

is the uncertainty of getting supplies of the seed of several species. Any plans that are laid down for planting are upset if the supply of the seed of a species fails, the distance we are from the big seed markets making it quite impossible to make other arrangements in time. Suppose, for example, it is desired to plant an area with larch and Douglas fir in mixture: The larch-seed is procured without difficulty, while the Douglas fir seed-crop is reported as a failure, or partial failure. We subsequently have an abundance of larch plants and no Douglas fir, and both species must be even aged to succeed in mixture; or if any difference in the ages of the two species is permissible, the Douglas fir should be the older of the two. Supplies of seed of European species are much more certain than the American species.

Although the general principles of silviculture are applicable to any part of the world, the influence of the locality upon tree-growth must be taken into consideration in determining the species that may be successfully grown in mixed plantations. At Hanmer Springs larch and Menzies' fir do well together; but in the Rotorua District larch makes marvellously quick growth, while the Menzies' fir will not thrive unless planted under the shade of other trees. When planted along with larch, Menzies' fir make perhaps 1 in. growth a year for four years, while the larch has attained such a height as to completely smother them. Larch along with redwood has also been a distinct failure. The redwood, although naturally a quick grower—isolated specimens comparing favourably with the larch in this respect—does not readily recover after transplanting, being somewhat tender, with the result that the larch soon kills them outright. Larch and Douglas fir has proved a better mixture, but while one Douglas fir will hold its own with the larch there may be ten other trees that the larch overtops and suppresses. Our experience is that the larch must be planted pure.

Many specimens of growing trees for timber purposes are practised in the older world, and it is here proposed to give a brief description of the various methods employed, in order that the aims of the Department may be understood. In New Zealand we have had an abundance of timber suitable for almost all purposes, from general building timber to those kinds suitable for cabinetmaking. The latter class of timber is by no means exhausted, as many of our indigenous trees suitable for furniture-making have been almost entirely neglected; so that it is thought our Forestry Department's efforts should first be directed towards producing a supply of timber suitable for building purposes, to take the place of the rapidly disappearing kauri, rimu, &c., leaving the growing of the kinds especially suitable for furniture to a future date. Judging from the present state of the industries which use timber in this country, it does not appear desirable that timber of a small size should be produced, and therefore it is proposed to adopt, within certain limits, the system of high forest, or, in other words, a system that will enable the trees to grow into a large-sized timber. Against this there is the coppice system, by which material of a small size is produced. Trees that can be grown under the coppice system are those which, when cut down, make fresh growth from the stump or root, and this class includes such species as oak, ash, alder, willow, &c. A coppice plantation is formed by either sowing or planting in the ordinary manner. The purpose for which the timber is to be grown determines the size to which the trees are to be allowed to grow, and whenever the desired size is reached the plantation is cut clear. From the stumps which remain in the ground fresh saplings are produced. These are thinned to the desired density, and from what then remains a fresh crop of timber is in time produced. Such a system produces timber suitable for firewood or charcoal, tool-handles, basket-making, implement and vehicle frames. Oak is often grown in this manner for the sake of the bark, for tanning. At the present time a ready market could be found for New-Zealand grown English ash of almost any size. It is admirably suited for wheels, tool-handles, frames for vehicles, &c., being both tough and elastic. The supply of American ash handles has steadily become less plentiful and more costly, until at the present time other less suitable timbers are being used in place of it. The quantity of handles for slashers, picks, hammers, and similar purposes imported annually into New Zealand must be very large, and the time is coming when such articles will be too costly to buy.

Coppice plantations would also be a good investment in districts where firewood is scarce, the advantage of this system over one which includes the growing of conifers being the rapidity with which a new crop is produced if the trees are cut in the proper season. Several methods of growing coppice plantations can be adopted, but in each the principles of simple coppice already described are identical. In districts where the broad-leaved trees are liable to be frosted, shelter plantations of a hardy conifer such as larch could first be grown, and after it is well thinned the species for coppicing could be introduced by underplanting. Such a system permits of the production of both large and small timber on the same area. The shelter-trees, which should be selected from the light-demanding species, have space to develop, and, while giving protection to the under-trees, they in return have the benefit of the protection given to the soil by the under-trees. Where the climatic conditions are suitable this two-storied system can be attained by first producing a simple coppice plantation, and when the cutting commences leaving a number of trees at even distances to remain as shelter for the subsequent crop of underwood.

*High Forest.*—As has already been stated, this term covers a number of systems, in all of which the object aimed at is the production of large timber. It is proposed to here give a brief description of several systems of growing trees into large-sized timber, but first of all two points which are essential in each method will be recalled. The protection of the soil from the sun and wind by the leaf-canopy is essential for success by each of any of the systems that are adopted. By crowded planting the soil is quickly protected, and the height-growth of the trees is favoured, while the suppression of the branches necessary for the production of timber free from knots is assured.

*Clear-cutting High Forest.*—A plantation is raised in the usual way. It is tended by way of thinning, and when the trees have reached a marketable size the whole area is felled, and the process of growing a further crop is repeated as before. The production of timber grown under