

PACIFIC COAST SPECIES IN N.Z. FORESTRY.

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Presidential Address read at the 11th Annual Meeting of the N.Z. Institute of Foresters, 1938.

The importance to New Zealand forestry of species having their origin on the Pacific Coast of the North American continent can perhaps be best understood when it is stated that at least ninety-five per cent. of our afforestation has been undertaken with species from this source. Exact figures for statistics of local body and private plantings, other than those of afforestation companies which appear in the National Year Book, are unavailable, but as the species in such plantings are obviously almost in their entirety of this origin the figure stated above is probably conservative rather than otherwise.

Extensive plantings of *Pinus radiata* are of course responsible for this overwhelming predominance. The ubiquity of this species in New Zealand is a most remarkable thing, especially when it is remembered that it was endemic to a very circumscribed locality centred on the Monterey Peninsula in California in about 37° North latitude (corresponding roughly to the situation of the city of Auckland in South latitude), where it occupied the low coastal hills and was a species of little merit.

In New Zealand it has been planted from the North Cape to the Bluff, from 35° to 47° South latitude and from sea level to 2,000 feet or more in altitude. It is in fact typical of much of our countryside. We have had failures with it, but remembering its circumscribed native habitat and its lack of merit therein, it is truly remarkable that it has so seldom failed and so often has given unique results. (For example, it is recorded that as much as 200,000 board feet per acre of sawn timber has been obtained in the Matamata district from a shelter-belt plantation). From the viewpoint of the forester its worst feature is perhaps that it is responsible for a short rotation complex in the minds of many New Zealanders, and an impatience of the long range forest conscience which is demanded in the use of other and better species. We have in New Zealand now, as nearly as can be estimated in round figures, half a million acres planted in *Pinus radiata*. If we make an allowance of twenty-five per cent. for failure either in establishment or in subsequent development as a timber crop (the failures will probably not amount to so much) and then apply Syme's figures for Site III in Mid Canterbury (1) which should be quite a conservative average if applied to the whole, we must have either present or potentially in this species an annual increment of approximately 75,000,000 cubic feet. This is worthy of thought especially as the bulk of the crop is of an age class and is centred within a radius of fifty miles.

Pinus ponderosa occupies the next place on the list with a total planted area of approximately 94,000 acres, somewhat less than one-fifth of that in *Pinus radiata*. It is somewhat difficult to sum up the potentialities of this species, for most of the crop is still young and a diversity of types varying from the poor variety *scopulorum* upwards towards the optimum of the species is manifest. Most of the plantings, however, originated from seed imported from the Columbia and Frazer River basins, localities to the north of the optimum of the species but still producing a good type. Unfortunately little seed from the optimum type which centres on Eldorado County in Northern California has been available. So far, little timber of the species has been converted in New Zealand and as the crop is for the most part very young, no increment figures of general value are available. Early promise, however, appears generally to be good. Some reports concerning the indifferent value of the timber from a few trees which have been converted have been received, also reports that in some localities the tree has died off at an early age. It is, however, too early to prognosticate on the place this tree may occupy in our forestry, but one thing should be remembered when using it and that is that it is essentially a tree of comparatively high altitudes and dry climates, generally far removed from coastal influences. The cause of such failures as have been reported may possibly be found in the non-observance of these factors in site selection.

Douglas fir (*Pseudotsuga taxifolia*): Approximately 54,000 acres have been planted in this species and its promise in most localities is distinctly good. Unlike *Pinus ponderosa*, there is little variation; most of the seed imported being of the true coastal type from the Puget Sound and Lower Fraser River localities with some late importations from the Ryderwood district in Southern Washington. As in the case of *Pinus ponderosa*, most of the crop is young and no increment figures of general value are available, but it is interesting to note that a study carried out by Hocking (2) on logs from Vancouver, available while the ship Golden Harvest was undergoing repairs in the Wellington dock, show that the diameter growth rate of the species in New Zealand up to 28 years, as taken from mean sample plot trees at Kaingaroa and Dusky plantations, was much on a par with, but slightly less than, Canadian growth. It is manifest that the general construction value of the timber of this species combining as it does lightness, strength and ability to "stay put" and the promise of successful growth in most sites except those subject to high winds and unseasonable frosts, must always keep this species in a foremost place in future forestry developments.

