Pinus Radiata Planting Techniques & Common Planting Faults

1. OBJECTIVE

To plant trees in a way that minimises stress and planting defects, promoting early growth and maximising survival.

2. PLANTING OPERATION PROCEDURE

2.1 Directions of lines and spacing

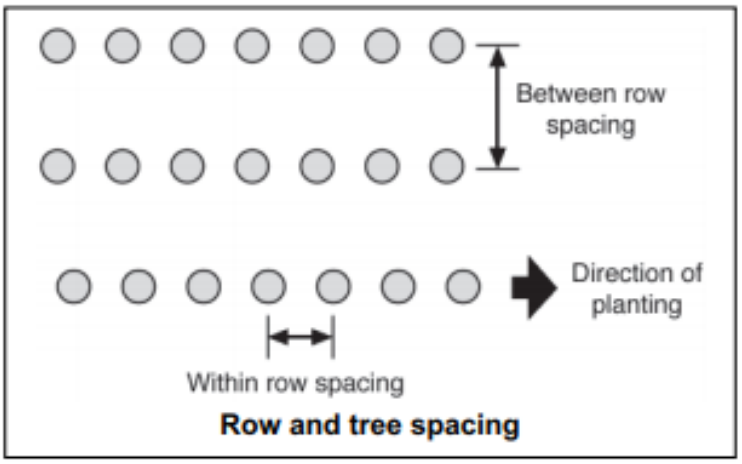
i) The Contractor shall plant trees at the prescribed spacing stipulated in the Prescription.

ii) The Contractor shall ensure that the trees are planted in straight lines. All such lines are to run in the same direction within any area to the boundaries as defined by roads, formed tracks, the edges of the working block or the edges of ripped or slash raked areas.

Selection of Planting Spots

Trees are planted in rows to:

- Make it easier to achieve the required stocking.
- Produce uniform branch and diameter growth.
- Allow planted trees to be identified from regenerated trees for future tending operations (e.g., post-plant spot spraying).
- Assist in the management of later silvicultural operations.

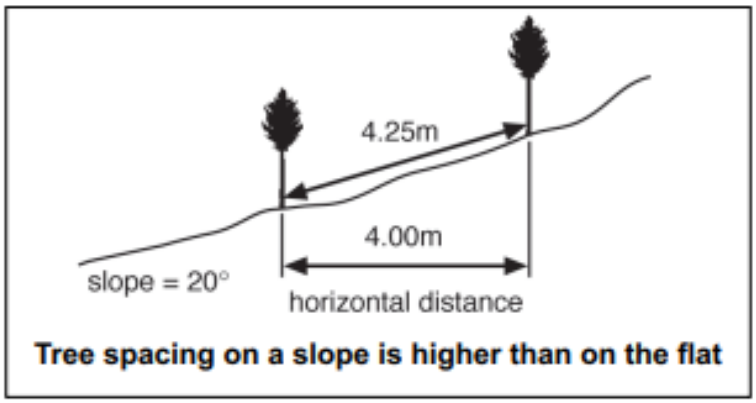


Row and tree spacing

The steps for selecting planting spots are:

1. Identify good planting spots.
2. Identify required row spacing.
3. Identify required tree spacing within rows.

The required stocking is achieved by planting trees at the correct spacing within and between rows. The row and tree spacing (and stocking rate) should be identified in the job prescription. Rows may be planted further apart than trees within the row to reduce planting and tending costs. The stocking rate needs to be uniform over the site.



Tree spacing on a slope is higher than on the flat

Stocking is based on a flat area (plane). Therefore, tree spacing will need to be different on flat and sloping ground to maintain the same stocking.

For a given stocking rate, tree spacing is greater on a slope than on flat ground. If the correction for slope is not made the stocking rate will be too high.

