WESTERN AUSTRALIA

FORESTS DEPARTMENT
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PROPAGATION OF EXOTIC AND NATIVE TREES AND PLANTS FROM SEED

A. Raising Trees and Shrubs in Pots or Other Containers

The majority of evergreen trees are adversely affected by any serious disturbance to their roots during transplanting and for that reason it is generally advisable to raise them in individual containers. The usual procedure is to sow the seed in seed boxes and to subsequently transfer (or prick out) the seedlings to pots or other suitable containers in which they are to remain until they are transferred either to the field, or in special cases, into larger containers.

The best time to sow the seed is in early spring as the weather is then warm enough to ensure germination and the seedlings have sufficient time to become established before the very hot weather sets in.

Hard coated seeds such as Wattles, Tree Lucerne, False Acacia, Carob Bean, Sturt Desert Pea, Bossiaea, Gompholobium, Hardenbergia, Kennedya, Hovea, etc. require treatment before sowing. If only a small number is involved the seed coat may be pierced with a gramophone needle or a similar very sharp piece of steel. The needle is mounted in a piece of hardwood for a handle and each seed is pierced just deeply enough to touch the white inner kernel. This allows the entry of moisture which is essential to start the germinating process.

Heat treatment of seeds, either with hot water or by burning debris over them is frequently employed, but such drastic treatment sometimes gives disappointing results. (Success has been obtained with several of the acacias by immersing the seed in a cup of water - just below boiling point and leaving it there until the water cools off. With large quantities of water and consequently slower cooling, results may not be so good.) Other methods involve the abrading of the seed coat or its treatment with sulphuric acid.

Eucalypts and the majority of other seeds do not require any treatment before sowing.

In inland areas where pricking out losses are likely to be high, as a result of high temperatures and low humidities, direct sowing into the pots and the subsequent thinning out of seedlings, is usually advisable. In fact, this was standard practice at the Kalgoorlie nursery. Similarly, some plants such as Carob Bean which do not prick out readily under any conditions, must be treated in this manner.

A box from four to six inches in depth, twelve to fourteen inches wide and twenty to twenty-four inches long will make a suitable seed box. Five or six holes about three-quarters of an inch in diameter should be drilled in the bottom to allow drainage. Over each hole place a piece of convex material, such as a piece of broken pot or china to prevent the soil running out. Then spread about an inch of charcoal over the bottom of the box, then a thin layer of straw or narrow leaves or dry grass, which will not impede drainage, and fill with soil to within half-an-inch of the top. A light loamy sand to which has been added some fine leaf mould should be used for this purpose, and, if possible, it should be sieved before use. Press the soil well down around the edges of the box and into the corners and level off the surface. Sow the seed evenly and fairly thickly and with a piece of flat board press it firmly into the soil. Cover seeds a little more than their own thickness with a sand leaf mould mixture; this can best be done by sieving it over the box with a fine sieve. Do not place the box flat on the ground, but on some support so that there is a small air space underneath and see that it is quite level, so that the soil and seed will not wash to one side when watering. As a further safeguard against this migration of seeds in the box, the surface may be subdivided into several compartments by lengths of thin straight stick pressed for half their thickness into the soil.

Watering of the seed boxes should be carried out as required, using a fine rose on the can. Holes in the rose should be approximately one thirtysecond of an inch in diameter, spaced half an inch apart. The holes should be punched and the burred edges left projecting and on no account be filed off. The soil should not be allowed to become dry nor should it be kept in a saturated condition.

The seed boxes will require protection from heavy rain or hot sun. A blind made of hessian of about the same texture as a chaff bag and placed over a frame to form a tentlike structure will run off heavy rain and give sufficient protection from the sun. If this is made so that the sides can be rolled up when required, it will also serve as a protection for the young seedlings after they have been potted.

Potting may be carried out as soon as the young seedlings are large enough to be handled safely - usually when they are about one and a quarter inches high. Some authorities advise (with Eucalypts) waiting until they have one or even two pairs of leaves above the cotyledons.

