

motive power), pine-oil, tar, resin, dyes, tannin, &c., might be obtained from these waste products; and, finally, the wood-pulp industry might well be carried on in conjunction with timber-milling.

At the present time the only timbers that are milled are kauri, totara, rimu (or red-pine), kahikatea (or white-pine), matai (or black-pine), miro (in some places it is cut up, and the boards dispersed and sold with other timbers), and to a small extent silver-pine.

There are many other of our forest-trees (now neglected) which would be of value were the industries for which they are useful well established in the country. The mountain-cedar (*Libocedrus Bidwillii*), which grows in great quantity in the Waimarino forests, could be used for all purposes for which Australian and Asiatic cedar are used; so, also could the other cedar, the kohekohe (*Dysoxylum spectabile*), which is plentiful in Auckland forests; the pukatea (*Laurelia novæ-zealandiæ*), the kamahi (*Weinmannia racemosa*), the mangeao (*Litsea calicaris*), the titoki (*Alectryon excelsum*), and the hinau (*Elæocarpus dentatus*) are all valuable for furniture, coachbuilding, and like purposes; maire (*Olea Cunninghamii* and *lanceolata*) are equal to lignum vitæ; and the different kinds of *Fagus* in other countries would all be used. In this country, however, all these trees are being cut down by the pioneer, their charred barrels remaining as an encumbrance to the land till years of exposure have finally caused their decay.

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(3.) WESTLAND DISTRICT.

This report deals specially with the Arnold Valley timber areas, Mawheranui, Hohonu, and Brunner Survey Districts, hitherto the most prolific source of supply of timber in Westland.

To work forests on this coast profitably at present prices, it is necessary that the sawmill should be on, or of easy access to, a railway, with speedy delivery to a port capable of fair-sized vessels. The milling-bush must be close to the mill, in order that there shall not be the outlay on, and the upkeep of, a long distance of dead tram; though, once established, the mill may extend its workings to a distance of eight or ten miles. The country must be generally flat or lightly undulating.

In the Arnold Valley, from Stillwater Junction to Lake Brunner, are nine mills cutting almost exclusively on Crown land, and four cutting almost entirely on alienated land (Midland Railway land grants). These mills each cut an average of 8,500 sup. ft. of red-pine and white-pine per day, and reckoning 275 working-days in the year, the total output of the whole of the above mills aggregates to over 30,000,000 ft. per annum.

The amount of marketable timber per acre of milling-forest in the district varies from 10,000 sup. ft. to as high as 60,000 sup. ft.

At an estimate of 20,000 ft. to the acre, the output above mentioned means the denudation of 1,500 acres annually, and, as this excludes all silver-pine workings and blank places, a much larger area is worked over every year by these mills alone.

It is beyond the power of the writer to give more than a nebulous forecast as to the duration of the supply for these mills; but he considers that the profitable possible supply of red-pine, white-pine, or even miro will cease for at least one mill in five years, and the life of even that mill which has the best supply cannot exceed twenty-five years, although the owner considers he has thirty years' cutting. At present rates of cutting, all pine accessible to present railways in this district will be cut out in about twenty years, and the future source depends on the extension of railway southward from the Mikonui River.

Of the various "birches," *Nothofagus Solandri*, *fusca*, *Menziesii*, &c., and *Weinmannia racemosa*, there is abundance for many years; but these timbers will never be used by builders while material more easily worked can be obtained.

Waste.—Much timber is needlessly wasted by the sawmillers, and it is safe to say that only 60 or 70 per cent. of the timber cut, or available, in the workings in the forest ever reaches the market. The millers declare with truth that, if the east-coast market continue to demand nothing but absolutely clean timber, they will have to waste fully another 10 per cent. of the available timber. It will therefore be impossible to demand from any one miller that his bush shall be worked clean unless this is rigorously required of all alike. Then each mill will arrange for a market for its rougher timber, which, by the way, is the stronger by far and more durable than the clean immature sapwood in request by the builders.

Tenure.—In this district all timber-areas are considered as mining rights, and are under the control of the Warden.

Conversion.—A very abridged description of the method of working the forest in this district will render more comprehensible the detailed cost of production given below. The tree is felled by axe and saw, the barrel sawn off by hand, when a wire rope up to 18 chains in length is secured to the barrel by iron dogs, and the log is hauled along the ground by a steam-winch of about 8 brake horse-power to the loading-bank near the tram. The log is not snouted, an iron shoe plate serving the purpose more efficiently.

The log is then rolled on to trucks, and a rake of trucks carrying perhaps ten logs containing 5,000 ft. of marketable timber, plus waste, is drawn by a simple but effective locomotive along a wooden- or iron-railed tram, it may be eight or nine miles to the mill. (One of these locomotives, chain-gearred, on eight wheels, can work grades up to 1 in 7 on wooden rails, and 1 in 10 or 12 is easily surmounted.) When the log arrives at the mill, it is rolled off the trucks on to skids, crosscut, hauled on to the travelling bench, and sawn into flitches by twin circular saws, when the flitches are rolled to the breast bench to be cut into the required sizes of building-timber, and straightway loaded by hand on to railway wagons (U's and UB's) for shipment. It is therefore quite usual that the timber being used in any building was growing green in the forest the previous week. The falling of the timber is carried on continuously throughout the year, irrespective of season.