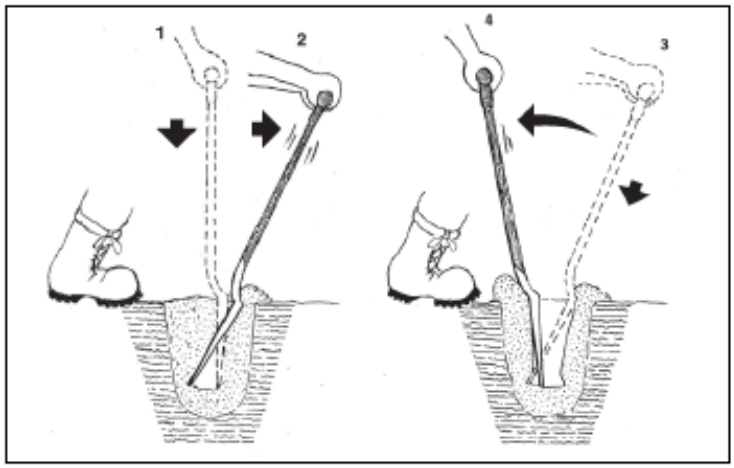
2.2 Planting techniques

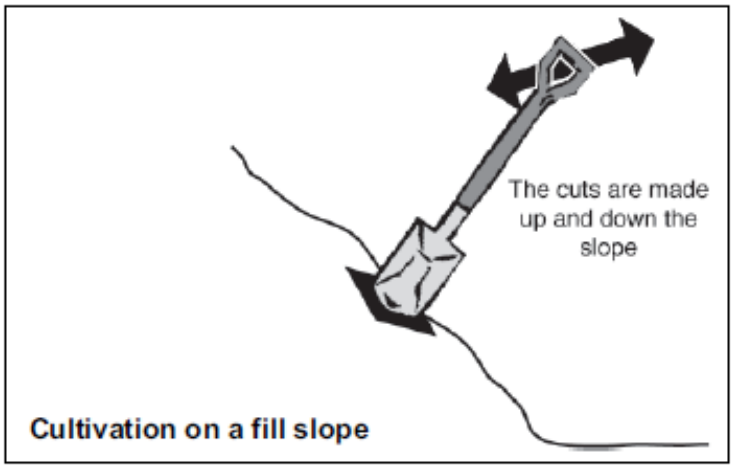
Cultivating the soil

The method used to loosen the soil will depend on soil firmness and whether there is a grass cover.

Method for Cultivating Loose Soils

1. Thrust the spade into the ground and use your foot to push it in to its full depth (25–30 cm) (1). Lever the handle back and down to loosen the soil (2).
2. Thrust the spade down (3) so that the blade bites and lever the spade forward (4) to further open the hole.



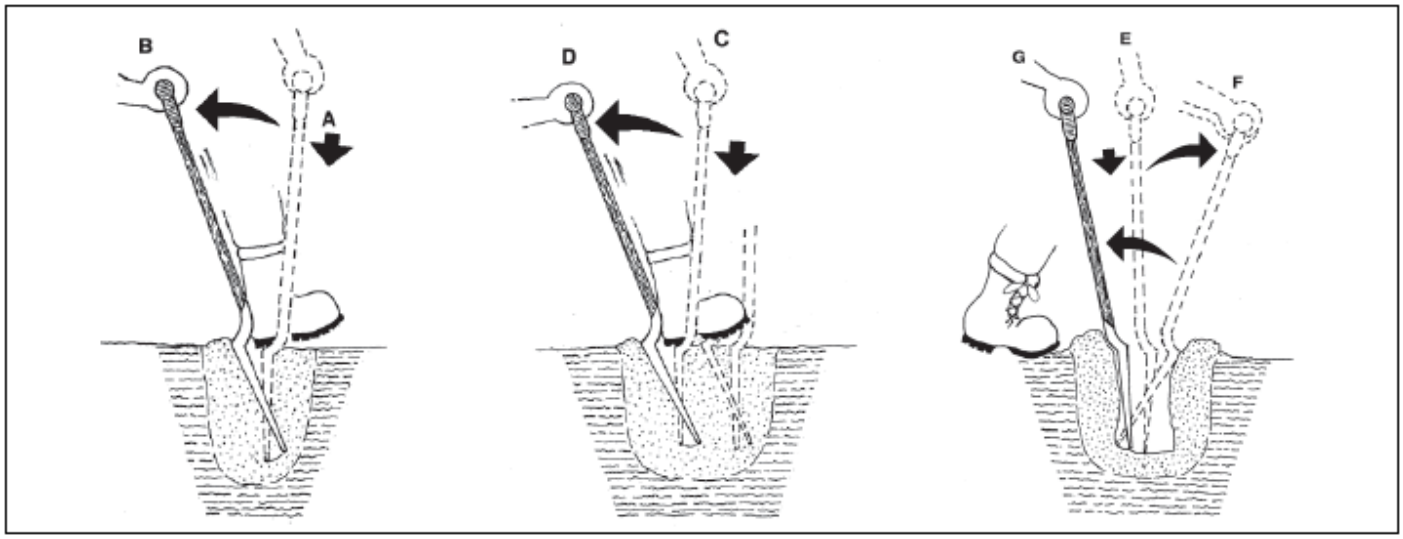


Where the planting spot is located on an erodible slope (such as a fill slope), angle the spade cuts so they are up and down the slope, rather than across it. This minimises the soil disturbance and soil loss.

