

seed-kernels. Thick-meated or soft seeds quickly show signs of dryness when stored in a dry place, or, on the other hand, become too moist when placed in a cool situation. A medium and uniform temperature is generally favourable for the successful transport of any seeds, although further precautions in the form of hermetically sealed packages, or packing in finely powdered charcoal, are resorted to in many cases. Small amounts of such seed as *Pinus insignis* and *P. muricata* gathered from mature trees growing in the Dominion have been obtained annually, and such success has attended these sowings that on our plantations reaching a more mature age we hope to become practically independent of foreign supplies.

Certain exotic trees may take generations before becoming acclimatized to the conditions obtaining in New Zealand, and, although such trees may thrive, and yield prolific crops of seed, which on being sown produce strong plants, we do not yet possess sufficient knowledge to state with any degree of certainty if such vigour will be maintained during the life of the plant.

Well-bodied seeds from a healthy mature tree not only possess greater germinative qualities, but are also capable of enduring more adverse conditions after sowing. The possession of these facts has influenced the action of the seed-collectors for the Department in gathering only from specially selected trees.

During the past four years very limited sowings of hardwoods have been undertaken, simply because the nature of the ground now being operated upon is more suitable for coniferous tree-growing.

No difficulty is experienced in securing any desired quantities of hardwood seeds—oak, sycamore— which, on falling during the autumn period, are easily swept up and conveyed to the nurseries in sacks. It is customary to devote more care to the gathering of English ash, alder, beech, &c.; and in these cases hand-picking direct from the parent tree has been found to give the best results.

Before germination is possible, the external covering of the ash-seed requires to be in a decayed state, which is usually brought about by pitting in a mixture of sand and soil immediately the seed is collected—about the latter part of May. If the contents of the pit are kept damp, and periodically “forked,” the gradual decay of the seed-shell is brought about after twelve months, when sowing may be undertaken.

Seed-testing is always resorted to before finally preparing the seed-beds, as the quality of the seed at all times influences the density of sowing. In dealing with acorns, a trough half filled with water is used, and on emptying a reasonable quantity of the seed into this receptacle, and stirring the whole, the inferior acorns will immediately rise to the surface. A large proportion of such seed will germinate if sown; but experience proves that the resulting plants do not attain youthful vigour to such a degree as the heavier seed, and should be discarded. The vitality of other varieties is ascertained by simply cutting them open with a penknife.

The appearance of pine-seed kernels is oftentimes deceptive, for whilst the desired milky substance is discernible at the first glance, closer examination reveals the existence of a small cavity between the shell and kernel—a state which generally accompanies seed-decay.

A further test of germinative capacity can be made by placing, say, two hundred seeds on a plate which has been covered with a piece of damp flannel. The plate should be allotted a dark place, and care taken that the flannel retains its moisture. Irregular germination will eventuate from such an experiment when stale or immature seed has been used; but on counting the number which sprout, it is possible to estimate fairly accurately what may be expected in the general sowing.

#### PREPARATION OF GROUND FOR SEED-SOWING.

Climatic conditions experienced at the three South Island nurseries are sufficiently favourable for raising the hardier varieties of timber trees, and in this connection it has been possible to adhere to a general working-system, which, however, receives slight modifications according to the variations of the seasons. The ground selected for the raising of seedlings at each nursery is neither of an exceptionally rich nor damp nature, but of fair fertility, moderately compact, well drained, and provided with a reasonable amount of shelter from the prevailing winds. It is also imperative that a fairly level surface be available, otherwise, in all probability, the smaller seeds sown will be washed away if subjected to a heavy fall of rain. Although our germinating-grounds have been specially selected, it occasionally happens that we are compelled through the presence of the destructive bark-eating grass-grub (*Odontria zealandia*) to confine the season's sowing operations to a less-cultivated area, which has been previously utilized for transplanting purposes; and in this case the amount of preliminary labour in connection with the preparation of ground is, of course, considerably increased. It is not always practicable to adhere rigidly to any fixed method in transforming the surface-soil from its rough consolidated condition to a sufficiently fine state for the reception of seeds; but the following procedure, very briefly described, possesses many advantages, and is generally adopted:—

1. Assuming that we are about to operate on virgin ground, the first point of importance will be the removal of any heavy surface vegetation, preferably by burning, after which the area should be trench-ploughed to a depth of about 14 in. This first heavy plough-work (which usually costs 17s. 6d. per acre) is generally undertaken by private contract in the late springtime, to permit of the ground becoming sufficiently settled to receive a second cross-ploughing before winter.

2. Previous to the second working, a light dressing of decayed stable manure is applied, and two small ploughs are then brought into requisition, the leading one taking the opening furrow to a depth of from 6 in. to 8 in., whilst the following plough (from which the mould-board has been removed) is directed over the same course, and stirs up the subsoil to a further depth of from 4 in. to 6 in. By this means the ground is thoroughly loosened some 12 in. or 14 in. deep, and the gradual incorporation of surface with subsoil is almost as effectually accomplished as by the old and less speedy trenching by hand method.