Art. XXXV.—*On the Regrowth of the Totara.*

By Joshua Rutland.

[*Read before the Wellington Philosophical Society, 16th October, 1900.*]

Of the four trees—kahikatea, matai, totara, and rimu—on which the sawmills of the Pelorus have been mainly dependent since the establishment of the timber industry in the district the totara was by far the scarcest, yielding probably not more than 1 per cent. of the sawn timber produced; yet of all the *Coniferæ* occurring in the Pelorus the totara was the most generally distributed. Dividing the land into three classes, hill-sides, level terraces, and alluvial flats, to the terraces and flats the kahikatea and matai chiefly belong, the former growing in the damper and swampy portions of the ground, the latter on drier soil. The rimu was restricted to the hills and terraces, the totara being scattered over the three descriptions of land without displaying a decided preference for any. On steep hill-sides, on the stony soil of the terraces, and on the rich alluvial land it attained dimensions which entitled it to be considered "king of the forest."

On the shores of the Pelorus Sound, where the vegetation was especially vigorous, keikei, supplejack, and other climbing plants converting the forest in many places into an almost impenetrable jungle, the totara was extremely scarce. In the Rai Valley, where, owing to the scarcity of climbers, the bush is comparatively open, the totara is most abundant. Along the summits of the ranges inland and bordering the Sound there still is in many places a narrow but almost continuous belt of the mountain totara, the *Podocarpus hallii* of the late Mr. T. Kirk.

Looking back to the sixties, on the abandoned Maori clearings, which occupied most of the alluvial land in the lower Pelorus Valley, there were numbers of young totara-trees from 12 in. to 15 in. in diameter down to mere rods, standing singly or in clumps, and forming a conspicuous and very attractive feature in the vegetation of the partly open land. Within the shade of the adjacent forest small totara-trees were scarce; in addition to the giants already referred to, trees of useful size and saplings were dotted about, generally singly and far apart.

In swampy places the kahikatea monopolized the ground, on the better-drained alluvial land matai predominated, and on the hilly land rimu occupied extensive areas; but, excepting the narrow belts of mountain totara, the young trees on

the Maori clearings, and a few small clumps of larger growth in the Rai Valley, totaras nowhere congregated. Throughout the forest they stood generally solitary, surrounded by trees of different species.

On Mr. Farnell's property, in the Kaituna Valley, an explanation of this singular distribution may now be seen. Here, scattered over the grass land on hills and flats, are numbers of young totaras. Mr. A. T. Cavell, who kindly obtained the particulars of these trees for me, writes: "I visited Mr. Farnell as promised and saw the prolific growth of totara. It is really impossible to say how many to the acre, as, like young birch-trees, they grow in patches. In one place I saw about thirty nice young trees in a space 15 ft. square, while it is quite common to see three, four, and five in a bunch. They grow freely, and Mr. Farnell assured me that they transplant easily. The largest, near Mr. Farnell's house, measures 52½ in. in girth 6 in. from the ground. There are any number measuring from 25 in. to 45 in. in girth, and all of these, including the large one, are less than twenty years old. The large one is one of the dark-coloured species." In other parts of the district the same thing may be observed, but, cattle being generally kept on the farms, only a few of the totara seedlings escape destruction. During twenty years sheep alone have been depastured on Mr. Farnell's property.

Evidently the totara belongs to the open land, and not to the dense bush; hence its congregating on the ridges of hills, where it cannot be overshadowed by other trees, and its being most plentiful in the Rai, where the forest is comparatively open. From the appearance of the bush in one part of the Rai, large totaras standing amongst trees of much smaller growth, it occurred to me that the land had at some remote time been artificially cleared, and in writing on Maori matters I ventured to say that probably traces of human occupation would be found there. Since then the clearing of the land has brought to light ovens and other remains; thus from these forest giants historical data may be gathered.

Where the mixed bush escapes fire after the milling timber has been removed young kahikatea, matai, rimu, and totara come up in their proper places, but along with them quicker-growing trees, shrubs, and climbers also spring up in a much larger proportion. These are conditions fatal to the young totara, but apparently essential to the other species, which grow rapidly, running up into tall slender rods, and subsequently increase slowly in girth.

