Planting-systems adopted.

The impossibility of explaining thoroughly in the limited space available the planting-systems in vogue and ultimate results anticipated will perhaps be apparent to readers. Touching lightly on a subject of almost paramount importance in tree-growing for profit has, too, a tendency to confuse rather than educate one desirous of receiving a general idea of how the work is being conducted. It is, however, desirable to make a few abbreviated references to our present position, without dwelling too freely on the more speculative future of thinning, under-planting, felling, and timber-utilization.

By judicious blending of our practical knowledge of the requirements of the country, extending over fifteen years, with advanced continental practices, it is not a very difficult matter to determine appropriate modes of associating various trees in plantations.

Adverse criticism on some of our earlier experimental labour is occasionally uttered by persons who evidently fail to realize that without such experiments a suitable general working-basis would never be arrived at. Much knowledge has been gained regarding association of trees and afforestation-work in the various stages by private planters, who do not hesitate to diffuse any information solicited by the departmental officers, and in this way also help to lighten the experimental work.

No matter from what point of view the study of planting-systems is taken, high forest stands out pre-eminent in being specially adapted here for the raising of timber of a desired marketable size. This high-forest system, which may be arrived at by a judicious mixture of varieties suitable for the existing soil and climatic conditions, or by planting suitable light-demanding varieties pure, and eventually introducing shade-enduring species after thinning has been commenced, is now being adhered to. In the first place, close planting is absolutely necessary for ground-protection, and the inducement of straight branchless boles. Certain varieties exhibit greater tendencies to produce strong lateral branches—such as *Cupressus macrocarpa*—and naturally these varieties should be confined to an unusually small growing-space—about 3 ft. apart. On the other hand, the forceful nature of the leaders of eucalypti make it possible to attain equally satisfactory results by planting these as much as 6 ft. between each tree.

The light-demanding *Larix europaea* constitutes one of the most important varieties at present being grown. It is easily raised and transplanted, and up to quite recently has shown decided partiality to all tried situations. Most writers affirm that the growing of a thoroughly healthy crop of larch is a sylvicultural impossibility, owing to its susceptibility to a fungoid disease. There is no doubt that in mixed planting the liability to disease is more remote; but repeated experiments in associating larch in their youth with other trees of commercial value have clearly indicated the undesirability of substituting our present pure-planting for any mixed system.

At the present time larch is planted at 4 ft. apart, and we anticipate being able to conduct the first thinning operations—which will merely consist in removing the dominated or suppressed trees—when plantations are from fifteen to twenty years old. From that time onward periodical thinnings will be undertaken, and be followed by the gradual introduction of shade-bearing species of the Oregon pine or *Thuja plicata* types. Such trees as *Picea excelsa*, *Picea sitchensis*, *Pseudo-tsuga taxifolia*, *Fraxinus excelsior*, *Quercus pedunculata*, *Pinus austriaca*, *Pinus Laricio*, *Pinus ponderosa*, and *Pinus strobus* have been planted pure in suitable localities; but in the cases of the thinly foliaged trees under-planting will subsequently have to be resorted to.

Several large compartments have been filled with a mixture of English ash and spruce fir, and although both varieties have proved intensely slow growers in their youth, where the soil is of good fertility a uniform progress is being maintained. For the ultimate crop *Pinus ponderosa* is being nursed by *Pinus Laricio*, and both species are keeping well together. The yellow-pine, however, being the most valuable tree for succeeding under adverse conditions, is generally allotted the more exposed rocky situations where pure planting is followed.

The Department has practically ceased raising the undesirable *Acer pseudo-platanus* and *Acer saccharum*, both of which have proved to be utterly unsuitable for planting, even on semi-sheltered hillsides. In several deep gullies sycamore are making excellent progress; but as the more valuable ash also thrives under these conditions, the latter tree is now receiving preference. The swaying influence of winds on trees becomes more pronounced the higher the altitude.

Although we endeavour to partially restrain this ill effect by planting double lines of fast-growing shelter-trees—*Pinus insignis* or *Pinus muricata*—where practicable, little or no assistance in this direction can be rendered those trees occupying positions upon steep exposed hillsides.

Labour and Supervision.

The raising of about three million trees and afforestation of 1,025 acres annually, together with the allied maintenance-labour in pruning, &c., the previously planted 3,612 acres, involves an outlay of some £7,670, and provides employment throughout the year for an average number of sixty-four men. These figures, however, do not include prison labour, which is confined to the Hanmer Springs station, where the hearty co-operation of the Justice Department is responsible for the substantial saving effected in dealing with the permanent planting-work there. After due allowance is made for domestic and camp-maintenance duties, about ten prisoners are available, and the annual value of their tree-planting work may be computed at £57 per man. The total expenditure thus devoted to afforestation in the South Island section may be more accurately set down at £8,067. Although the Hanmer Springs tree-planting camp is a comparatively small one when compared with similar institutions in the North Island, equally satisfactory results are attained. Naturally, the amount of labour performed varies according to the nature of the ground being operated upon, and it would indeed be decidedly unfair to expect our Hanmer Springs workers to prepare daily on the existing hard gravelly surface a corresponding number of pits to those working on light pumice lands.