

Totara post and rail fences are expected to last from ten to thirteen years, and would probably stand for a longer period if split of larger dimensions. I have not seen any fence in thoroughly good condition that has been of greater age than twelve years.

Totara sleepers have been in use on tramways at the Taupiri Coal Mines for nine years: some of them are still good, although of small scantling, and split from small-sized trees. On the Invercargill railways, totara has been sparingly used for sleepers. All that I saw were in capital condition, after having been down eight years, and contrasted strongly with rimu sleepers, which were worthless at the end of seven years.

For piles for marine wharves and bridges, &c., it is one of the most valuable timbers known. In addition to its great durability, it has the power of resisting the attacks of teredo for a considerable period, especially if driven with the bark intact. It is said that trees felled during the growing season will resist the attacks of teredo for a longer period than those felled during the winter. Although I have been unable to obtain direct evidence in support of this, I entertain little doubt of its truth, but fear the advantages that may be derived from the property are overrated. I have seen totara piles attacked by teredo within a year of their being driven; but usually from two to four years elapses before they are touched, and if the bark is preserved intact, a much longer period: in fact, I have never seen the bark of any timber perforated by teredines. Heart of totara will resist the teredo still longer. In the Auckland Museum is a section of a Tasmanian blue gum pile, taken from the wharf after having been driven six or seven years. The pile itself is closely perforated, but heart of totara cradle sections bolted to it have not been touched. When the sap-wood of totara has been thoroughly perforated, it sometimes happens that the teredo dies out, being unable to attack the heart-wood until it has been subjected for a longer period to the action of sea water, when the mollusc resumes possession, and the destruction of that part of the pile exposed to its ravages is a mere matter of time. The fine wharf at the Bluff Harbour, constructed scarcely ten years ago, already shows the substantial totara piles in many cases perforated to the heart. Still, no other native timber, except perhaps the puriri, has equal power to resist the teredo.

With regard to simple durability, the oldest totara piles yet driven in our wharves and piers are perfectly sound, whether below the mud level or above high water-mark—in short, where not actually exposed to the attacks of teredo. Piles driven in the Auckland Wharf have been drawn twenty years after being driven, when the portion below the mud level was fresh and sound, even the bark undecayed; and wherever used for beams, girders, or stringers, the same durability is shown, even in the oldest works, wherever good heart timber has been used.

Totara piles in inland bridges exhibit earlier signs of decay: the sap-wood decomposes more speedily, and appears to affect the heart. In situations of this kind, it is of great importance to remove the sap-wood before the pile is driven; and the same remark applies when totara is used for house blocks. The heart-wood will last longer if the sap is removed before the pile is used.

On the Otago mountains, and, I believe, on other mountains in the South Island, are still to be found large numbers of fallen totara trees, which must have occupied their present position long before the advent of settlers. Many of these logs are said to be sound and good after their protracted surface exposure, a far more trying test than would be afforded in most constructive works. I had the opportunity of examining a portion of one of these logs, which was quite sound, although evidently of great age.

It may be fairly estimated that kauri and totara afford more than two-thirds of the indigenous timber employed for buildings and constructive works in the colony. A concise summary of their comparative use and durability may, therefore, be considered of special interest.

Both are extensively used for general building purposes, and exhibit the same amount of durability; kauri, however, is easier worked, and takes a higher finish. Owing to the great abundance, in the kauri district, of puriri and manuka, which afford the most durable fence constructed in the colony, totara has been used to a far greater extent than kauri for fencing purposes, but without evincing greater durability. I am not aware that either timber has been tried on a sufficient scale to obtain average results as to their durability for sleepers; but so far as known, the results are equal. For the timbers of constructive works, kauri has the advantage of greater strength coupled with equal durability, so far as tested. For piles for marine wharves, jetties, bridges, &c., totara stands alone. Kauri has been extensively employed in shipbuilding for many years, and ranks deservedly high for this purpose. Totara has been but sparingly employed, and I have been unable to ascertain with what results. Both timbers are extensively used in the manufacture of furniture. Lastly, both are found exposed from natural causes of remote date, and exhibit great durability under the varied and severe tests thus applied.

### 3. RED PINE—RIMU. (*Dacrydium cupressinum*.)

A tree from 40 to 80 feet high; trunk, 3 to 5 feet in diameter. Found throughout the colony, but increasing in frequency from the Auckland Isthmus southwards.

This timber has been extensively used in the construction of public works, especially in the southern part of the colony, and has hitherto had a higher reputation for durability than it deserves.

Its chief drawback arises from its liability to decay under the influence of wet. Wherever moisture can penetrate, as at joints, sun-cracks, shakes, or even the concavities on the surface of hewn beams, decay speedily commences, although intervening spaces may remain sound for a considerable period.

Separation of the ligneous tissue frequently takes place during growth, leaving small cavities, which become filled with a resinous deposit. This becomes shaken when the tree is felled, affording fatal facilities for the access of moisture.

In the North Island, red pine was extensively used in the Waikato district, soon after the war of 1865-66, in the construction of bridges; but in all cases where it was employed, the bridges have had to be partially or entirely rebuilt at considerable expense. Many of the principal timbers were entirely decayed, and in nearly every case the joints were in the same state.