

are admirably suited to the species named, also to pines. Care, however, must be taken to select, for spruce, not necessarily rich but fairly deep soils, if timber production be the object rather than ornament. This question of deep soil has a most important bearing on tree-culture for timber. To get size of bole the roots must go down. In a large number of the Canterbury plantations this fact has been lost sight of, in some cases unavoidably; and the result of tree-growth in shallow soil, with shingle deposit but a foot or so below the surface, is apparent in the spindley character of the gums and other trees—weakly specimens, of use neither for timber nor ornament.

In the forests of Victoria and Tasmania is what is locally termed “spar” timber. This description is applied to young trees which have shot up among the more vigorous grand specimens of their kind, and in the race for supremacy “the survival of the fittest” resulted. The stronger saplings shot ahead, and took possession of the sky space, leaving their weaker brethren struggling below. When the large timber is removed these “spars” remain, but they are useless for forest-renovation purposes, being old young trees which have become attenuated in the struggle for existence, and have matured in their half-grown or apparently young state. I mention this peculiarity of Australian forests because it may account in a large measure for the fact that in the bushes of New Zealand a similar state of things exists in the local pine groves, and has probably given rise to the idea that the pine is a very slow-growing tree, or that it will never be worth replanting. The true explanation is, however, found in the fact that forests need thinning. The practical value of a forest is enormously increased by judicious thinning; though Nature unassisted does this work in the manner described above, the process is very slow. The skilful forester can, however, assist Nature by removing such trees as can be dispensed with, thus giving the standards more vigorous growth, and bringing them to maturity in less time than under the natural conditions. The knowledge of how to thin a plantation is by no means common, and an unskilful person may easily cause sad havoc in a plantation for lack of practical experience in this work.

In starting a plantation care should be taken to study the character of the trees it is proposed to grow. The larch (*Larix europæa*) is a tree which thins itself, or is self-pruning. Hence it may be planted 8 ft. to 10 ft. apart. Eucalyptus may with safety be planted 8 ft. apart. The first thinning at eight or ten years, according to growth and intermixture of branches, follows in due course, leaving the trees 16 ft. apart. Then at next thinning alternate trees come in for piles or telegraph-poles, and the standard crop, 32 ft. apart, is left to attain maturity. In plantations of valuable trees “nurses” may be used, allowed to grow for three or four years, and then cut out.*

Spruce firs, with “nurses,” should be planted also 8 ft. apart—that is, an *Abies*, then at 8 ft. a “nurse,” and so on alternately. The “nurses” should be trees of quicker growth than the standard crop. By adopting a uniform distance—say, 8 ft.—thinning is made easy, because in our climate most of the trees grow and few gaps occur, while if these are filled up in the following year the substituted trees readily overtake those a year older. This question of uniform distance is most important, and should be steadily adhered to by planters. The tendency to overcrowd trees has been very prevalent in Australia, the result being that as the trees grow they have not sufficient room to expand and assume the form Nature intended for them. In botanic gardens and private estates this stupid error is very common, and has caused untold loss and general unsightliness. In such cases, when thinning becomes inevitable, it is found that all of the trees are hopelessly crippled, such thinning having been too long delayed. In too many cases it is now impossible to rectify blunders caused by overcrowding, without making a clean sweep of the standing crop. All Conifers require at maturity a space apart of 32 ft. when grown for timber, but if required solely for ornament should have 45 ft. to 60 ft., to allow for expansion of the branches.

THE PLAINS OF OTAGO.

There can be no doubt that plantation of the plains and foot-hills of Otago would be attended with success equal to that attained in Canterbury. The people of Otago, indeed, should do something better, seeing that they may profit by the experience of their neighbours, and avoid many errors committed by the earlier planters of that province.

EXOTIC TREES RECOMMENDED FOR PLANTATION.

The following exotics will, I think, be found most suitable for planting in New Zealand:—

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| <i>Pinus austriaca</i> (Austrian pine). | } All hardy good timber trees. |
| “ <i>laricio</i> (Corsican pine). | |
| “ <i>ponderosa</i> (American pine). | |
| “ <i>excelsa</i> (red pine), American. | |
| “ <i>maritima</i> (common maritime pine), Italy. | |
| “ <i>mitis</i> (sturdy free-growing pine), California. | |
| “ <i>stribus</i> (clear pine), America. | |

These comprise some of the best known and most valued commercial timbers in use all over the world. They are all hardy, and would grow well in a climate like that of New Zealand. I very strongly recommend the trees named in this list for any Government plantations which may be formed in either North or Middle Island, adding for the north the following:—

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| <i>Eucalyptus corynocalyx</i> † (sugar-gum). | |
| “ <i>goniocalyx</i> (grey-gum). | |
| “ <i>obliqua</i> | } (stringy barks). |
| “ <i>macrorhyncha</i> | |
| “ <i>capitalata</i> | |
| “ <i>rostrata</i> and <i>teretecorius</i> (red-gum) two species. | |

* This depends upon the height and growth of the young trees, and judgment must be used in determining the proper time to thin out.

† Nearly allied to *Pinus insignis*, but better quality of timber.