

4. The kinds of timber that are required to meet the demands of the market. Timbers for general construction purposes are, of course, always in demand. Many other industries, however, require special kinds of timber, and these should be anticipated.

5. Diseases and insect-pests. So far there has been very little damage done to any of the plantations by disease or insects. These, however, are sure to come, and must be watched and dealt with as occasion demands.

6. Period of rotation. In forestry this term is used to denote the period between the formation of a forest and a final cutting. The period of rotation may be determined on either of the following lines:—

(a.) The object for which the timber is grown. This means that the timber is allowed to grow until it is a suitable size for a special purpose, without considering the financial aspect.

(b.) The period which best suits the natural reproduction of the trees.

(c.) The financial aspect. The quantity of timber formed annually in a forest may be fairly regular up to a certain period, after which the increase of timber gradually declines. Suppose, for instance, the investment is required to pay interest at the rate of 4 per cent. At a certain period the crop may yield the required interest; if cut before or after that period the interest would be less. Coppice forests, being worked on a short rotation, give a quick return, but the value of the produce would probably only yield a small interest on the capital invested. The production of very large timber requires a long rotation period, and if the capital invested is multiplied by the years of rotation, plus compound interest, the interest yielded may be very low.

Provision is being made for collecting all information that will assist towards making the plantations a success, both physically and financially, and as a start in this direction the enclosures are being subdivided, and plans of reference being prepared. Each compartment is being given a distinguishing number, and records of trees planted and all work done on each compartment is being kept.

*Choice of a System.*—The climatic conditions of the Rotorua District have left us little choice in manner of conducting the work of afforestation. As regards the choice of species, the hardiest kinds have been necessary, and of these the species producing the most valuable timber have been chosen. Although mixtures of species were planted at first, latterly all the species have been planted pure. This, so far, is all right, the land has been covered, the soil is being protected, and a condition absolutely necessary for the production of timber created. As most of the species planted, however, are light-demanding, there will come a time when they will fail to give the requisite amount of protection to the soil, and it is when this period arrives that a further choice of species and a system will become necessary. The question then arises, What system is the best to adopt? If the production of small-sized timber would meet the demands of the market, then in most cases a system of clear cutting could be adopted. Small-sized timber would, however, be hard to dispose of in New Zealand, and it is therefore apparent that some other system must be chosen. The species that have been planted are not suitable for a uniform system, so that each class will be mentioned separately.

*Larch.*—This species occupies more than half of the area that has been planted. It is extremely light-demanding, and, in this respect, does not protect the soil to an advanced age. If we consulted the best authorities on silviculture they would probably advise that the common beech (*Fagus sylvatica*) is the best species to mix with larch, either when the plantation is formed or when the larch thins out, by underplanting. Two difficulties stand in the way of carrying this method out. First, beech-seed cannot be procured in New Zealand, and will not carry from Europe; and, second, larch would kill out beech or any other tree planted along with it, owing to its fast growth. In Europe, larch is not now planted pure, owing to the prevalence of the larch disease, a trouble that can only be ameliorated by mixing another species along with the larch. This disease, so far, is unknown in New Zealand; but as it has such a disastrous effect on the larch, it seems common prudence to take measures to prevent it as long as possible, as well as to give it the least number of chances to spread if it should occur. This could be done by thinning the larch severely at an early age—about the twelfth to fifteenth year—and introducing another species by planting this under the larch that are left on the area. For this purpose the Oregon pine, Sitka spruce, probably the redwood, and *Thuja plicata* would be suitable. If, on the other hand, the liability of a disease affecting the larch is left out of the question, the plantations should be sparingly thinned as occasion demands, and then, when the crowns are too far apart to protect the soil, underplanting could be done with the above-mentioned species.

The period at which larch or any of the other light-demanding species open out depends on many circumstances, and in different districts it may vary considerably. On this point much information is still required, and this information can only be got by observations of our plantations as they gradually become older.

*Pinus Laricio and Pinus ponderosa.*—The former species, next to larch, is the one most extensively grown at the plantations. *Pinus ponderosa*, perhaps, comes next in the conifer class, but both species have been bracketed together, as it is probable that the same silviculture system will be suitable for both. Our observations up to the present reveal the fact that both these species require a fair amount of light, and, consequently, space to allow of their proper development. Just how long it will be advisable to allow them to remain in pure plantations is as yet unknown, and cannot yet be determined. Timber of a suitable size may be produced in pure plantations, but, if not, a system of underplanting will have to be resorted to.

*Pinus Austriaca, Pseudo-tsuga Douglasii, and Pinus Strobus.*—Each of these species stand more shade than the ones previously described. It is probable that these will protect the soil sufficiently to an advanced age, and that a system of natural regeneration could be adopted.

*Eucalypti.*—None of our plantations of these trees are sufficiently advanced to make it possible to give a definite opinion as to the proper silviculture system to adopt, but it is probable that the group system of natural regeneration will be found to be the most suitable.