

AFFORESTATION STUDIES.

Co-ordination Investigation.

A comprehensive co-ordination study was begun during the year of the Rotorua Nursery Station and plantations for the purpose of standardizing our technique in tree-propagation and plantation formation, introducing economies where possible, and developing the most efficient practice. A continuous programme of silvicultural-improvement investigations will be established during the current year.

Weed-eradication Experiment.

A study as to the application of zinc sulphate to seed-beds for the eradication of weeds was begun and will be continued.

Tree-propagation Studies.

At the Hanmer Springs Nursery the sowing of the tree-seed in open lines has been developed during the year with certain advantages in stock and cost. The actual labour charge in connection with the raising of over three million trees here was approximately 2d. per thousand. This does not, of course, include subsequent tending charges, nor overhead. As a comparison, the actual figures covering the cost of raising a similar number by the old method works out at approximately 1s. 3d. per thousand. This also is only the actual labour charge of preparation of land and sowing. Scrim coverings and seed-frames are not taken into consideration, but it would practically double this figure. The germination in the open-line sowing was about fourteen thousand per pound, and in the latter only seven thousand, so that it would appear that the line sowing has a very considerable advantage over the old roller and seed-frame method. Sowing with the Multiple seed-sower would still further reduce the cost by expediting the sowing, as four or five lines could be sown at a time, instead of the single-line hand-sowing. This work has practically passed the experimental stage, as it was tried on a small scale the previous year. This year's sowing was on a sufficiently large scale to prove its efficiency.

Two-year seed-bed *Pinus ponderosa* is quite far enough advanced at Hanmer Springs to transfer to the permanent planting-area, and as a large proportion of the season's planting at Balmoral and Hanmer Plantations was carried out with similar stock with a loss of only 1 per cent., it is emphatically established that we can do away with three-year stock which it has been customary to use in previous years. As a matter of fact, it appears to be better than three-year transplanted stock. *Several advantages stand out prominently* with this system—viz., less handling in the nursery; cheapening of the raising-costs by retaining in nursery for two years only instead of three; one mortality percentage by transferring direct from seed-bed to plantation; the elimination of lining-out and the occupation of less space in the nursery; the liberation of a larger area of land within the nursery for tree-raising purposes. The system cannot perhaps be applied to all species, but it is applicable to the main species being dealt with. As the scope of our afforestation policy expands it becomes necessary to go in for mass production, therefore it will be necessary to adopt wholesale methods, and, if practicable, the methods should be mechanized as much as possible.

Autumn Seed-sowing in the Nurseries in the South Island.

An experiment was also tried with the autumn sowing of seed at Hanmer Springs and Tapanui. At the latter station the result was disappointing, but at Hanmer it was successful in virgin soil. The seedlings were well above the ground long before the ordinary spring sowing was commenced, and it is possible that a fair portion of our seed-sowing could be done in the autumn months with advantage. The resulting seedlings in the case of *Pinus radiata* are almost large enough to transfer to permanent quarters in the plantation. In the case of the slower-growing *Pinus ponderosa*, *P. Laricio*, and other similar species, it gives a longer growing-period, and will give a better and sturdier two-year seedling. This matter requires further testing before risking a large sowing.

Plantation-thinning Project.

The loss of volume increment due to very close spacing in the early days of planting can be overcome only by extensive thinning over several thousand acres of plantations at Rotorua, Hanmer Springs, and Tapanui. Preliminary arrangements were made during the year to carry out a profitable experimental thinning at Rotorua. Various cultural rules as to extraction, disposal of slash, and felling have been put into force, and the initial experiment so far has progressed favourably. It is proposed to expand this work considerably during the current year.

Establishment of Plantations by Direct Sowing.

In order to continue the experiments under way at the Kaingaroa Plains Plantation a P. and D. Duncan "Star" drill was specially fitted and adapted to sow tree-seeds in two drills at any distance from 14 in. to 8 ft. in width and in quantities from $\frac{1}{2}$ lb. to 2 lb. per acre.

Early in November, 1923, the following seeds were sown:—

Name.	Amount per Acre.	Total Seed used.	Area covered.
<i>Pseudo-tsuga Douglasii</i>	$\frac{3}{4}$ lb.	27 lb.	36 acres.
<i>Pinus radiata</i>	$\frac{3}{4}$ lb.	52 $\frac{1}{2}$ lb.	70 "
<i>Pinus ponderosa</i>	1 lb.	63 lb.	63 "
Totals	..	142 $\frac{1}{2}$ lb.	169 "

The results at the 10th March, 1924, were: *Pseudo-tsuga Douglasii*, 907 trees per acre; *Pinus radiata*, 513 trees per acre; *Pinus ponderosa*, 169 trees per acre. The spacing has in the above trials proved better than in previous sowings with an ordinary grain-drill. This important experiment is to be continued.