

# Eucalyptus

Sustainable Land Management Programme

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## Introduction

Most Eucalyptus species are endemic to Australia (and closely adjacent islands), although several species originate in Papua New Guinea and Indonesia. Many species have been introduced into New Zealand, with the first trees being established by the early settlers in the mid nineteenth century.

NZ experience has identified a few species that have grown well, are untroubled by insects, and have demonstrated their potential for many uses such as timber, fuel, shade, shelter, erosion control and aesthetics. Selected species appropriately grown and managed can produce high-grade clear timber suitable for furniture, interior joinery, and other specific end-uses (eg: a source of short-fibred pulp for the manufacture of fine paper).

There has been a marked increase in eucalypt plantings in recent years and this information sheet focuses on the essential practical factors associated with ensuring a successful growth cycle through to harvest.

## Species Selection & Siting

No one species of eucalypt will thrive over the range of sites in a similar manner to *Pinus radiata*. Consequently any eucalypt species selected for planting must be suitable for the end use required and also be suited to the conditions of the specific site.

Species trials throughout New Zealand indicate that some eucalypts are better suited to certain regions than others. Guidelines on species choice are generally based on broad climatic regions, therefore some overlap may occur (refer to the Taranaki Regional Council information sheet on Eucalyptus species selection).

## Tree Stocks

As with any tree species, good quality nursery stock is important in the successful establishment and growth of eucalypts.

For large-scale plantings, seedlings are normally grown as bare rooted cuttings. These are much cheaper than container grown stock. Bare rooted seedlings should be lightly branched, about 45 cm tall, have a root collar of at least 7 mm in diameter,

a compact fibrous root system and dark green healthy foliage. Bare rooted stock can be planted from May to September, provided the seedlings are properly conditioned by undercutting, wrenching, and lateral root pruning. *E.Pilularis* and *E.Pyrocarpa* must be container grown. Stringy-bark eucalypts are generally best grown and planted as container grown stock also.

The costs of growing and transporting container grown seedlings are much higher than for bare-rooted seedlings. This method is used for species not easily raised as bare-rooted stock, establishment of seedlings outside the normal planting season, or filling small orders for farm, amenity plantings, or research trials. On unfavourable, droughty, exposed or low fertility sites (which are the norm in erosion control planting) container grown stock give greater survival and early growth rates, and is preferred in many situations. Container grown stock can also be planted out of season if necessary to avoid frost problems.



Figure 1 A eucalypt timber belt planted along an exposed roadside to screen a pine forest

Ideally container-grown stock should be planted out when the plants are 15-25 cm tall and have 6-8 pairs of leaves. Large plants receive a considerable check at transplanting, and the root system is often deformed and constricted in the container. This can result in death of the plant through 'strangulation' by restricting the transport of water and nutrients from the soil. A deformed root system can also make the tree prone to windthrow, particularly during the first few years after planting on a favourable site when shoot growth is very rapid.

## Establishment

The rapid development of young eucalyptus depends on the ability of their roots to extend into the surrounding soil. Growth on compacted soil is therefore poor and such sites should be ripped or cultivated prior to planting. For successful establishment, it is also necessary to remove competing vegetation, ensure careful transportation and handling, plant the seedlings correctly, and provide a suitable application of fertiliser.



*Figure 2 A well tended eucalypt stand*

It is essential to take care of tree stocks during transportation from the nursery to the planting site and during planting. Bare rooted stock should be planted no longer than a day after lifting to ensure a good survival rate. Seedlings grown in containers receive little damage during handling.

## Weed control

Weeds need to be controlled prior to planting. This can be achieved either by cultivation and/or chemicals. Eucalypts are more sensitive to weed competition and less able to suppress weeds than *Pinus radiata*, therefore greater care should be taken. Because of their susceptibility to sprays, it is advisable to carry out initial weed control **prior** to planting.

Glyphosate is one of the most suitable knockdown sprays and has proved safe to use if applied before

planting. Longer-term control can be obtained on sites where bare-rooted seedlings are to be planted if Atrazine, Simazine, or Carragard are also applied. Atrazine and Carragard have proved unsafe with seedlings raised in peat pots.

Release spraying of trees will normally be necessary 4-6 months after planting. Young container-grown seedlings of some Eucalyptus species can be affected by even low rates of Carragard and extreme care is required when using this chemical not to exceed 3 kg/ha active ingredient (terbumeton and terbuthylazine). Simazine at 1.5 kg/ha a.i. appears to be safe on most soils, although lower rates should be used on soils low in organic matter, particularly when irrigated. Do not use pre-emergent sprays on sandy soils.

## Planting Technique

Care should be taken to ensure that eucalypt seedlings are planted correctly. Bare rooted seedlings should have roots well spread out and be firmed around the stem without excessive compaction.

Container raised eucalypts need to be planted in well-cultivated soil to encourage the rapid development of a vigorous root system. If peat-based containers have been used the rims should be removed, otherwise they will project above the soil surface and can act as a wick, allowing moisture to evaporate making the pot wall impenetrable to the roots. The base of the pot should also be removed immediately before planting because it can act as a barrier to taproot development.