The abandoned pit-dwellings of the ancient Moriori inhabitants, with large forest-trees growing in and close around them, prove beyond question that much of the bush on the

shores of the Pelorus Sound was a regrowth. Though nothing could have been more beautiful or more interesting to a botanist than the tall evergreen trees, draped with climbing plants and loaded with epiphytes, beneath whose shade nikau palms, tree-ferns, and other tropical forms enjoyed an almost continuous spring, commercially this regrowth was of little value. Even on the level land it did not yield more than 5,000 superficial feet of marketable timber per acre.

Of all the marketable timber-trees the totara is the only one that might be artificially produced on a large scale without a great expenditure. From what naturally takes place it seems only necessary, after the present crop of forest-trees has been felled and burned off, to sow the land broadcast with totara and grass seeds, excluding cattle, but allowing sheep to run over the ground in order to keep down other woody plants.

The totara forest might be reproduced by raising seedlings in nurseries and transplanting; but this would be a costly process. In England it has been proved that transplanting forest-trees shortens their existence. By sowing the land with seeds the New Forest was created in the eleventh century, and in the same way has been renewed ever since. In a very interesting article, dated Lyndhurst, 1892, the writer, who had evidently much information at his command, thus compares the effects of the two ways in which the English forests have been artificially produced: "There has been a great dispute as to whether the grand forests which have survived from the Middle Ages were sown or planted, but it is now pretty well settled that every tree has grown from seed in the place where it stands. There are, of course, plenty of planted forests, or woodlands, in England, but not ancient ones. The trees which William the Third planted at Hampton Court, at Bushey, and at Kensington are an example. They are now about two hundred years old, and their days are already numbered. They all show signs of age, and one by one they are dying. Planted trees, in fact, do not live more than about two hundred years, even when taken the best care of, and many of them decay much earlier. Trees grown from seed in the place where they stand, on the other hand, are everlasting, and, under fair conditions, never decay. The oaks, beeches, and birches which were sown in the New Forest in the eleventh century are as vigorous now as they were at a year old, and there is no reason why they should not be as vigorous eight hundred years hence. There are trees in the forest, indeed, which are much older than the forest. I went a few days ago to see the Knightwood oak, in a secluded part of the forest about three miles from here. It is an enormous tree, one of the largest in England, with a

vast trunk branching at a height of 20 ft. into eight main boughs, each as large as a large tree, and spreading so far that they need to be supported on props This tree is mentioned in 'Domesday Book' as being famous for its size and antiquity. Now, 'Domesday Book' was written in 1085–86, so that, allowing only two hundred years for the Knightwood oak to have attained a growth that made it famous then, it must now be more than a thousand years old, yet it is full of life and vigour, and to all appearance is sound at heart. It makes each year a good deal of dead wood owing to the enormous stretch and interlacing of its branches, but with a little skilful trimming it may flourish for centuries to come—always, of course, barring storms and lightning. Close to the Knightwood oak are several groups of gigantic beeches undoubtedly belonging to the same period with the oak, before the forest was laid out. These magnificent trees seemed to have formed a small plantation by themselves, and probably belonged to some religious house, or perhaps to the dwelling of some Saxon thane, the history of which is forgotten. They are not the only instances of the kind, for in several other parts of the forest are groups of trees, or distinctive plantations, which evidently belong to an age before the Conquest, and which were carefully preserved and planted in by William's men."

In the portion of Marlborough north of the Wairau River care is necessary to prevent the land taken from the forest being overrun with brambles, briars, St. John's wort, manuka, tawhinau, and other woody plants, none of which spread on the natural grass land of the adjacent Awatere district. Possibly the tendency of the forest country to revert to an arborescent vegetation might be turned to account. The low lands, to which the mixed bush was chiefly confined, cannot be spared for timber-growing, but there are within the forest country large areas of hilly land unsuitable for pasture now being overrun with fern and other troublesome plants owing to repeated fires. If this land could be replanted with useful trees without a great expenditure of labour it would be a positive gain.

Like our totara, many of the European and North American *Coniferæ* reappear after the forest has been destroyed by fire.

Probably some of those trees suitable to the situation and climate might be propagated by sowing the seed on the ash-covered ground after bush-fires. One of the Australian hakeas which I introduced from Nelson some years ago can be grown in this way.