NOTES

THE TREATMENT OF NATURAL REPRODUCTION OF PINUS RADIATA

On returning from New Zealand in April 1949, the writer visited the only existing area where *Pinus radiata* grows naturally, at Monterey, California. The species there reaches full maturity at 70 to 80 years with maximum heights of 120 feet, and average growth of 3 feet per year until approaching maturity.

It was observed that in spots where this pine had seeded naturally it had formed thickets of slender saplings with poor tops, thus resembling *P. banksiana* and *P. contorta* (lodgepole pine) in Canada. This indicated the need for very early thinning if a healthy crown and stout form were to be attained.

The natural reproduction of Monterey pine observed in New Zealand, especially after fire, had formed dense stands running over 500,000 per acre. The question arose as to the future of this thicket unless drastic early thinning was undertaken.

In February 1951 the writer was informed by Mr. J. D. Gilmour of Montreal, P.Q., Canada, a member of H. R. MacMillan's far-flung lumber industries, that an acquaintance of his, Mr. David Robertson of Chile, had developed successful techniques for handling natural reproduction of this species which had come in when previous plantations were harvested. On writing him, a reply was received which is reproduced below.

This information confirms the impression, when the writer saw the natural reproduction of this and one or two other species of pine that had come in on the extensive burn on private plantations near Rotorua, which was then four years old, that it was already too late to secure the best results from early thinnings, and that the longer stands were left without cultural thinnings the more worthless would be the final crop.

H. H. CHAPMAN.

New Haven,
Conn., U.S.A.,
May 1951.

Sociedad Agrícola & Forestal Colcura,
Lota Alto, Chile, 23rd April, 1951.

H. H. Chapman, Esq.,
Professor Emeritus,
New Haven 11, Connecticut.

Dear Professor Chapman,

Your favour of 2nd March duly received, and I have pleasure in informing you about the subjects in which you are interested. As Mr. Gilmour informed you, we have extensive plantations, the principal species being Monterey pine. We started selective cutting some 25
years ago, and final cutting some 7 years afterwards, so our first stands of natural reproduction have now some 18 years.

We left the first stands 8 years before thinning, but experience showed us that we had left the trees too long to get well formed trees with good growth. Part of the stand which we thinned to 2,500 trees per hectare (1010 per acre) was greatly affected by wind storms, and other parts of the same stand which we have thinned periodically, reducing the number of trees gradually, have not shown the increase we have obtained afterwards when the thinning was started when the plants had two years.

After this experience, we have, generally speaking, followed the following program:

(1). The first thinning is performed when the plants are 2 years old, when the plants are reduced to 2,500 -3,000 per hectare (1010-1210 per acre), the second 10 years afterwards, reducing the plants to 2000 per hectare (810 per acre), 5 years afterwards a new thinning reduces the trees to 1500 per hectare (610 per acre), and two more operations reduce the plants in another 10 years to about 900 (365), and in some cases to 700 (280).

(2). Tools and method used. The first thinning is made with a kind of knife with a 1-metre wooden handle, and the following thinnings by ax, and the wood is removed with horses. The system we employ is the European one called the "selective method."

(3). Approximate cost. The first thinning which also includes the cleaning of all natural shrub, costs about 20 U.S. dollars per hectare and the second about 10 U.S. dollars including burning of the branches etc. to diminish fire danger. The following thinnings are paid for by the timber obtained.

(4). What happens to thinned and unthinned stands. By thinning opportunely we have been able to reduce the cutting cycle by about 10 years, with a better grade of timber. The danger from fires is greatly reduced, and the same can be said of attacks by insects and fungi and of windfall.

Trusting that the above information is what you require and placing myself at your disposition for any further data which you may consider interesting.

I remain,
Yours truly,
DAVID ROBERTSON.

Comment

In comparing the Chilean operations with New Zealand experience it is perhaps necessary to point out the difference between the amount of insignis pine regeneration that comes up on a clear-felled area and that appearing after fires. On Central North Island pumice seedlings on clear-felled areas vary from 1000-10,000 per acre where conditions are favourable. The growth in some localities may be
much less and in some forests it is so sparse that restocking is done by planting. On burns, the more abundant seed and more favourable seed-bed produce much higher densities, up to the 500,000 seedlings per acre observed on the 1946 Taupo burn.

Once the principle of thinning the first type of regeneration had been accepted it was clear, both for reasons of cost and for prevention of mutual suppression, that the first operation must be carried out in the first few years, when the crop is 5-6 feet high, 3 or 4 years after the felling of the old stand. Thinning to about 1,000 trees per acre has been practised in such stands in Whakarewarewa and Kaingaroa Forests since 1949. (See J. Ure, *N.Z. Journ. For.* Vol. VI, No. 1, 1949). If thinning is done before this stage there is some danger of additional stocking from delayed germination. Technique for later years is still largely conjectural but it is doubtful if it will be desirable to leave more than 300 stems per acre at the age of 10 years. The figures given by Mr. Robertson seem to show a higher survival rate and a close utilisation. Additional data on the original stocking and the rate of growth would be interesting.

It is now equally clear that if thinning is to be attempted in the regenerated burnt areas it must be done before the burnt mother tree start to fall, i.e. in the first 3 years. The work required would be considerably more intensive than on the clear-felled areas. Possibly mechanical or chemical methods could be used. After six years the Taupo burn now provides as hard forest going as any in New Zealand—a dense thicket of stems 12-18 feet high criss-crossed with fallen trees and branches which are often suspended 3 feet or so above the ground. More of the old crop comes down after every gale. No work will be possible until the old stems rot down.

It seems doubtful whether New Zealand *P. radiata*, with its well known faculty of asserting dominance, can be generally compared with the thickets of *P. contorta* and *P. banksiana* described in Canadian literature. A shortage of regenerated stands of insignis pine over 10 years of age restricts comparison. There are, however, two unthinned grown-up nurseries, one in Southland and one on the North Island pumice, which show remarkable disparity of diameters at the age of 20 years. Large dominant trees are spaced at distances of 15-25 feet and seem likely to increase their superiority until final crop stage. There are also in the Rotorua area unthinned stands on old burns dating from 1936 and 1942 which show a similar trend. Data on all these stands should be forthcoming in due course and should give some facts on the extent to which insignis pine “thins itself.” That crops of this nature must be in dangerous biological equilibrium is undeniable but it cannot be accepted that the final crop will necessarily be worthless.

H. V. HINDS.

Forest Research Institute,
Rotorua,
December 1951.