

used will be established: but the manufacture of paper-pulp from species suitable for that purpose, and the destructive distillation of wood (by which timber of any size subjected to great heat produces acetic acid, wood-alcohol, charcoal, and in some cases tar) seem to offer the best solution of the difficulty.

*Benefits of Afforestation.*—Many incidental benefits accrue to the district in which the work of afforestation is carried out, such as—(a) The beautifying of the landscape: the plantations already afford a pleasing relief to the eye wearied by the monotony of the prevailing scrub; and year by year as the trees grow larger they will become more effective in this respect. (b.) The conservation of water-supplies: in this district this would seem of small moment at present, but it will assume greater importance as the natural bush is cleared. (c.) The moderating of the extremes of temperature: forests have a similar effect to large bodies of water in making the temperature of day and night, summer and winter, more equable. As already stated, frosts occur in this district usually with a light southerly wind, and, since Whakarewarewa Plantation lies south of Rotorua, the temperature of this wind will be slightly raised at night. To what distance and to what degree this effect will extend cannot be foretold, but it should at least reduce the number and severity of frosts in the adjacent districts. (d.) A more immediate and tangible benefit is derived from the employment of a large number of free men and prisoners, and the consequent circulation of money in the district. Even at present this is a matter of considerable importance; but when the woods mature the establishment of the sawmilling industry must increase the number employed, and add to the prosperity of the district. However, these benefits are but incidental; the true measure of the value of the work is the service it will render to the State in providing a supply of useful timber when the existing native forests are exhausted, and the check that this supply in the hands of the Government will impose upon the operations of speculators.

#### DESCRIPTION OF THE PRINCIPAL TREES GROWING ON WHAKAREWAREWA PLANTATION.

[By D. J. BUCHANAN, Assistant Forester, Whakarewarewa.]

*Larix europaea* (*European Larch*).—The larch is a native of the Alps, and the Moravian and Carpathian Mountains. Height, under favourable circumstances, 120 ft. A true mountain species, it is found at an elevation of from 3,000 ft. to 6,000 ft., and even as far up as 7,000 ft. It is a very thinly foliaged, light-demanding species, with an undivided stem and thin conical crown; the branches are small, and soon die when deprived of sunlight; and, unlike other conifers, the species is deciduous. In this district the larch has proved itself one of the best species tried, and, with the exception that it is liable to be damaged by unseasonable frost when planted on low-lying country, is one of the most hardy. The young plants stand handling well, and it is without doubt the easiest of all to transplant, the percentage of failures being much lower than that of any other species. After the first two years, when it has become fully established, it grows very fast; and in the older part of the plantation the trees have since the time of planting increased in height at the rate of 3 ft. 3 in. per annum. Other species tried in mixture with it have mostly been killed out by the faster-growing larch, which is now for this reason always planted pure. Larch yields a most valuable timber, which is used for a great variety of purposes. Moderately heavy, hard, tough, and durable, it makes the best of railway-sleepers, and is excellent for fencing-material; it is used also for pit-props, for strutting and shoring tunnels, for bridge-building, for general farm purposes, and to a less extent for house-building. Venetian turpentine is also procured from the tree, and the bark is used for tanning and dyeing.

*Pinus austriaca* (*Austrian Pine*).—A native of Lower Austria-Hungary and the south-eastern Alps, where it ascends to an altitude of about 4,500 ft. It is rather a small, slender-stemmed tree, very rarely exceeding a height of 75 ft. The needles are placed two in a sheath, and the branches, which are numerous and strong, give the tree a compact appearance and make it very useful for shelter purposes. The Austrian pine is very hardy, and few failures have occurred in planting in this locality; it is rather slow in growth, and has averaged only 2 ft. per annum. For timber-production the trees must be planted very closely together to form a dense canopy, which will kill off the side branches; if planted widely apart the timber is full of knots and of very little commercial value. The planting of Austrian pine here has been discontinued in preference to the Corsican species, which grows much more rapidly and produces a more valuable timber. The timber of the Austrian pine is light, soft, and very durable, and is chiefly used for general building purposes. More turpentine is obtained from this tree than from any other European conifer.

*Pinus Laricio* (*Corsican Pine*).—The Corsican pine is a native of the south of Europe, where it is generally found growing in mountainous country. It attains a height of 150 ft. It is similar to the Austrian in the arrangement of its needles, but in appearance is a much more open tree, the branches being less numerous and not so strong, and disposed in regular, somewhat distant, whorls. It is also more light-demanding than the Austrian pine, and grows faster here, the average annual growth being about 2 ft. 6 in. Although it is perfectly hardy when established, the Corsican pine, on account of its poor non-fibrous roots, is always somewhat difficult to transplant, but nevertheless it is the most suitable forest-tree for planting in this district. Plantings of this species are now made pure; although in the past it has been mixed to a slight extent with *Pinus ponderosa*, owing to the similarity in the light-requirements of both species there is little to be gained by this method. The Corsican pine yields a light, soft, resinous, and durable timber, which is used for joists, rafters, door and window frames, pit-timber, telegraph-poles, and for scaffolding. The tree is said to produce valuable timber at forty years of age.

*Pinus ponderosa* (*Yellow or Heavy Pine*).—Native of the western States of North America, where, with the exception of the Douglas fir, it has the widest distribution of any of the timber-trees of the