

Matai grows up to an altitude of 1,800 ft. above sea-level, and the timber is valued for its strength, its close-grained, smooth, and even texture. It is, however, one of the most slowly-growing trees in the colony. Blair's tests give the following results: Weight per cubic foot (green), 75·534 lb. to 77·798 lb.; seasoned, 46·862 lb. to 47·508 lb.; breaking-point, 384·03 lb. for piece 2 ft. long, 1 in. square, supported at each end and weighted in centre. Balfour gives specific gravity 0·572 to 0·792; weight per cubic foot, 34·97 lb. to 49·36 lb. This timber is in general use for bridge and heavy construction-works, also for house-building and flooring; but, being harder than kauri or white-pine, it takes longer to lay down than these timbers. The fact that though formerly used for sleepers, matai is not now in demand for this purpose, seems to indicate that when brought in contact with the ground, or exposed to damp, matai is not durable. In this, as in other cases, however, the unreliability of the timber may be due to the cutting of trees during the sap season, or before it has reached maturity, or to its not having been properly seasoned before being used. Matai is more or less subject to heart-shakes.

"The genus *Podocarpus* includes sixty-three species, of which four are indigenous to Australia, and seven to New Zealand" (Professor Kirk).

PAHAUTEA (*Libocedrus bidwillii*), Hooker f.; KAIKAWAKA (North Island), KAWAKA (South Island), (*Libocedrus doniana*), Endlicher.

These trees are so closely allied that their points of difference could scarcely be detected by a layman, and are only recognisable by a scientist on careful examination and comparison of specimens. *Libocedrus bidwillii*, however, differs from *L. doniana* in its lower stature and narrower conical habit, in its tetragonous branchlets, in the smaller size of its leaves, and especially the fruit ("Flora of New Zealand": Professor Kirk). The leaves of the latter, on the other hand, are large, as also are the seed-vessels; the matured branches are compressed, and never tetragonous; the seeds have shorter and broader wings.

On the West Coast, where I observed this tree, it is generally known by the name given to it by both Maoris and bushmen—kaiwaka, or kawaka. The species *bidwillii* is the more plentiful in the North Island. Some fine specimens are also found in the Grey Valley near Arahura River, and in the neighbourhood of Kumara, while a splendid belt or bed exists some twelve miles beyond Ross, in the direction of Mount Cook, not far from the sea-shore (Cedar Creek). Within two or three miles of the Kumara Railway-station I saw trees which I believe to be *L. doniana*, but through lack of time to obtain and examine specimens was unable to verify my conclusion. I found, however, *L. bidwillii* on the Lake Kanieri Road, about ten miles from Hokitika, but the trees were small.

Professor Kirk fixes the habitat of *L. doniana* in the North Island only, while the *L. bidwillii* is widely distributed over both islands, with strong affinity for mountain altitudes, attaining to largest dimensions between the levels of 1,200 ft. and 2,500 ft. In some districts the *L. bidwillii* is plentiful, in others so rare that only isolated single trees are found.

I notice here the strong resemblance between this species and the *Arthrotaxis* of Tasmania (three species), not so much botanically as in the wood and in choice of habitat. There is very great similarity in the texture and colour of the wood. The Tasmanian tree is known on the north-west coast, on the west coast, on the Pierman and the Collingwood Rivers as the River Forth pine, and it would be interesting to compare closely the habit of these genera, which botanically must be closely allied.

The wood of *L. doniana* is dark-red, with streaks of even darker hue and great beauty, straight and even in grain, stronger and of greater durability than *L. bidwillii*. The timber, according to Professor Kirk, is most used for posts, palings, shingles, &c. Its southern limit is placed by Mr. Buchanan, F.L.S., as at Mount Egmont.

The wood of the *L. bidwillii* is of a pretty light-red colour, very fissile through its straightness of grain, very light, and, though rather brittle when cut small, very durable. It is used for bridge-work piles, blocks, railway-sleepers, palings, shingles, telegraph-poles, &c.

During my tour through Otago I heard of the existence of large numbers of dead kaiwaka trees and logs,* standing or buried in the mountain-sides, and was much struck with the occurrence of timber under such conditions, the dead forest bearing silent testimony to the wonderful durability of the wood. There is little doubt that these mountains could be replanted with these fine trees with less difficulty than would attend the planting of other indigenous growth.

In the volcanic country of the North Island I came across magnificent specimens of *L. bidwillii* on both sides of Waimarino Plain, in the forests about Raetihi and Taumararui, associated with totara, rimu, white- and silver-pine, all of these trees unusually good in both quality and size.

Valuable testimony as to the durability of kaikawaka I recognised in connection with a hut on the road to Waimarino. In its construction, shingles of both white-pine and kaikawaka were used. The white-pine shingles had rotted, whereas those of the kaikawaka were as sound as on the day, eleven years ago, on which they were cut. The slabs of totara, which formed the frame, were also showing signs of decay. This experience enables me to indorse Professor Kirk's estimate as to the great durability of the kaikawaka. Blair gives the weight per cubic foot, seasoned, from 26·306 lb. to 28·611 lb.; green, from 47·750 lb. to 61·405 lb.; breaking-point, 99·98 lb.

TREE-CULTIVATION IN THE PROVINCES OF CANTERBURY AND OTAGO.

When the pioneers of Christchurch took possession of the broad open plains of the province, and founded the city above named, the treeless character of the country proved a serious hindrance to progress. For miles and miles nothing met the eye but the open undulating country, fertile in other respects, but barren of timber. Nothing daunted, the old pioneers set manfully to work, and with dogged perseverance fought the elements, and successfully established exotic trees. In view,

* The effect of unusually severe frosts probably. The same thing occurs with the *Arthrotaxis* trees of Tasmania, in southern Tasmania; also with *Eucalypti* in Victoria; but here the trees are dead *in situ*.