

Selecting your planting stock: seedlings versus cuttings

Planting stock may be raised as seedlings or cuttings. Seedlings are cheaper, but for the best planting stock, the seedlings should be grown from genetically improved seed collected from a seed orchard. This stock will give you a better quality tree with uniform growth rate and more even size at harvest. Cuttings originating from the same mother tree will be the most uniform in growth and size at harvest. However, there is little genetic variability amongst cuttings and there is a risk of greater damage to the plantation following a single stress (frost, insects, disease) if the cuttings are susceptible.

Potted versus open rooted seedlings

Potted stock is supplied in paper or plastic pots and these may be single or more commonly, in trays. Potted stock should not have reached a size where roots are bound within the pot. You can check this by removing the seedling from the container. There should be no spiraling of roots. Modern plastic cells have root trainers on the inner walls to ensure that the roots grow downwards. The size of your pots will determine the desirable attributes of your stock.

Open-rooted stock has been raised in nursery beds from which they are lifted just before delivery. Potted stock may be quite small whereas open-rooted stock, which has usually been grown for longer before sale, may be quite large.

The quality and size of open rooted stock can be assessed further using the following criteria:

- The diameter of the stem where the root and shoot meet (root collar diameter: *see Figure 1*);
- The comparative size of root and shoot (root to shoot ratio (*see Figure 1*); and
- The appearance of the roots (*see Figure 1*).

Use the guide below (*Figure 1*) to learn about the attributes of desirable open-rooted planting stock.

What to watch out for

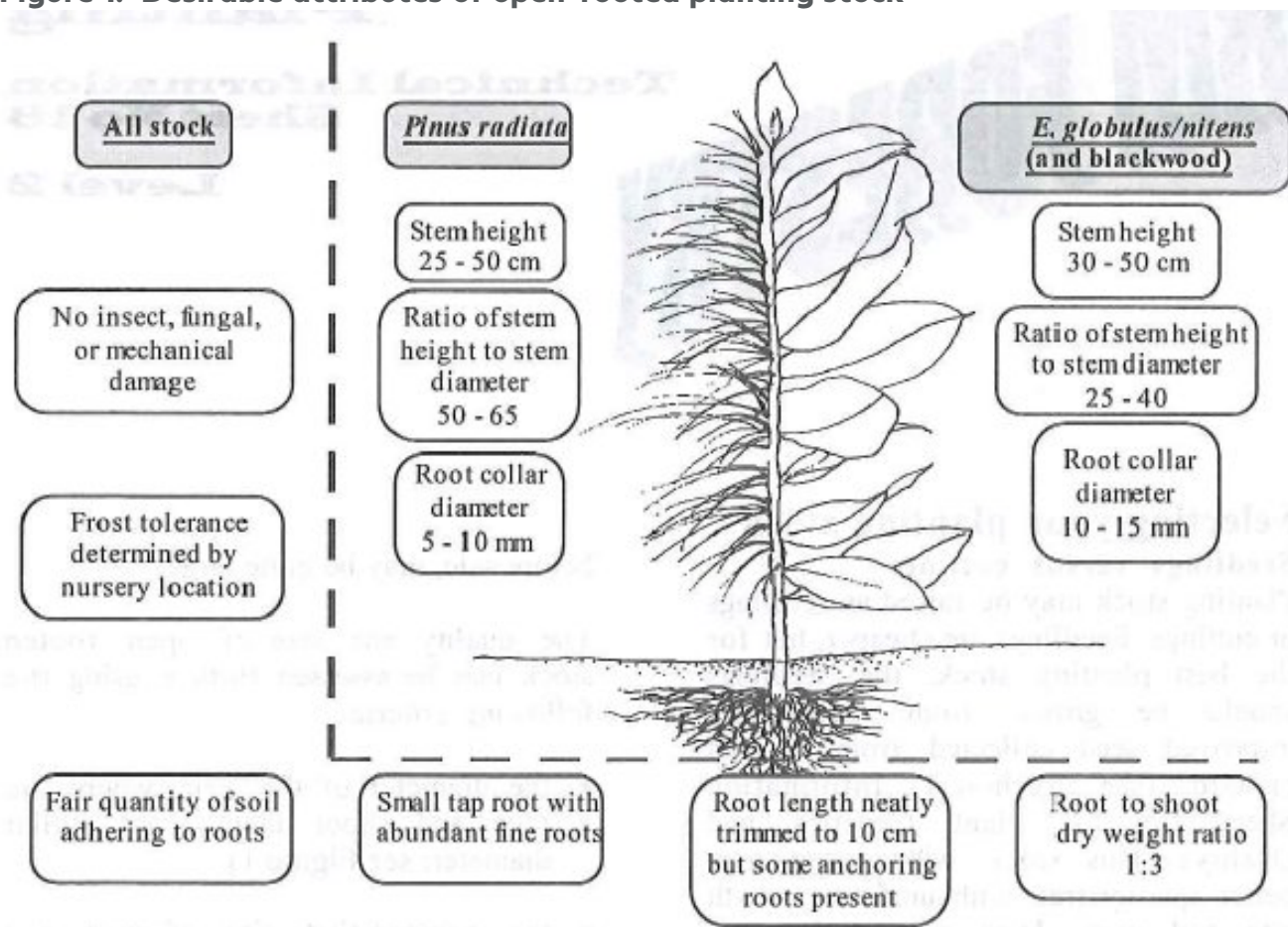
Stock chosen for planting should have a high survival rate (greater than 90%). Nursery practice can be adjusted to increase the level of survival of seedlings when they are planted out. Frost, drought and animal browsing are major influences on early seedling survival. The resistance of your planting stock to all these factors can be increased by hardening. The nursery can harden your stock by exposing it to cold nights (maximum frost hardening of eucalypts is obtained by exposure to minimum night temperatures of 0-4°C for 4 weeks).