Pinus murrayana. 11,500 acres of this species have been planted, largely no doubt on account of its extreme hardiness and ease of establishment in difficult situations. In parts of its natural distribution *Pinus murrayana* produces good crops of valuable timber but it is unfortunate that no seed from the optimum type, which occurs in the Prince Rupert district of British Columbia, has been

procurable in this country. Consequently the resultant crop may possibly be disappointing in comparison to that which may have been obtained had it been possible to procure seed of better origin.

Californian Redwood (*Sequoia sempervirens*): A total of 8,700 acres of redwood have been planted, but generally the species has not been a success in New Zealand. It is manifest that the site requirements of redwood are such that in the average area available for afforestation only those very limited portions having good soil and mild exposure are suited to its successful development. The wave of enthusiasm for the extensive planting of redwood which occurred some few years ago doubtless had its origin in the few magnificent specimens in the Whakarewarewa plantation of the State Forest Service in the Rotorua district. These trees are certainly a joy to behold but when their number is compared with the number originally planted (in the block of larch in which they are situated and in the neighbouring blocks of Austrian and Corsican pine redwood was planted every fourth tree in every fourth row, i.e. sixteen feet apart each way), the establishment is a failure and is actually more a demonstration of the unsuitability of the tree for wide scale *en bloc* planting than otherwise.

Pinus muricata: 5,500 acres have been planted in *P. muricata*. There are two distinct types of this species which can best be described as a white and a blue. The former is distinctly worthless while the latter has demonstrated itself as quite a good tree under most conditions. However, it is doubtful if under any set of conditions it has any advantage over *Pinus radiata*, and it is probable that the same area planted with the latter species would have ultimately produced a larger volume of timber of at least equal quality.

Lawson's Cypress (*Cupressus lawsoniana*): As nearly as can be estimated an area of 4,000 acres has been planted mostly in late years and under some circumstances it is giving distinct promise of success. Unfortunately we have developed or in the past introduced a diversity of types in this species, many of which appear to be subject to persistent development of multiple leaders. During late years the tree has demonstrated its suitability for interplanting in cut-over native forest as a means of replacing the native timber trees which are not regenerating, and making possible sustained yield planning in relation to such forest.

Western Red Cedar (*Thuja plicata*): Some 3,500 acres, almost entirely in late years, has been planted, also mostly in cut-over native forest. In most situations where it has been planted for this purpose it has, after a year or two of slow growth, come away quickly and more than kept pace with the profuse second growth of competing broadleaved species. Judging on early results, this tree appears to have all the merits requisite to a successful interplanting species.

Monterey Cypress (*Cupressus macrocarpa*): Probably 1,000 acres cover the area planted by the State, Afforestation Companies and Local Bodies with this species, but it has been widely used by farmers in small plots and as shelter-belts. As a species for farm forestry it probably has no peer, growing quickly and at an early age producing durable timber suitable for fencing material, etc. Its greatest drawback is that it is somewhat difficult to transplant unless very carefully handled. A few years ago a limited quantity was used by the writer in interplanting in the Wellington District with results so promising that in the future it will be used more extensively. In progressive height growth, a most important factor in this work, it has actually exceeded any other species experimented with.

Several other species of Pacific Coast origin have from time to time been planted in small areas in various places in New Zealand, but the areas are so small that it is not possible to prognosticate on their success or otherwise had they been used on a larger scale.

References.

- (1) Syme, J. W. (1933) *Te Kura Ngahere* Vol. 3 No. 3 p. 133.
- (2) Hocking, G. H. (1933) *Te Kura Ngahere* Vol. 3 No. 3 p. 147.

CHIEFLY ON CHILEAN FORESTS.

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Having in mind the interest of all New Zealand naturalists in the biological relationships that exist between Chile and this Dominion, the following account is presented. It is written merely from the viewpoint of a general observer and is summarised from the diaries of expeditions to South America, where from people met and from other sources information was gathered on a variety of subjects outside the actual object of my missions.

In outline, Chile is represented by the lofty snow-capped Andes mountains and a narrow sea-board, the whole extending over some 2,800 miles from the latitude of Fiji to that of the Macquarie Islands (Maps 1 and 2).^{*} In a country covering so many latitudes, one would expect to find climates varying from tropical to sub-antarctic. However, though the latter is found in the far south of Chile, the climate is agreeable on the whole, being mostly temperate with a wide-ranging rainfall, but never tropical even in the northernmost region within Capricorn. This is largely due to the influence of the Humboldt Current that runs north along the coast; this visibly flowing current is associated with a temperate climate even northward beyond Chile and Peru, and along the greater part of Ecuador, until it turns abruptly westward, practically under the Equator, into the Pacific Ocean.

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