It has been customary in Western Australia to use 3" pots 4" deep, a size which is considered by some authorities far too small but which has been dictated by the expense involved in packing and despatching for long distances by rail. Larger containers permit somewhat better root development and give better plants. Other containers used, according to the availability of local material, are tubes of sisal paper, metal, bamboo, wood veneer, square concrete pots, and containers made of cane, banana leaves, plastic sheet, etc. Old food containers such as jam tins can be used. If the latter are used a number of small holes must be punched in the sides near the bottom to allow for drainage. It is also advisable to almost cut the bottom out of the tin, leaving it held in position by three or four small sections which can easily be cut at the time of planting. As it is usual to leave the tin round the roots when the plants are put in the field, it is advisable to burn it before use to accelerate its subsequent decomposition.

The pots or tins should have a piece of convex material (a piece of broken pot, broken china, etc.) placed over the drainage hole and the bottom of the pot filled with half an inch to an inch of charcoal.

The potting soil should consist of a good, rich loam, but it should not contain so much clay that it will set hard in the pots. A little well-rotted stable manure, leaf mould or bonedust mixed with the soil will encourage the growth of the plants. Contrary to general opinion, there are very few even of our Australian plants which will not benefit by the application of some fertiliser. If possible, the potting soil should be put through a half inch sieve before use.

It is advisable to water the seed boxes shortly before commencing to lift the seedlings. In removing the seedlings from the box, use a small trowel or an ordinary table fork. Take out a trowel or fork full of soil and gently separate the roots of the seedlings from the soil, taking care to break the roots as little as possible. Keep the roots damp and well sheltered from the sun and wind.

Prepare pots and soil beforehand, and have everything ready on a bench in a shady, sheltered position. Well fill a pot with damp soil and make a hole in the centre with a suitable smooth wooden dibber or even a finger. Take a seedling between the forefinger and thumb of the left hand and let the roots drop straight down into the hole. If the roots are exceptionally long, they should be trimmed so that it is not necessary to double them up in the bottom of the hole. Firm the soil well round the roots with the fingers and give the pot a tap on the bench to level off the top soil. When potted the tree should be slightly deeper in the soil in the pot than it was in the seed box. The soil in the pot should come to within only about half an inch of the top of the pot to allow room for water. Water immediately after potting.

After potting keep the young seedlings under heavy shade and in a well sheltered position for at least forty-eight hours and until

any tendency to wilt has passed. After that they may be placed under some lighter shade, such as that described for the protection of seed boxes, or in a bush house. The plants should be shaded during the heat of the day, but blinds may be rolled up at night unless there is a likelihood of heavy rain or frost. As the plants grow older and the weather becomes cooler, the period of daily shading may be gradually reduced and at the end of the summer may be finally dispensed with.

The pots should be placed on a level base, otherwise the soil will be washed to one side and over the edge when watering. Watering must be carried out regularly as required, but do not over-water so as to keep the soil continually wet. At first the watering should be carried out with a fine rose to avoid flattening the seedlings, but, as the plants grow stronger, a coarser rose may be used. A frame-work of boards or a bank of soil around the outside edge of the block of pots will help to keep them from drying out so rapidly and will also serve to protect them from being knocked over.

The pots must be kept free of weeds and they should be examined periodically to see if there are any roots protruding through the drainage holes in the bottom. These should be cut off before they get a firm hold in the ground underneath.

Plants raised in this way are usually large enough to transplant into their permanent positions in the winter following sowing. Although some may seem rather small, it should be remembered that small plants are not only easier to handle, but their roots are less likely to be "pot bound" and they suffer less shock from transplanting and generally make faster and better growth than big plants raised in the same sized containers.

If the grower decides that his plants are too small and he desires to hold them for another year, he should transfer them to some larger receptacle. If left in the small pot for the second year, it will be found, in the majority of cases, that the roots are just a tight, tangled ball and such a plant will rarely make satisfactory growth when transplanted. Even if satisfactory growth does take place for several years the malformed root system will render the tree very liable to wind throw.

To remove plants from pots, place the tips of the fingers of the left hand on the soil, with the stem between two fingers. Invert the pot with the right hand and rap the edge smartly on some solid object. The whole ball of earth should then slide out into the left hand.