Root-pruning and starving seedlings of nutrients will also harden stock. Hardy eucalypt stock usually has a red tinge to the foliage. Avoid material that is lush and green with

obvious recent new growth.

Once you receive your planting stock, make sure it has not been exposed to drying conditions and has not been squashed during delivery. Stock should be planted as soon as possible after delivery. If storage is required, this should be undertaken in cool moist conditions. Avoid elevated temperatures (greater than 4°C) that cause de-hardening. Therefore, seedlings should not be exposed to full sunlight and plastic bags should not be used for storage. Avoid exposure to wind which will dry seedlings. If open-rooted stock cannot be planted for at least three days, heel into moist, loose soil without separating the plants.

Figure 1: Desirable attributes of open-rooted planting stock



Planting technique

Once you have chosen your site and prepared it you are ready for planting. Planting should be scheduled during the period late winter to mid spring. Earlier planting may be necessary to avoid the risk of early drought stress on dry sites, and earlier or later planting to avoid severe frosts on cold sites.

Careful planting is essential. Poorly planted stock have poor survival and growth, and if roots are not placed in the soil with care the tree will be more susceptible to windthrow because of poor root development.

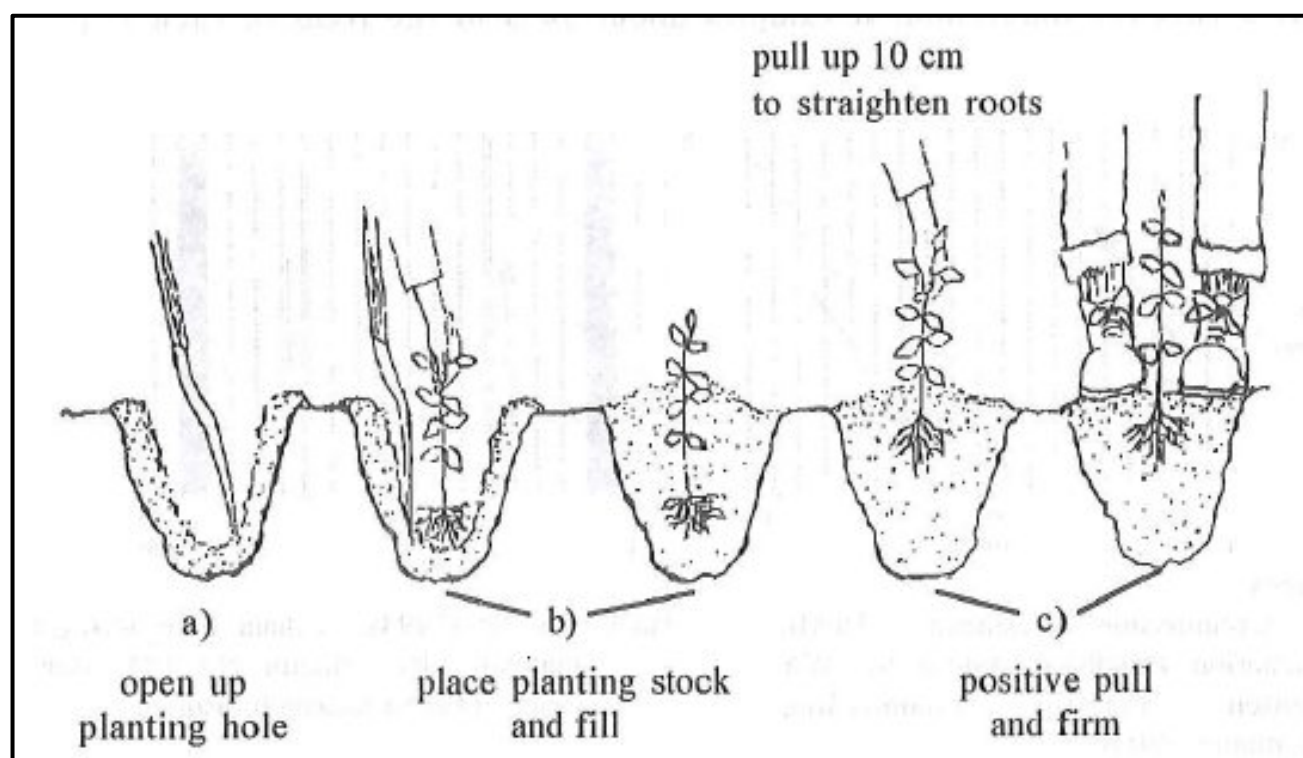
Tractor-mounted planting machines are available and are suited to well-prepared ex-

pasture sites (see *Private Forests Tasmania's 'Directory of Tasmanian Forestry Services'*). Hand held machines, for example the 'Pottiputki' planting tool, are also available. However, custom made planting spades are effective and well suited to the scale of farm forestry. Mattocks are less effective unless the ground is stony. Make a planting hole that accommodates the total root volume without distortion.

