

SOME EIGHT YEARS' EXPERIENCES IN PLACING A NORTH ISLAND PODOCARPUS RAIN FOREST UNDER MANAGEMENT PLANS.

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The application of management plans to a North Island podocarp rain-forest is perhaps as difficult a problem as can be found; for generally speaking, regeneration of the podocarps is suppressed in its infancy and the forest so far as its timber components are concerned is over-mature and stagnant. This condition is most probably caused by a combination of two factors, namely, the extremely slow growth rate of the podocarps and the dense shading effect of the evergreen broad-leaved species which form the secondary storey of the forest. Through this latter, the young podocarps are unable to penetrate and attain to their ultimate light requirements during their period of shade tolerancy.

Field work in connection with the preparation of plans for the management of some 12,000 acres of this type of forest, situated in the watersheds of the western tributaries of the Hutt River, revealed that of the dominant timber tree, rimu (*Dacrydium cupressinum*), there is an abundance of seedlings a few inches in height and of young trees up to three to four feet in height,—a sufficiency, but between these and trees of millable size there is, except for odd specimens, nothing; the shade tolerancy period of the species evidently being exhausted during the time it takes to reach that height. This remark, with certain modifications as to height, is also true of the other conifers, miro (*Podocarpus ferrugineus*) a tree of general distribution, kahikatea (*P. dacrydioides*), totara (*P. totara* and *P. Hallii*), and matai (*P. spicatus*), occurring as scattered small groups or isolated trees. Even where the canopy is broken, such a profuse second-growth of densely shading broad-leaved species occurs that conditions affecting regeneration remain constant, and it is manifest that the type is developing towards a hardwood climax.

To overcome this condition and manage the area with sustained yield as the objective, the writer has adopted the method of interplanting the logged-over portions with exotic coniferous species. No originality is claimed for the idea; actually it is somewhat old history, for as long ago as 1898, surplus stock from the State Nurseries at Rotorua was planted out in the native forest on the Mamaku plateau, and later a small logged-over area in the same locality was interplanted with exotic conifers. Except that they demonstrated what could not be done, the results from these two experiments were, generally speaking, negligible. In the first, the canopy was unbroken and with the exception of a few marginal trees which have had sufficient light for their development, the young exotics have failed. In the second, logging had been done some seven to eight years previous to interplanting and the second-growth was so far advanced that

there was little chance of success. However, the early results in this second experiment, particularly with Lawson's cypress (*Cupressus Lawsoniana*), were such as to demonstrate that given the three following essentials, success might be achieved :—

1. Immediate interplanting of the logged-over areas, i.e., year by year.
2. The use of large planting stock.
3. The use as planting stock of only vigorous growing and, at least to some extent, shade tolerant species.

The native second-growth, comprised principally of kotukutuku (*Fuchsia excorticata*), makomako (*Aristotelia racemosa*) and pate (*Schefflera digitata*), commences to come away vigorously about three years after logging, and by the seventh to eighth year has, in many cases, reached a height of twenty feet. From this stage, the growth rate slows up progressively and culminates at heights of from approximately thirty to forty feet. Hence, success in the establishment of the exotics resolves itself into getting them to a height approaching twenty feet by the seventh year, and given the above three essentials, combined with the proper placing of the trees according to their site requirements, this appears feasible.

It would of course be possible, at heavy expense, to cut back the second-growth and so ensure the exotics winning through, but on the score of expense, and also the loss of its cleaning effect on the conifers, it is advisable to avoid this if possible.

Interplanting was commenced on this area in the early spring of 1929, well grown two-year transplants of Lawson's cypress being used. The following year, besides this species, plantings of Californian redwood (*Sequoia sempervirens*) and sugi (*Cryptomeria japonica*) were made, and in 1931, western red cedar (*Thuja plicata*), Douglas fir (*Pseudotsuga Douglasii*) and deodar (*Cedrus deodara*) were added to the list. Subsequently, trial plantings of Monterey cypress (*Cupressus macrocarpa*), western hemlock (*Tsuga heterophylla*), Oregon alder (*Alnus rubra*) and a few assorted spruces and firs have been made.

The five species first mentioned have generally, where the site has been suited to their specific requirements, made remarkable growth. Lawson's cypress, planted in 1929, had in 1934, reached 13 ft., and in 1935 up to 17 ft., while sugi and redwood, planted in 1930, had reached 13 ft. and 11 ft. respectively, all maximum figures. This year, many trees of twenty feet have been measured.

Of species other than these five, Monterey cypress is doing well in the more open spaces, and Oregon alder appears to have distinct possibilities in the lower portion of damp gullies, where only trees of no economic importance have grown previously and where exotic conifers are also not a success. Deodar, hemlock and the spruces and firs do not appear to be making sufficient height growth to compete with the second-growth, but whether or not their shade tolerancy will be sufficient to enable them finally to win through, only time will demonstrate.

As indicated above, the first interplanting was done with well-grown two-year transplants, but now nothing under three and even four and five-year old stock is used. Such stock may appear to be too big, but the remaining bush and the mass of debris, among which the trees are planted, provides abundant shelter and eliminates wind-whipping. So far establishment approaching one hundred per cent. has been the rule and no check has been noticeable. This perhaps has been assisted by the practice, if possible, of lifting nursery stock and planting out on the same day.

Planting costs have of course increased in ratio to the size of the stock, but the few shillings increase per acre is but a fraction of the expense which would be involved in early maintenance, were small planting stock used.

The actual planting is one of the most important phases of the work and is definitely a skilled labour job. It has been proved on this area that given good intelligent men to commence with, it takes not less than three seasons to develop a satisfactory technique, and even then there is ample room for improvement. This can be readily understood if one visualizes the large amount of debris among which the trees have to be placed—to the uninitiated a very uninviting proposition, and realises that a range of species to suit various site differences, that can only be recognised after experience, is being planted simultaneously. Hence it is necessary that the same men be employed year after year and that they be given ample opportunity of going back over their work to see the results and to have pointed out to them the opportunities of future improvement. The direct result of this practice here has been a much better selection of site according to the specific requirements of the species, and an increase in the number of trees planted per acre from 103 in 1929 to 325 in 1935.

Whether the ultimate result of this piece of work will be success or failure, time alone can demonstrate, but so far as the result may be determined at present, the prospect of ensuring a rotational crop of timber appears to be exceedingly bright.

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- (2) The essay may be on any aspect of forestry and should not exceed 2,000 words.
- (3) The prize is valued at 3 guineas, but will be awarded only if competing essays reach a standard to be determined by the Council.
- (4) Manuscripts should reach the Secretary before the 31st March, 1937.