Method for Cultivating Firm Soils

1. Thrust the spade into the ground and use your foot to push it in to its full depth (25–30 cm) (A). Lever the handle back and down to loosen the soil (B). Several thrust/lever actions may be required to get the spade to full depth in compact or heavy soils (clay).
2. Remove the spade from the ground and make a second cut parallel to the first (C), about 20 cm from the first. Again, lever the handle back and down to loosen the soil (D).
3. Remove the spade, turn it around 180° and use it to open a hole (not a slot) between the first and second cuts as follows:

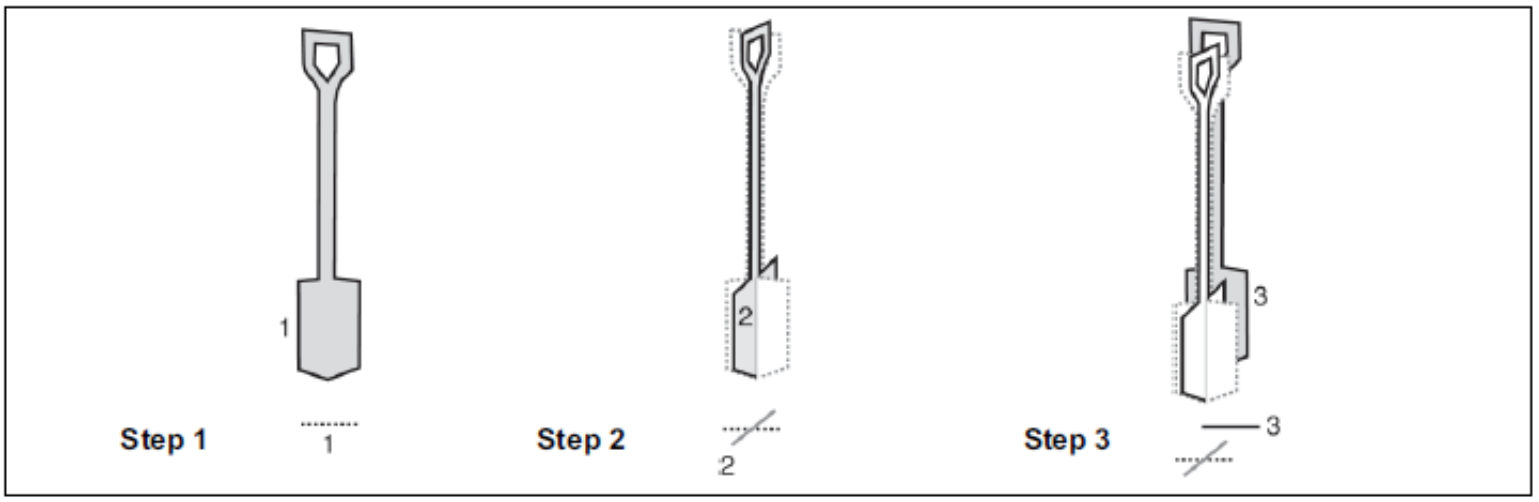
- Push the spade to the bottom of the loose soil
- Lever it back (E)
- Press down on the handle (F)
- Lever it forward
- Repeat until a wide hole is cleared particularly at the base.



Method for grass-covered sites

1. Thrust the spade into the ground and use your foot to push it in to its full depth (25–30 cm). Lever the handle back and down to loosen the soil. Several thrust/lever actions may be required to get the spade to full depth in hard or heavy soil (clay).
2. Remove the spade from the ground and make a second cut 90° from the first to form a cross. Lever the handle back to loosen the soil.
3. Remove the spade and thrust it into the ground in front of the first two cuts, and open a hole between the first and second cuts as follows:

- Push the spade to the bottom of the loose soil
- Press down on the handle
- Repeat until a wide hole is cleared.
- Lever it back
- Lever it forward



