What is site preparation?

The aim of site preparation is to prepare the site and soil for tree planting. The steps involve:

- Clearing the site of previous vegetation;
- Cultivating the soil; and
- Controlling weeds (*see Information Series No. 7 – Weed Control*).

To avoid soil damage, site preparation should not be done during or after heavy rain, or when sites are very wet.

What are we trying to achieve?

Preparation of land for any crop (including trees) is essential for a successful crop and to protect the long-term sustainability of the soil.

Good preparation will:

- Minimise soil disturbance;
- Result in good seedling survival;
- Allow the crop to grow as uniformly as possible;
- Increase the effectiveness of weed control operations and minimise the use of chemicals;
- Mitigate against frost damage, waterlogging or drought;
- Reduce risk of wind damage later in the rotation;
- Reduce and cater for fire risk; and
- Provide good access for thinning and pruning.

Land preparation can be very expensive. The money spent will not yield a financial return for at least a decade. Therefore, it is wise to select land that will grow a healthy forest at the least possible cost. It is important however, not to cut corners in land preparation. A shoddy job will inevitably lead to poor survival, unhealthy trees, lack of uniformity and continuing problems throughout the life of the plantation.

Forest Practices Code

Preparation of a site for a plantation should take account of the Forest Practices Code. The code has strict provisions regarding the movement of machinery around streams and drainage lines. It is also designed to protect soil from damage and erosion. While the code does not apply to establishment of ex-pasture sites, it will apply once the site is ready to be harvested. It is therefore necessary to consider this when planning a clearing and cultivation operation. (*see www.fpa.tas.gov.au for additional information)*

Clearing

Clearing the site of previous vegetation can be done by one or more of the following methods:

- Mechanical clearing
- Hand clearing
- Chemical
- Burning
- Grazing

Mechanical clearing
Machinery such as bulldozers, excavators or large tractors are used to clear ex-forest sites of logging debris. This material is often stacked in windrows or piles for burning. These methods cause a significant amount of soil disturbance but are the only way of removing such a large amount of material. When deciding on the positions of windrows consider subsequent silvicultural operations (cultivation, planting, harvesting). When using bulldozers or tractors to build windrows use root rakes in preference to blades to conserve top-soil. The use of excavators for stacking material can reduce the traffic on site, and their ability to stack material quite high can lead to better burning of the debris and less area lost to piles of debris. A poorly burnt windrow can be a major obstacle during harvesting.

Hand clearing
Hand clearing is used for planting in native forest areas such as stream side reserves and conservation areas, where the aim is to keep disturbance to a minimum.

Burning
The use of fire is always a risky business. On ex-native forest sites it may be the only practical method of reducing the large amounts of debris.

Fire also contributes to nutrient depletion from a site, especially nitrogen, so it is not recommended unless absolutely necessary.

If fire is to be used, the burn must be well planned and resources put in place to control the fire. The fire should be regularly patrolled until heavy rain extinguishes any hot spots. Personnel and machinery will be required for this purpose. A fire permit may be required. (*Visit www.fire.tas.gov.au for information on fire permits*)

Grazing
On pasture sites, grazing is a great tool to reduce the vegetation prior to chemical weed control and cultivation.

Chemical
Chemicals are used to clear existing vegetation and to control the germination of unwanted weeds. For example spraying pasture prior to cultivation will result in better breakdown of turf.

Cultivation
The aim of cultivation is to:

- Enable the young seedlings to establish quickly
- Assist root growth
- Allow deep penetration of roots into the subsoil
- Conserve moisture on site, but allow for drainage in wet periods
- Minimise soil erosion
- Maximise the effectiveness of chemical weed control

The difference between trees and most farm crops is that the trees have deep roots which can extract moisture from the subsoil and fine feeder roots which exploit the nutrient rich surface soils. It is important to prepare the site to allow these two functions to occur.

Ripping

Very few soils require deep ripping to assist root penetration into the subsoil. Deep ripping is to a depth of 60cm to 1m.

Ripping may:

- Relieve the effects of soil compaction;
- Shatter hard pans below the soil surface; and
- Assist cultivation of surface soils.

Ripping should only be carried out when soils are very dry. Ripping of some soils, such as heavy clays when they are wet can do more harm than good.

