Eucalypt Plantations

Info Sheet No. 2 - Establishment

Private Forests Tasmania

This series on Eucalypts has four parts. Each part can be read individually or as part of the series.

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2. **Establishment**
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ESTABLISHMENT

The successful establishment of any plantation crop requires careful planning, consideration of site factors, managing the timing of operations and consideration of the season. Establishment includes the selection of the planting stock, site preparation (cultivation and weed control), planting, and post-plant management (browsing and weed control).

PLANTING STOCK

Seedlings grown from improved seed where the genetics have been selected to increase growth and in some instances wood quality attributes targeted at solid and pulpwood products are readily available. Unimproved seed from native forest is not recommended for commercial wood production. The degree of genetic improvement, which can be significant, will be reflected in the cost of the seed/seedling. Generally, moderate genetic improvement comes from seedling seed orchards, highest genetic improvement comes from clonal seed orchards.

INITIAL STOCKING

The number of trees planted per hectare (stocking) is dependent upon the intended management regime for the future crop. Industrial scale plantations are typically established at stockings of about 1,000 stems/ha. Common establishment spacings include 3.0m x 4.0m (833 stems/ha) and 2.5m x 3.5m (1,143 stems/ha). Row spacing should be wide enough (3.5 to 4.0m is recommended) to enable access with equipment such as a tractor for slashing, post-planting weed control and future thinning operations. Wider row spacings also reduce cultivation costs when ripping and mounding.

Stockings at the lower end of the range:

- Require excellent survival to ensure maximum site occupancy and wood production.
- Have slightly lower establishment costs (reduced site preparation costs, seedlings, etc.).
- Have larger piece size at harvest (potentially reduced harvesting costs) for pulpwood regimes.

Stockings at the higher end of the range:

- Recommended for colder, high elevation sites, particularly those subject to exposure.
- A higher stocking is advisable for clearwood production as it provides a greater number from which to select trees of suitable form, vigour and spacing for clearwood pruning.

SITE PREPARATION

Site preparation prior to planting is required to facilitate successful establishment and involves the following:

- Cultivation (required most sites).
- Weed Control (essential).
- Browsing Control (essential).

CULTIVATION

Soil cultivation is usually required to:

- Increase the effective rooting depth and ease of root penetration through the soil profile.
- Increase moisture availability (particularly at depth), survival and uniform growth.
- Reduce waterlogging during the establishment phase on wet sites by mounding.
- Improve weed control, particularly when residual herbicides are applied to cultivated soil.
- Provide easier planting conditions and therefore cheaper planting costs.

Deep Ripping to a depth of 60cm to 1m should be undertaken prior to the autumn break when soils are dry to enable the subsoil to be shattered. Ripping to these depths requires large bulldozers. Deep ripping should not be undertaken when soils are very wet, as the subsoil is sliced rather than shattered. This can lead to soil damage and the concentration of roots along the rip lines, increasing the potential for windthrow.

Note: *Ripping is not suitable for all soil types. Deep sands will not benefit from ripping. Soils with dispersible subsoils should not be ripped as additional water infiltration can result in dispersion of the subsoil, leading to potential tunnel and gully erosion.*

Mounding concentrates topsoil along the planting lines and mounds should be positioned over the rip line. Mounds should be at least 30cm above the general ground level. Higher mounds are advisable for wet sites to increase drainage and successful establishment. Mounds should not consist of large clods as air pockets can reduce seedling survival. A second pass with cultivation equipment can be useful to reduce the extent of large clods of soil in the mound. Mounding in the autumn followed by spring planting is beneficial to enable winter rains to settle the mounds and reduce air pockets.

Row direction is important to conserve moisture and reduce the potential for soil erosion following cultivation. Mounding on the contour is advisable even on relatively flat sites. On wet sites a slight fall towards drainage lines can help to reduce waterlogging. On dry sites, a slight fall away from the drainage lines towards the ridges can improve moisture retention.

First Rotation Sites

It is standard practice to undertake ripping and mounding for the establishment of eucalypt plantations on ex-pasture sites. Cropping in particular can result in soil compaction. Some sites can be planted without cultivation, such as steep slopes with well-structured soils. Poorly structured soils will require cultivation. Spot cultivation may be possible on steeper sites.

Second and Subsequent Rotation Sites

Second rotation plantation sites are often spot cultivated. Spot cultivation, while expensive, provides numerous benefits. It is possible to plant between the stumps on second rotation sites and, although planting costs are higher, cultivation expense is foregone, resulting in considerably cheaper establishment. Snig tracks and landings usually require deep ripping to reduce compaction.

Note: *The Forest Practices Code provides guidelines and restrictions upon cultivation practices, depending upon soil type, erosion potential and slopes. Refer to the Forest Practices Code or seek further advice regarding cultivation for plantation establishment.*

WEED CONTROL

Pre-Planting Weed Control

Successful weed control prior to planting is essential to obtain successful, uniform establishment of eucalypts. In particular, the control of grasses is important on ex-pasture sites to reduce competition for resources. The use of residual herbicides, in accordance with label directions, is particularly important for weed control into the first summer. The presence of weeds during dry summer and autumn conditions can greatly reduce early growth and survival. Failure to control weeds successfully prior to planting can result in major difficulty and expense associated with post-planting weed control.