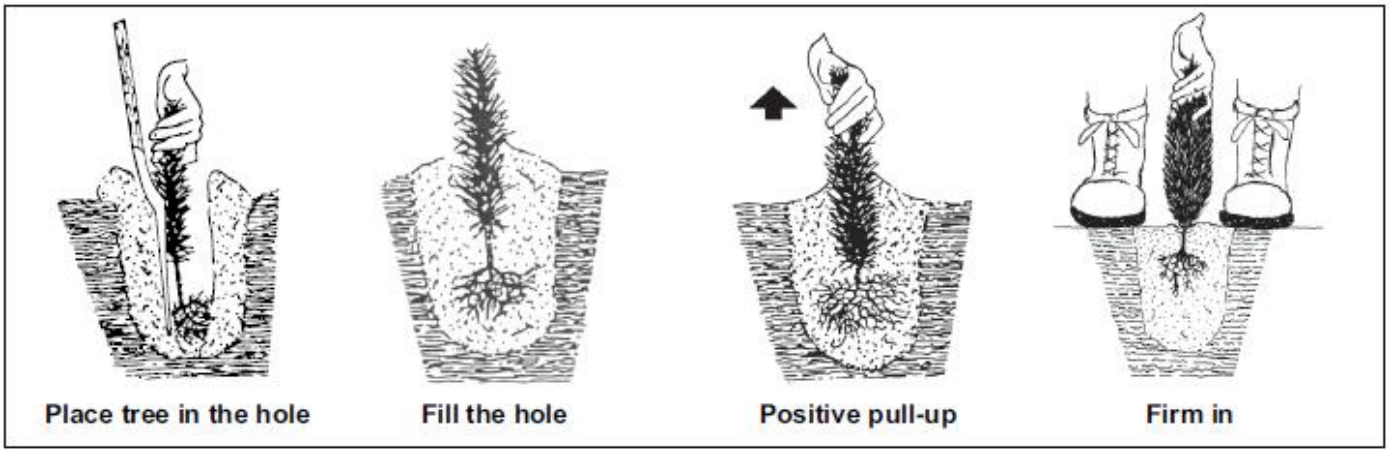
Planting the tree

1. ***After*** opening the hole, take **ONE** tree at a time from the planting bag.
2. Place the tree in the hole with the roots in the bottom.
3. Lift the spade clear of the hole
4. Holding the stem, lower down the tree, use your boot to push soil into the hole until it is filled. ***Note:*** *if using containerised stock ensure the whole plug is in the planting hole. The original soil of the plug should not be visible.*
5. Give the tree a positive pull upwards 5 to 10 cm to straighten roots. This should leave the stem buried in the soil to a depth of about **1/3 of the stem height.** ***Note****: if using containerised stock, a positive pull-up is not required and if applied will rupture the tree.*
6. Firm the soil around the tree by standing on it with the front of the boots. Be careful not to rub bark or foliage off the tree. Never use your heel to firm in. There should be no air pockets at the bottom of the hole. ***Note:*** *Containerised trees require only minimal firming to avoid root plug damage.*
7. Make sure the tree is vertical.

8. If the tree is damaged during planting (top pulled off during pull up or firmness checking) it should be removed and replaced with an undamaged tree. Do not pull the tree up using the tip.

DO NOT stamp the soil in with your heel.

If the soils are very loose, the hole opening and tree planting are combined as one movement.



Appendix 2: Common Planting Faults

Cultivation*	Any tree not planted in the centre of a cultivated zone of 25 cm deep, a width of a spade and a length of 25 cm as a result of spade placement during planting.
Damage*	Any stripping or damage to the needles or bark on the stem or roots.
Depth*	Tree planted greater than or less than 3-5cm above the nursery collar or the roots are not in mineral soil.
Loose trees	If the tree is given a gentle but firm pull or pushed mid stem and it moves, the tree is too loose.
Roots*	Any tree root twisted up or to the side, or its roots are squashed tight together as a result of poor planting technique.
Site selection*	The tree is not planted in the best site within a 1-metre radius of the specified planting site and preferably planted within the tree row. See also section 3 of the Planting Specifications.
Spacing*	Any row varying more than one metre from the specified row spacing. Any tree varying more than half a metre from the specified spacing, for no reason. This will also include unplanted spot cultivated sites
Vertical*	(Not straight) - Top of tree when planted varies more than 10cm from vertical.
Understocking	The acceptably planted trees per plot have a stocking less than 825 for prescribed stocking of 900.
Overstocking	In the event of an area being planted with more than 975 the Contractor may be charged for extra trees used.

* See pictures below.

Cultivation

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Tree is not cultivated to the depth of 25 cm (or a

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Damage

Needles are stripped and bark is damaged on the stem as a result of firming in the tree too close to the stem.

(a) Planted too deeply. Root collar is far too deep under the ground. (b) Planted at the correct depth of 3 to 5 cm above the root collar. Some foliage is under ground. Root collar is 3 to 5 cm below the ground. (c) Not been planted deeply enough. The root collar is above the ground level and no foliage is under the ground.

Roots

Roots are pointing up and the taproot tip is bent to the side.

Roots are all squashed tight or jammed together, and lower branches are also swept down. This is due to firming in before the positive pull up.

Roots are all pointing down and well-spaced and the taproot is pointing down

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Tree (c) is planted directly undera log and not in the best site within 1 m radius of the specified planting site. This tree will not be able to grow straight up. *Yellow line shows the log lying over the seedling.*

(a) & (b) These two trees have been spaced correctly. (c) Tree is only 1 m (length of a spade) from tree (b) for no reason.

Vertical

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Top of tree is more than 10 cm from base of tree

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