Figure 1: Cultivation and weed control

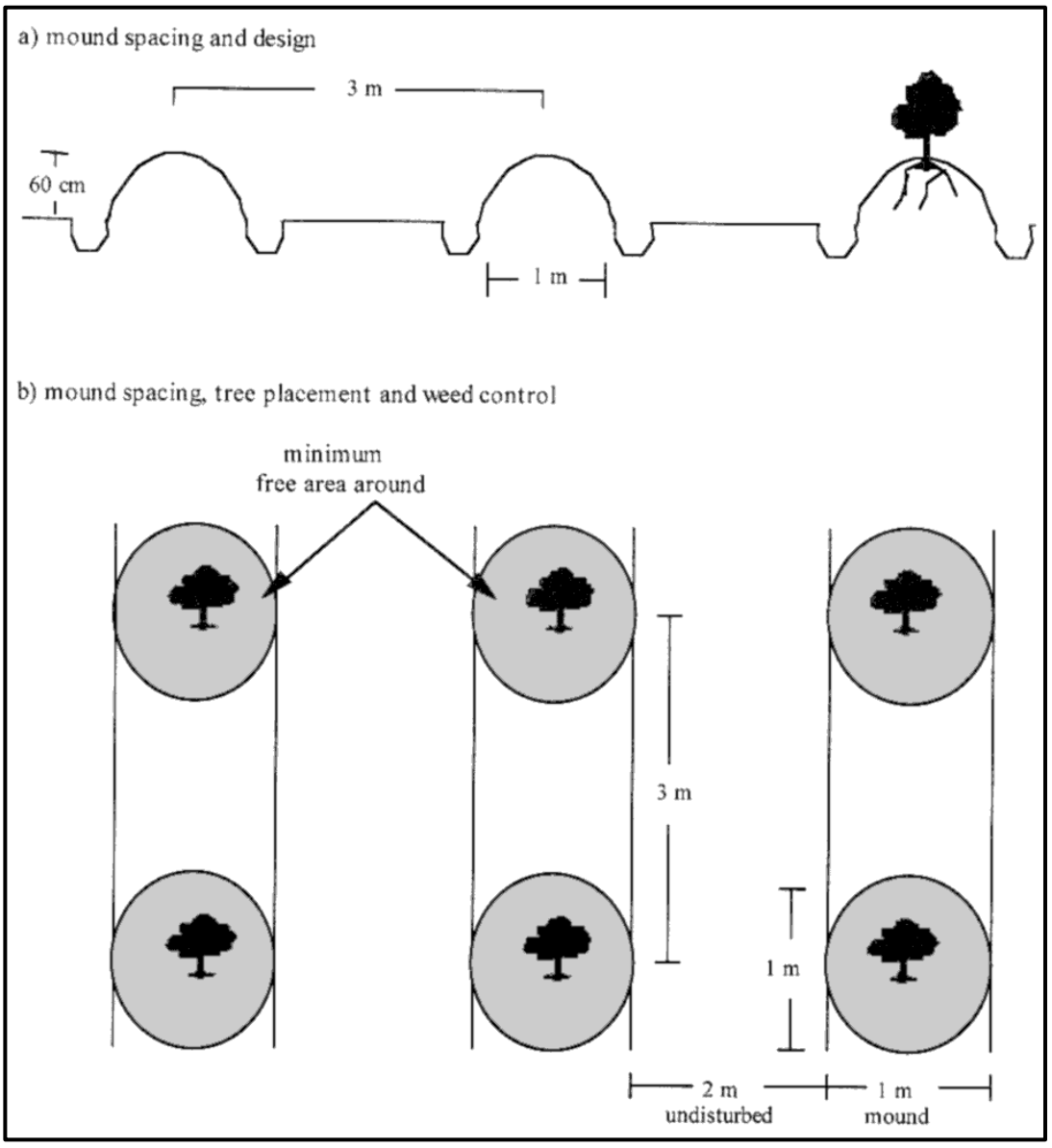

Figure 1 is for tree spacing of 3m x 3m (1,111 stems/ha). Row spacings vary from 3 to 5m and within row spacings vary from 2 to 4m, depending on the intended silviculture management. However, the principals remain the same regardless of spacing.

Mounding

The formation of a mound or raised bed will assist early tree growth on all soil types (***see Figure 1)***. The main benefit of the mound is the finely tilthed surface soil, which concentrates nutrients and allows for rapid surface root penetration in the first two years of growth. The existence of this fine tilth at the time of application of herbicides will increase the control period obtained from residual herbicides.

The height and width of the mound may vary depending on the site, but as a general rule mounds should be at least 1m wide and be at least 30cm above the general ground level.

On wet sites, mounds may allow the trees to establish and drain the site of excess moisture as they grow. The mounds can be up to 1m high on such sites. Swampy areas will be extremely difficult to establish and should be avoided in most situations.

Mechanical cultivation for plantations is done either as rows or spots. Spot cultivation is generally done by excavators using implements such as the Wilco® Spot Cultivator. These excavator mounted implements have been designed to cultivate the soil to a depth of 60cm to 1m and provide a fine tilth on the surface.

While row or strip cultivation may be done by bulldozers or tractors, a large bulldozers is needed if deep ripping is required. For trees to take advantage of the deep ripping, it is important that top soil is placed over the rip line (usually as a mound). Ask Private Forests Tasmania for information on ripping and mounding equipment for hire.

On ex-pasture sites it is advisable to make at least two passes over the planting row to achieve a fine tilth in the mound. The first pass should be made with an implement such as a moldboard plough, offset discs or other implement capable of creating a well formed bed. A second pass should be made a few weeks later with discs or a rotary hoe to achieve a fine tilth and to break up any clods in the mound. Air pockets in the mound can lead to poor survival.

Design

The design of row cultivation can be critical to conserving moisture on dry sites, reducing soil movement on highly erodible soils and removing excess water on wet sites. It is advisable to run mounds along the contour with a fall of about one to two degrees. On wet sites the fall should be towards drainage lines to direct excess water into the drain, while on dry sites the fall should be away from the drainage line to allow moisture to spread through the plantation. Design of cultivation should be considered in conjunction with road layout and future harvesting requirements.
It is not recommended to run cultivated strips up and down the slope.

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