If tins have been used instead of pots, it will be difficult to remove the ball of earth without damaging the roots. If the bottom of the tin has been almost cut around as previously advised, snip away the remaining pieces, remove the bottom and plant tin and all. The tin will soon rust away.

"Damping Off"

"Damping off" is a fungus disease liable to affect the seedlings of most plants, and many of our native plants are particularly prone to it.

When damping-off affects the seedlings, the small plants appear normally above the soil and may reach the stage where a second set of leaveshas formed. Then, for no apparent reason, the stalk becomes weak and the seedling falls over and dies. In a box of seedlings the whole number may be lost, or patches only may be affected.

There is no completely infallible way to control the disease, but the following precautions should be taken:

1. Use a well drained sandy soil.

2. Use fresh soil for each box of seedlings.

3. Sterilise any seed boxes and pots which have been previously in use. One method suggested is to dip them in a 40% fermalin solution and then leave in the open air for about three weeks before use.

4. See that surface soil in the pots is absorbent and does not permit the formation or persistence of a wet surface film.

5. Keep seed boxes in a morning sun position.

6. Water in cool part of the day, and preferably in the morning, but if essential during the late afternoon also.

7. Avoid over watering and do not allow soil to become water-logged by allowing drainage holes to become blocked up.

8. Seed boxes during the germinating period, and while plants are very small, may be watered by percolation - that is, by standing them in a tray of water a couple of inches deep until the soil surface is moist. They should then be removed and allowed to drain.

9. Where attacks by damping off fungus are prevalent, soil treatment with Chestnut mixture solution is advisable.

B. Raising Trees in Open Beds

This method has the advantage of heapness but unfortunately it cannot be applied to all species. However, deciduous trees and certain evergreens which transplant readily with bare roots may be raised in beds in open ground. Most of the popular pines (pinus) can be raised in this way, an exception being the Canary Island Pine, which should be raised in pots. Kurrajongs also can be raised in open beds.

A good loamy soil, well drained, but having some summer moisture, is the most suitable. If possible it should be in a somewhat sheltered position but should not be directly under tree shade or too close to established trees where root competition may be a serious handicap. The beds should be deeply dug, well raked to a fine tilth and levelled off. A dressing of well rotted stable manure or such artificial fertilisers as Blood and Bone or Bonedust should be dug into the soil.

There is a fungus (Mycorrhiza) associated with the roots of pines, and, unless this is present in the soil, pine seedlings will not thrive. Therefore, when pine seed is being sown for the first time in any piece of ground, soil from around some well established pine tree should be obtained and mixed with the soil in the seed bed.

Seed sown in open beds should not be broadcast, but should be sown in drills to facilitate weeding and cultivation.

In the South West, best results have been obtained from sowing seed in open beds about the end of August, but in drier areas it may be advisable to sow evergreens in the autumn as soon as the rains commence. Seeds of deciduous trees should, of course, always be sown in the late winter or spring.

Plants raised in open beds do not require a great deal of attention beyond weeding and an occasional cultivation. Unless natural moisture is available, watering during summer will also be necessary and the beds should be given a good soaking at regular intervals.

Deciduous trees should be left in the seed bed till the leaves have fallen, when they may be dug up and transplanted. Pine trees and Kurrajongs may be transplanted during June, July or early August, whenever weather conditions are suitable, i.e. preferably when the sky is overcast and the soil is damp.

To lift trees grown in open beds a sharp spade with a good long blade is required. This should be driven into the ground on either side of the row about three or four inches away from the trees and at a slight angle so that the two cuts meet at the bottom. If the handle of the spade is pressed downwards when completing the second cut the trees will be lifted out of the ground in a V-shaped clod of earth. The roots

may then be shaken free of the earth and wrapped in damp sacking for transport to the planting site. Any long, straggling or badly bruised roots should be cut off cleanly. Care should be taken to keep the roots moist and they should not be exposed to sun and air any more than is absolutely necessary.

Kurrajongs require extra care, as they have a single, long, carrot-like tap root which should not be damaged when lifting. When lifting these plants, it is advisable, to dig a trench on one side to the full depth of the tap root and from the opposite side work the plants forward into this trench.