

White-pine, like the kauri, is free from ring- or heart-shakes, and is a sound timber-tree. Unlike the latter, however, it has a large percentage of sapwood, and when this predominates over the heartwood the timber decays rapidly.

Like all other timbers, white-pine of extra good quality is found in particular districts, and I am of opinion that the humidity or dryness of the atmosphere in different localities accounts for the variety in quality of New Zealand woods.

TOTARA (*Podocarpus totara*), A. Cunningham.

This fine tree ranks next in value to kauri, and for certain purposes is even superior to that timber. It is a handsome tree, running from 60 ft. to 90 ft. in height, with clean straight stem, of handy size for milling. The timber cuts mellow on the saw, is of a reddish colour, with clean straight grain, and is extensively used as building material. It is one of the best timbers in the colony for railway-sleepers, and also for piles, its immunity from attack by the teredo and other marine insects being only equalled by that of the puriri and pohutukawa (T. Kirk). Totara is also most useful for wood-paving, and has been found very effective for this purpose on crossings at the intersections of streets in Wellington, and elsewhere. The timber has the defect of being rather brittle, but, nevertheless, in heavy logs for large construction-works and for sleepers is found so far reliable that it is in general use.

The best totara I found was at Dannevirke, Hawke's Bay, and in the forest near Taumaranui. Its specific gravity is 0.559; weight per cubic foot, 35.17 lb.; average breaking-point, 133.6 lb., as given by tests of seventeen pieces.\* Blair's tests of the timber in its green state give weights per cubic foot varying from 49.783 lb. to 56.715 lb., and when seasoned, from 36.21 lb. to 42.228 lb.; breaking-point, 142.5 lb. for ten specimens.

Mottled or figured totara is in great demand for cabinet-making, and the burrs of this tree, when cut into veneers, are very handsome, and most effective for inlaid work. Indeed, kauri (mottled), puriri, rewarewa, totara, silver-pine (knot, or burr), worked up in combination into designs represent the handsomest timbers known to the cabinet-making trade even in Europe. As yet, however, the excellent beauty of these timbers so used is but little known to the trade outside of New Zealand.

The mottling of these trees is produced naturally in a curious fashion. The tree has numerous fissures, which often remain open for many years, till they are overgrown, and the bark caught by this growth is enclosed. At the rising of the sap the enclosed bark becomes a source of irritation, exactly in the same manner as the presence of a splinter sets up inflammation in the human body. With each year's growth the enormous compressive power of the tree squeezes the bark patch smaller and smaller, irritation of the sap continuing all the time. This process in the case of the *Dacrydium* gives the satin-like waves or undulations—the lighter or darker shades according to distance from the source of irritation. The pressure continuing makes the wood so dense and hard that it becomes darker in colour, assuming at the same time the figures and wavy lustre that are so prized for cabinet-making in kauri, totara, Huon pine, &c. Mottling is also caused by burrs formed through shoots or sprouts growing into the sap and setting up irritation and gangrenous growth of wood. These burrs are sometimes the results of injury to the tree through insects or other causes.

Totara is well distributed over the colony, and, like other New Zealand trees, is usually found associated with other woods. As a rule, to which there are, however, notable exceptions, totara is smaller than either rimu or white-pine. It is occasionally gregarious, though not usually so. Cut into blocks for wood-paving, 3 in. by 6 in. by 9 in., the contract price for the City of Wellington is 14s. 4d. per 100 superficial feet, and the wood is estimated to last for twenty years. The timber is also used very generally for beams, joists, wall-plates, and other heavy construction-works.

As in the case of most other New Zealand timbers, there is already threatened a scarcity of totara, more especially as the forests are not allowed the chance of regenerating themselves.

Totara shares with kauri, rimu, and kahikatea a preference for low altitudes, rarely flourishing more than 1,500 ft. above sea-level.

This timber has always been a special favourite of the Maoris, who use it to large extent in the construction of their canoes, and also in building wharepunis and patakas. Some of the largest canoes in the Wanganui and Taranaki districts are made from totara obtained in the forests above the head-waters of the river near Taumaranui. In Southern New Zealand the Natives distinguish between two kinds of totara—red (taihuoro), and white (taitea). ("The former is the most durable."—Professor Kirk.) This gentleman also points out in "The Flora of New Zealand," page 13, that *Podocarpus hallii* is a distinct species from *Podocarpus totara*, though there is a strong resemblance between the two, and they are found associated from the Bay of Islands to South Cape. Totara is, however, the superior timber.

*Podocarpus hallii* differs from the totara in having a thin papery bark, larger leaves, and pointed fruits. The Maoris on Stewart Island are the only Natives who have recognised the two species as distinct trees, and this fact—only recently discovered by Mr. Hall—indicates what close observers these Maoris are.

TOOTHED-LEAF BEECH, TAWHAI RAUNUI (*Fagus fusca*), Hooker.

This useful tree—the birch of New Zealand—is very widely distributed all over the colony, and, with the several kindred species, constitutes the bulk of the forest timber and sub-alpine growth upon the mountains in both North and South Islands. The toothed-leaf variety—a fine tree with average growth in sheltered valleys to 60 ft. or 70 ft.—takes its name from the serrated edges of the leaves, which, with its corrugated and crenulated form, enable the bushmen to recognise it, though Professor Kirk describes another tree so nearly resembling it that mistakes might easily be

\* Professor Kirk's "Flora of New Zealand," page 229.