £8 would be all that would be necessary. By this means many families could produce, according to their numbers, from a half to one hundredweight of fibre per week, worth at least at the rate of £20 to £25 per ton, besides fifteen pounds to thirty pounds of tow, worth 1s. 9d. per stone,† and thereby supplement their otherwise scanty means, as well as train their children at the same time in habits of industry and order.

How can this be initiated? is a question which no doubt will arise in the minds of many. To suggest, therefore, what would perhaps be a feasible means of realizing the object now under contem-

\* This will leave sufficient margin for manufacturers fine-dressing the fibre down to three and a half feet, the necessary length for the manufacture of rope, whether by hand or machinery, as well as for its adaptation for other uses.

† Since the above was written, the *Otago Weekly Times*, of 27th November, 1869, received at the Nelson Institute, quotes flax auction sales at above prices in Dunedin.