



GROWING EUCALYPTS FOR TIMBER

Thinning eucalypts

Information Note 5

There are variations on the theme of when and how to thin eucalypts. This Information Note introduces some of the general principles of thinning, and emphasises the need to thin eucalypts promptly if good diameter growth rates are to be maintained through the rotation length.

Knowing your target end market and rotation length is important at the outset, as this will guide your thinning operations.

WHY THIN?

If growing trees for timber, normal practice is to plant many more trees than the number eventually planned for harvest. High early stocking density encourages trees to grow straight and tall, and restricts the size of branches.

Many of our eucalypt timber species come from 'wild' populations and have not benefitted from breeding programmes to improve form and growth. High initial stocking acts as an insurance policy because it allows trees with poor form and growth to be selectively removed from the stand while still retaining enough trees for a final crop of the desired number and quality.

If left at its initial planting density, a eucalypt plantation will grow many tall, small-diameter trees. Most eucalypt growers aim to produce clearwood (knot-free wood) from pruned trees. Clearwood is generally the most valuable timber. To maximise the volume of clearwood produced in a rotation, trees need to put on diameter and volume (grow fat and tall). Timely thinning is essential for this.

Timely thinning means a plantation:

- maintains its growth rate because trees are not competing with their neighbours for light and moisture
- produces larger, fatter individual trees and, if pruned, a higher volume of clearwood
- remains relatively stable in high winds.



A 6 year-old stand, planted at 1100 stems per hectare, ready for its first thin.



A 4 year-old *E. globoides* stand following its first thinning.

WHEN TO THIN EUCALYPTS

Eucalypts are light-demanding, and their lower crowns quickly die back if they are competing for light with neighbouring trees. The trees then grow upwards but do not put on diameter growth.

The trigger for thinning, therefore, is to look at the tree crowns. Thinning is due once crowns are touching.

Young eucalypts generally grow fast, so thinning often needs to begin at a young age – around 4-7 years, depending on growth and initial stocking rate. By this age the trees should have been form pruned (years 1-5) and also had a first pruning lift (from year 3 onwards).

Some growers may choose not to prune their trees, and rely on eucalypts' ability to self-prune. A very high initial stocking of over 1500 trees per hectare is need for this. Unpruned stands being grown for timber still need to be thinned if the plantation is to produce millable timber within a reasonable timeframe. If the aim is to produce small-diameter products such as posts, then a no-prune, relatively high stocking density regime, is ideal.



6-year old *E. fastigata* following its first thinning from 1100 stems per hectare to around 500 sph.

How rotation length, final stocking, individual tree size and total volume of timber grown interact – some indicative data for *Eucalyptus fastigata*

Thinning regimes must take into account the planned rotation length and the target number of trees in the final crop: there will always be a trade-off between rotation length, target final stocking rate, individual tree size, and the total volume of timber harvested per hectare. A 20-year rotation could suit growers wanting to grow a post and pole crop of a ground-durable species, while longer rotations will suit growers aiming to produce larger diameter, high-quality sawlogs from any species

Rotation length (years)	Final stocking (stems per hectare)	Average tree diameter at harvest (DBH* cm)	Total standing volume per hectare at harvest (m ³)
20	350	45	490
25	210	60	610
40	145	80	840

Trees planted at 1100 sph on an average site, grown on three hypothetical regimes. The 20-year rotation is thinned twice by age 8 to 400 sph, the 25-year regime is thinned twice by age 10 to 250 sph; the 40-year regime is thinned three times by age 12 to 200 sph. (Source: FFR *Eucalyptus fastigata* Calculator, available at www.nzffa.org.nz)

* DBH = diameter at breast height, 1.4m from the ground.

HOW MANY TREES SHOULD I REMOVE AT THINNING?

With eucalypts, a key objective is to minimise crown competition whilst maintaining small branch size. If a stand is overthinned, the risk is that big branches will develop in the crown, and the unpruned 'top logs' will be downgraded by sawmillers. However, underthinning is worse because tall trees with small diameters are unlikely to be as valuable as large diameter trees even with a heavily branched crown.

If the aim is to grow large sawlogs, then final crop stocking of around 150-200 stems per hectare can be achieved by two to four thinning operations removing up to 50% of the trees at each thinning by age 10-15; the lower the stocking, the longer the optimum rotation and the larger the individual trees at harvest. If a shorter rotation posts and poles crop is planned, then one or two thinning operations to bring stocking down to 400-600 stems per hectare should suffice.

HOW TO THIN EUCALYPTS

Thinning provides the opportunity to select the best stems in a crop, cull any diseased stems or stems with poor form, and then remove additional trees until the target stocking for that thinning operation is reached.

One approach for novice growers is to mark a sample area of trees to be thinned with 'dazzle' paint, monitoring tree form and crowns for crowding while targeting a stocking density and hence spacing of the trees to be left standing (see table). Thin this area, then assess the area again, checking that remaining crowns have plenty of space to grow. This will help you 'get your eye in' for your ideal thinning intensity. Continue from there.

Example target stockings(stems per hectare) and spacings for eucalypts over a rotation

Spacing between trees (metres)	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
2.0	2500	1666	1250					
3.0	1666	1111	833	666	555	476		
4.0	1250	833	625	500	416	357		
5.0		666	500	400	333	285		
6.0		555	416	333	277	238		
7.0		476	357	285	238	204		
8.0						178	156	
9.0							138	123

Planting (sph)
 First thin (sph)
 Second and further thins (sph)



Photos: John Milne, Paul Millen/NZ Dryland Forests Initiative, Harriet Palmer.

PRODUCTION THINNING: HEARTWOOD IS ALL-IMPORTANT

Production thinning entails extracting and milling trees which have been felled in a thinning operation from a mid-aged stand. With eucalypts, the trees need to be big enough to have laid down a reasonable amount of heartwood before harvesting. Like all trees, eucalypts produce outer rings of sapwood and, as they grow older, heartwood. The older the tree, the higher the heartwood to sapwood ratio. Heartwood is more durable than sapwood; it is heartwood that sawmillers are interested in if the sawn timber is for exterior applications such as decking. For flooring and internal applications, sapwood is generally acceptable.

On some sites it may be possible to progressively thin mid-aged stands and mill some of the larger logs. Eucalypt logs ideally need to have a minimum 'small end diameter' (SED – i.e. the diameter at the narrow end of the log) of 30 cm before they are worth sawing.

Access to, and within, the plantation needs to be good enough so that individual logs can be extracted cost-effectively. Production thinning requires skilled, experienced operators if damage to standing trees is to be minimised, and does require considerable care. Many eucalypt species are prone to bark damage by, for example, the wheels of skidders and the wire ropes that are used for hauling. The grower needs to weigh up the value of the thinned wood versus the potential damage to the final crop.

1: Thinning gives the opportunity to remove trees with poor form such as double leaders.

2: Marking a tree to come out.

MORE INFORMATION

The best source of information on growing eucalypts for timber is the NZFFA Eucalypt Action group. We recommend you join this group.

This information note is one of a series produced by the NZ Farm Forestry Association with funding from the MPI Sustainable Farming Fund. A series of videos is also available.

www.nzffa.org.nz