For open-rooted stock, use the positive pull technique (*use Figure 2 as a guide*). The positive pull technique has the following advantages:

- Avoids development of J-roots;
- Avoids air pockets;
- Trees are firmed-in;
- Avoids stem damage; and
- Straight trees are planted.

Figure 2: The positive pull technique for open-rooted seedlings



For potted stock with a small root volume, make a simple spade slit and place stock in slit beside spade. Withdraw spade, lowering stock to bottom of slit. Drive spade in adjacent to first slit, and after raising seedling to correct position, compress soil around the seedling to close the spade slit. Firm using heel on spade side of slit, then sole as for open-rooted seedlings (*see Figure 2*). Paper potted stock must be wet at planting. Tearing the paper may assist faster exploration of the soil by roots. Make sure no part of the paper pot is above the soil as it may act as a wick to evaporate water.

Protecting your planted stock

Your planted stock must be protected from browsing animals and weed competition.

Checking on survival

Between four and eight weeks after planting, survival counts should be made and, if necessary, replant immediately.

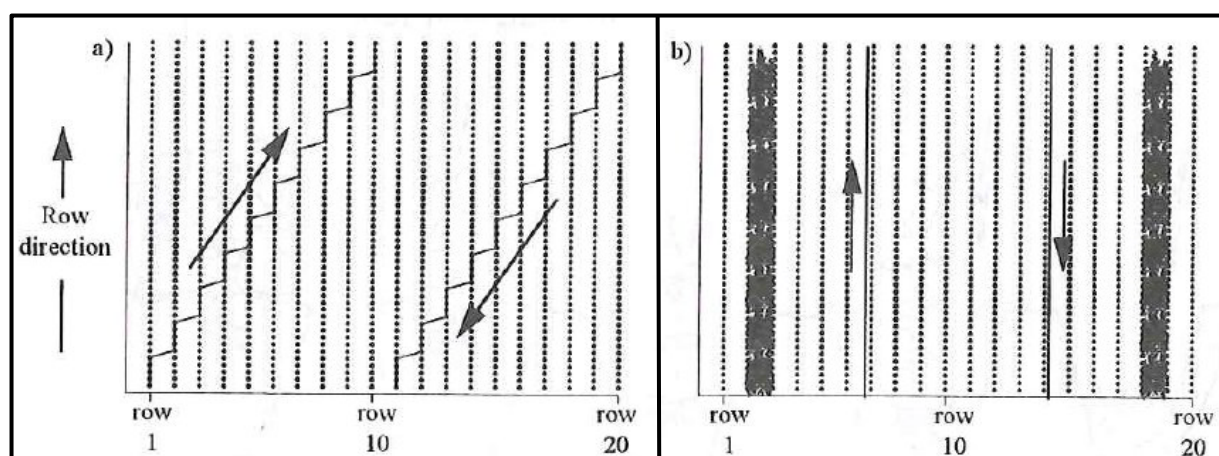
Survival counts can be done by randomly selecting a point at the end of a row near the corner of your block (e.g., bottom of row 1 in Figure 3a). How you arrange your counting depends on the shape of your block. Aim for a sample of about 10% of your planted area. Using *Figure 3a* as a guide, count survival in a given number of planting spots (say 5) before systematically stepping across and along the rows until you reach the other side of your block. (Long narrow blocks will require a greater number of counts per row before stepping across to the next row). Then move further along the block a given number of rows (every 10 for a 10% sample of your planted area) and repeat. Divide sample into blocks of 20 trees and calculate percent survival.

An alternative system is described in *Figure 3b*. In this instance, survival is counted along complete rows, percent survival being calculated as before.

If survival is greater than 90% replanting is not necessary. If less than 80%, or large patches have very low survival, reasons for such a high failure should be assessed before any replanting occurs.

Figures 3 a and b: Two methods of carrying out survival counts

- a) Samples about 10% of your planted area.
- b) The second method is described for a plantation established on a site where windrows are placed at approximately 50m intervals across the plantation. It samples about 14% of the trees in each bay.



REFERENCES

- Sustainable Timber Tasmania - 1990, Plantation Handbook. Edited by WA Neilsen. (Forestry Tasmania, Forestry Commission, Tasmania) - (p 270).
- MacLaren, J.P. - 1993, Radiata Pine Growers manual - FRI Bulletin No 184 - New Zealand Forest Research Institute.

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