

maker is able to measure correctly with his spade, to which an allowance of an additional 9 in. gives him the usual planting-space—4 ft.

At Hanmer Springs (where prison labour is employed) a specially designed pitting-line has been used for some years, and very accurate work is performed, even by totally inexperienced men. Some 70 or 80 links, 4 ft. in length, are constructed from No. 16 gauge wire, and jointed together. On this line being stretched across the pitting-ground in the desired direction, strained, and finally made secure at both ends, each prisoner takes his allotted place, and opens a similar number of pits immediately opposite the link-joints, after which the line is brought forward 4 ft., set parallel to the preceding one, and again pegged in readiness for pitting. Care is taken to have pits opposite each other in every other line. The daily number of spade-pits prepared individually by prisoners depends to a great extent upon the class of ground being afforested. On light easily worked soils as many as 700 each have been made in a day of eight hours; whilst on ground of a hard gravelly nature a similar amount of energy will be required to form 350 holes.

TREE-PLANTING METHODS AND CLIMATIC INFLUENCES.

Before expressing definitely the recognized most suitable time for tree-planting, attention might be directed to the effect upon which our changeable climate has in the matter. In certain seasons abundance of moisture is available from the time of planting onwards, and prospects of success are still further enhanced by the prevalence of a comparatively mild yet moist winter. Under these conditions the losses in planting-out rarely exceed 4 per cent., although when a severe winter is followed by almost persistent winds and a prolonged absence of moisture, it is not unusual to record as high as 8 per cent. in transplantation failures.

Without a doubt greater problems have to be faced in conducting our work in Central Otago. Owing to the severity of winter frosts (on one occasion the thermometer registering as low as 14 degrees Fahr. below zero), which are at times responsible for completely lifting newly planted trees out of the ground, we endeavour to commence the planting-work at Naseby about the early part of August, by which time the surface-soil is relieved of frost. The conditions obtaining at Tapanui and Hanmer Springs Plantations are, fortunately, much milder, and actual planting is often entered upon before the end of April, and continued with occasional intermissions until the beginning of October, during which period between two and a half and three million forest trees are planted out.

The mode of preparing pits having already been alluded to, a few brief remarks will be sufficient to explain the planting in operation. Where practicable a light spring dray is used to convey trees from the temporary depots to the planters; but the hilly and otherwise rough nature of a great proportion of the ground being planted makes it necessary to employ a packhorse, which, with heavy woven baskets, one on each side of the saddle, is able to distribute from conveniently arranged trenches a sufficient number of trees to keep from fifteen to twenty planters fully occupied. By keeping a record of trees thus dealt out, the employee in charge of the packhorse or dray is able to check the number of trees planted daily. For carrying trees, canvas bags, 17 in. long and 14 in. wide, with shoulder-straps, have given most satisfaction.

Although tree-planting was in former years carried on by two operators (one holding the plants and the other using the spade), the equally effective and certainly more economical method of single planting is now employed.

The adherence to the following points, as a rule, is maintained, although at times deviations are both necessary and desirable. Assuming that tree-planting is being carried out in grubber-pits: By a well-directed blow or two with the spade an upright back is formed on the side away from the prevailing wind, and on withdrawing the soil a sufficiently deep crevice is opened to comfortably insert the roots of the trees straight down. The planter—holding the young tree in one hand, with its root-collar on a line with the ground-surface—presses the most pulverized soil available against the roots, and by applying foot-pressure makes the young trees perfectly firm, and more able to withstand the injurious effects of high winds.

At each plantation this class of planting is carried on by day-labour, at an average cost of 10s. 5d. per thousand, each man being able to plant from 700 to 800 daily without undue exertion. At Conical Hills Plantation, where rough steep hillsides are being afforested, over a million trees were planted by contract last season under this system at 12s. 6d. per thousand. Specially careful supervision is essential during the progress of any contract-work, although the result of the experiment justifies its repetition.

Spade-pit planting has been principally carried on at Otago Central and Hanmer Springs Plantations, and at the latter station the prisoners connected oftentimes make excellent planting-tallies, which, under fair conditions, not infrequently reach 800 per man daily.

It invariably happens, in operating over large areas of ground, that small portions of a light or stony nature are encountered. The "notching" or "bar-planting" methods, which are the cheapest forms of planting recognized by officers, are then frequently introduced with advantage. A planting-bar, which is about 5 ft. in length, weighs 8½ lb. The handle is made of ¾ in. gas-piping, to which is welded a wedge-shaped steel-pointed foot 10 in. long and 4 in. across the top, tapering to 2 in. at the extremity. In manipulating the bar on scuffed spots prepared, the operator, by two or three driving movements, forces the tool into the ground some 9 in. deep, and by working the handle backwards and forwards a crevice is formed, into which the young plant is thrust. The opening is then closed by again driving the bar into the ground a couple of inches distant, and prizing the soil towards the plant. In computing the average cost of dealing with trees by this or the similar spade-notching—about 8s. 6d. per thousand—allowance must be made for the rough nature of the surface generally associated with dibbling and notching work. Failures in transplanting by bar are often traced to the omission of the necessary final heel-firming, without which no great success in any method will be realized.