- Slash or graze the site to reduce the existing weed volume if grasses and broadleaved weeds are the major weed species. Woody weeds such as blackberry and wattles should be treated with herbicides 6-12 months prior to slashing or burning to ensure sufficient uptake and death of the root systems, ensuring minimal germination post-planting.
- Strip or broad scale spray with knockdown herbicides (e.g. glyphosate) along planting lines 4-6 weeks prior to cultivation. Although sites can be cultivated without initial knockdown, a finer tilth is often achieved if existing weeds and associated root systems are dead.
- Apply residual herbicide and plant in accordance with the label instructions.

The following herbicide chemicals are for guidance only and does not imply any endorsement by Private Forests Tasmania, additional advice must always be sought before selecting and applying chemicals.

General herbicide options for knockdown of existing weeds

- ***Glyphosate*** - knockdown capability only.
- ***Triclopyr*** - Woody weedkiller for the control of perennial weeds such as blackberry.

General herbicide options for residual control of weeds

- ***Terbacil*** - A water dispersible or granular herbicide for *E.globulus* and *E.nitens* plantations. It has limited knockdown capability. Existing weeds are best controlled prior to application, although can be mixed with glyphosate. It is designed to control weeds prior to the planting of healthy seedlings taller than 20cm.
- ***Clopyralid*** - A water soluble herbicide for use with eucalypts for pre-emergent control of flat weeds, legumes (including wattles), thistles and capeweed. It has no effect on grasses.

- ***Simazine*** - residual control only.

Note: *These residual herbicides have restrictions upon the method and volume of application depending upon soil types, slopes, proximity to watercourses, etc. More effective and longer lasting residual control of weeds is achieved when applied to bare soil following cultivation.* ***Do not*** *cultivate following the application of residual herbicides because soil disturbance will greatly reduce the effectiveness of the herbicide. Read the label carefully and follow any restrictions upon use. Seek expert advice before carrying out on ground work.*

Post-Planting Weed Control

Herbicide options for knockdown and continued residual control of weeds

- ***Terbacil*** - A granular herbicide that does not need to be mixed with water. For use in *E.globulus*, and *E.nitens* plantations. It is designed to control weeds less than 10cm in height and spread. Application is made 12 months after planting. A weed-a-metre can be used for spot application. Sufficient soil moisture is required for uptake by weed species.
- ***Clopyralid*** - Water soluble herbicide for use in eucalypt plantations for the control of a range of broad-leafed weeds. It has no effect on grasses.

Herbicide options for knockdown of existing weeds

- ***Haloxyfop*** - Selective herbicide for the control of grasses only. Can be sprayed over the top of eucalypts, provided label instructions are followed carefully.
- ***Glyphosate*** - Shielding against spray contact is essential as eucalypts are extremely sensitive to glyphosate. Can be successful with extreme care, although generally not recommended. Where possible, safer options for weed control are advisable.

Slashing: between the rows may reduce competition from weeds and improves access.

- Rows must be wide enough for a tractor and slasher and clear of obstructions.
- Steep side slopes can be hazardous.

Mulching

Mulching or the use of weed mats may be suitable in some bespoke cases but can be very labor intensive and expensive and is not commonly used for broad scale plantings.

BROWSING CONTROL

- Eucalypts are palatable to browsing species such as wallabies, possums, deer, rabbits, hares and livestock.
- Maintaining strips of pasture between the planting lines, or undertaking spot weed control, retains an alternative food source. However, browsing should always be anticipated and prevention taken prior to planting.
- Heavy browsing can be expected on ex-forest sites or on sites adjacent to forests where alternative food sources may be limited.
- Poisoning, shooting and trapping may be used individually or in combination. A permit from the Department of Natural Resources and Environment is required for these activities.

- Stock-proof fencing is required to exclude livestock. Stock may browse young trees or cause bark stripping. Cattle can also cause physical damage by pushing trees over as they move through the plantation.
- Although expensive, wildlife-proof fencing to exclude native animals is recommended where browsing pressure is high. Wire netting with an electric outrigger to exclude possums or electric fences with multiple hot-wires can be used.
- Tree guards and stockings can be utilised. Stockings provide good initial protection while seedlings establish prior to top growth. Guards are expensive in most instances and some guard designs can result in poor initial growth due to a lack of ventilation inside the guards.

FERTILISING

Fertilising at establishment can substantially increase early growth and survival on most sites.

- Either 100-150g DAP (Di Ammonium Phosphate) applied 1-2 months post planting, provided adequate weed control has been achieved, or 20g of a controlled release fertiliser (such as Multicote or Basacote) applied at the time of planting.
- Nitrogen (N) is usually the most limiting nutrient for eucalypts, particularly on lower quality sites. Later age fertilising with N can substantially increase growth rates on most sites.
- High quality basalt soils, particularly those with a history of fertiliser input, may not require fertilising at establishment. High N levels can result in poor form due to multiple leaders.
- Micronutrient (trace element) deficiencies can occur on some sites. Fertilisers containing micronutrients can be applied at planting if the deficient nutrients are known.
- Additional fertiliser, if required, should be applied at, or before, age 3 to ensure rapid canopy closure and maximum site occupancy.

Identification of fertiliser requirements can be obtained from existing plantations growing on similar soil types in the area where fertiliser requirements may be known. Once the deficient nutrient(s) are identified, fertilising can be undertaken from the ground or by air.

It is recommended that professional advice be obtained, as it may be difficult to determine the exact fertiliser requirements for particular sites.

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