## Fertiliser Requirements

Eucalypts respond well to applications of nitrogenous fertilisers after planting. Urea is the cheapest source of Nitrogen, but can kill seedlings if carelessly applied. Based on the results of experiments with different fertilisers at varying rates, a suitable recommendation is bas urea applied in a spade slit 15-20 cm to one side and on the same contour as the seedling, soon after planting. Where there is a phosphorus deficiency 80 g of DAP is recommended. On some very infertile soils an application of phosphate may also be required.

Maximum response of a seedling to any fertiliser depends on the amount of weed competition during the vital first growing season after planting.

Nitrogen applied at planting is beneficial on all sites except those where natural fertility is high and where climate allows very rapid shoot growth.



These conditions can result in windthrow on exposed sites. On average or low fertility sites, nitrogen can be applied either as 60 g of urea in a slit 30 cm from the plant or as 20 g coarse grad Magnesium ammonium phosphate incorporated in the planting hole at the time of planting.

### Growing Systems

When growing eucalypts for timber the aim should be to grow large diameter trees, which produce long straight logs that meet the strict quality criteria for uniformity, strength, stability, working properties etc. Silviculture regimes suitable for achieving this include:

#### Woodlot-eucalypts only

- initial spacing of 2.5 x 2.5 m or equivalent – 1600 stems/ha
- at a height of 5.0 m – remove malformations, thin to 1000 stems/ha
- at a height of 10-12 m – thin to 500 stems/ha
- at a height of 25-25 m – thin to 200 stems/ha
- very little pruning is needed. Possible removal of persistent branches
- possibly prune to 6.5 m

**Note:** *This regime has proved to be expensive and results are inferior to a euc/pine mix.*



**Figure 3** *Eucalyptus oreades* - an attractive ash group species - bark is an important identification characteristic

### Woodlot – eucalyptus and pines

- eucalyptus spaced 2.0 m x 7-8 m – 1 row of pines between each eucalypt row
- retain 1 eucalypt in 4 and thin pines to 3 thinnings required. Local experience suggests that pines are all removed by year 8-10.
- eucalypts pruned to 6.5 m or more.

### Group planting

- 3-5 trees per group. Groups at 7-8 m centres (or about 600 stems/ha)
- reduced to one tree per group when best tree apparent
- final stocking 100-200 stems/ha.

Thinning is the major operation required because eucalypts need a large area to gain optimum diameter for quality timber. Generally a final stocking of 200 stems/ha has proved suitable for most species, however, 100 stems/ha is more appropriate to blue gums which need a large canopy to put on diameter.

### Silviculture

Pruning is usually necessary and the degree of silviculture will depend on the particular growing system adopted. To produce the greatest amount of high grade timber suitable for selected products such as 'clears' and 'clear cuttings' in the shortest possible time, some points to remember are:

- branches should be pruned before they are greater than 7.5 cm in diameter
- branches should be cut off as close to the stem as possible, to allow rapid occlusion, while avoiding bark damage
- form prune double leaders and ramiforms in tops before lift pruning
- life prune to lower (9 cm) diameter than pine to leave 3-4 cm of healthy green crown, leave a bigger crown if a number of ramiform (larger branches) have been removed
- silviculture should be aimed at producing a tree with a diameter at breast height of 75 cm in 35-40 years though some faster growing species such as *E.fastigata*, *E.fraxinoides*, and *E.Nitens* obtain this in 20-30 years
- because distortion and splitting is less pronounced in large diameter logs, it is recommended that most timber sawlogs have a minimum small end diameter of approximately 40 cm
- for maximum diameter growth the stem diameter/crown diameter ratio is site and species dependent. If the target is a tree of 75 cm in diameter at breast height the plantation/woodlot should be reduced to 15-200 stems/ha as early as possible.

## Pests and Diseases

### Insects

Many insects attack eucalypts, but generally only defoliating insects (notably the tortoise beetle *Paropsis charybolis*) cause serious damage particularly to *E.nitens*. Where eucalypts are situated within 1 km of indigenous bush, Platypus beetle attack may cause minor degradation of wood. An exception to this is that Platypus beetles are not found in Manuka scrub.

The Australian leaf-mining sawfly also damages eucalypts. One or two other insects are known to damage certain species (see Info Sheet #14: Euc species for Taranaki).

### Fungi

There are two fungi that attack eucalypts seriously, *Mycosphaerella cryptica* attacks the growing tips of *E.regans*/*E.delegatensis*, which may lead to forking. The other is *Sterium purpureum*, which attacks the wood wounds, including large pruning wounds, and causes heart rot.

### Animals

Eucalypts are less prone to browsing by a wide range of animals than pine. Hares however can be a problem at planting and adequate control measures should be taken.

Most eucalypts are palatable to hares and rabbits, and these should be brought under control prior to planting. Hares are the more difficult of the two and as they range widely it may be difficult to control the population over a sufficient area to prevent damage. Individual hare protectors constructed of wire mesh and fine plastic sleeve can be used effectively on wide spaced plantings.

For further advice or information contact:

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