Softwood species

Including Cypress, Cedar, Fir, Redwood & Spruce

Info Sheet No. 2 – Management Regime

Private Forests Tasmania

This series on Softwood species including Cypress Cedar, Fir and Redwood has two parts. Each part can be read individually or as part of the series.

1. Overview
2. **Management Regime**

MANAGEMENT REGIME

While there are several regimes that could be applied to the growing of cypress species for timber production, an intensive management regime is considered by many to be the most appropriate. The following is one possible regime based upon experience in New Zealand.

- Relatively high initial stockings at establishment.
- (E.g.: 3m x 3m spacing for 1,111 stems/ha)
- Weed control prior to planting.
- Fertilise following planting.
- Release spray for the first two seasons.
- Form pruning in years 1 and 2 to increase selection.
- Commence clearwood pruning when trees are 1.5m - 2.0m tall.
- Regular variable lift pruning with 0.5 to 1.0m lifts.
- Pruned stocking of 300-400 stems/ha.
- Non-commercial thinning to 600-800 stems/ha by age 6-10. (Trees of poor form are culled).
- Mid-rotation commercial thinning to 300-400 stems/ha.
- Clearfell at age 30-40.

STOCKING & ROTATION AGE

High quality sites

(E.g.: basalt soil, high rainfall and mild to warm low elevation sites).
A 25-35 year rotation with a final pruned stocking of ~400 stems/ha is anticipated. Commercial thinning of the unpruned trees at age 15-20 for small diameter knotty sawlogs is a possibility.

Low quality sites

(E.g.: low fertility soil, low rainfall and colder, higher elevation sites).
A longer rotation of 35-45 years with a final pruned stocking of 300 stems/ha or less is anticipated. Commercial thinning of unpruned trees at age 20-25 may be possible.

The following labour estimates are based upon an intensive management regime. Estimates are for a site planted at 3.0m x 3.0m (1,111 stems/ha) and a final pruned stocking of 400 stems/ha, pruned to 6.4m.

Table 1:

Activity	Year	Timing	Labour (Hours/ha)
Establishment *(Seedlings, planting, weed control & browsing control)*			
Order Seedlings	-1	Spring	-
Weed Control (1)[1]	-1	Summer	0-5
Plantation Layout[2]	-1	Autumn	1-3
Weed Control (2)[3]	-1	Autumn	8-12
Fencing (browsing control)[4]	-1	Autumn	10-15
Planting[5]	0	Winter	15-20
Fertilising[6]	0	Spring	4-5
Weed Control (3)[7]	0	Summer	10-15
Weed Control (4)[8]	1	Spring	0-15
TOTAL - Cypress Establishment			**48 - 90**
Management *(Pruning & Thinning)*			
Form & Clearwood Pruning	2-10	Spring	85-128
Thinning (non-commercial)	6-10		10-15
Thinning (commercial)	~15		-
TOTAL - Pruning & Thinning			**95-143**
TOTAL - Establishment & Management			***143-233***

Note: Estimates are a guide only and may vary depending upon a number of factors.

Most operations can be undertaken by landowners with basic training in silvicultural techniques.

Labour (hours/ha) is estimated time required for landowners to undertake silvicultural operations and will vary between landowners, depending upon experience and site conditions

1. Conducted 6-12 months pre-planting to control woody weeds (not required all sites).
2. Marking of planting lines / groups (where cultivation is not undertaken).
3. Knockdown and residual herbicides applied to planting areas with strip or spot application, depending on location and conditions.
4. Cost and labour requirements associated with fencing can vary, depending on browsing animals to be excluded, fence construction, terrain and perimeter to area ratio.

5. Small areas planted without cultivation. Planting rate based upon planting ~60 seedlings/hour.
6. 100g Diammonium Phosphate/tree 1-2 months post-planting. Ensure adequate weed control prior to the application of fertiliser.
7. Release spraying ~9 months after weed control (2). Labour rate based upon ~90 seedlings released /hour.
8. May not be required, depending upon initial growth but if required, undertaken ~9 months after weed control (3).

CULTIVATION OF PLANTING LINES

If ripping and mounding is undertaken, ensure there is sufficient rain and time for settling of mounds prior to planting. Planting into loosely mounded soil may result in tree instability.

WEED CONTROL

Cypresses can be slow to establish, with a fine surface rooting habit that is particularly susceptible to weed competition. Knockdown and residual herbicides should be applied prior to planting. Release spraying in the first and second growing seasons may be required.

- Control woody weeds such as blackberry 6-12 months before planting.
- Spot or strip spray with glyphosate for knockdown of established weeds.
- Spot or strip spray with simazine for residual weed control prior to planting. At this stage, little information is available on the impact of other residual chemicals upon cypress species. Hexazinone commonly used for residual weed control for *Pinus radiata* will often kill cypress species.
- Utilise a spray shield to protect seedlings when post-planting release spraying with glyphosate.

BROWSING CONTROL

C.macrocarpa is relatively unpalatable to wallabies and possums. *C.lusitanica* may be more susceptible to browsing damage, with reports from NZ that this species is prone to possum damage. Rabbits and hares can be responsible for snipping off seedlings at or near the base. Fencing to exclude stock and browsing animals is generally required. Tree guards are not recommended, as there are reports of tree instability and windthrow following removal of the guards.

Browsing control can be undertaken by:

- Maintaining strips of pasture between the planting lines, or undertaking spot weed control, retains an alternative food source.
- Poisoning, shooting and trapping may be used individually or in combination. A permit from Department of Natural Resources and Environment is required for these activities.
- Using stock-proof fencing to exclude livestock. Stock may browse young trees or cause bark stripping. Cattle can cause physical damage by pushing trees over.

- 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.

PRUNING REGIME

Annual form and clearwood pruning should commence from age 2. A traditional pruning regime, as applied to *Pinus radiata* (3-4 lifts to 6.4m starting at age 4-5) should be avoided for the following reasons.

- Prolific branching habit - Cypress species may have as many as 60 branches/metre of stem, compared with *P. radiata* with 6-15 branches/metre of stem. Efficient pruning of large numbers of branches necessitates that branch diameters are small at time of removal.
- High quality timber formed from an early age - Pruning to a small DOS (Diameter Over Stub) of 10-12 cm enables a greater recovery of quality timber. A well-managed pruning regime for *P. radiata* achieves a DOS of 20cm or less. Unlike cypress species, early pruning of *P. radiata* to achieve a significantly smaller DOS does not increase the output of quality timber due to the formation of juvenile wood.

Pruning Methods

Pruning to Half Tree Height

This pruning regime should commence when tree height is approximately 1.5-2.0m tall; possibly earlier than age 2 depending upon site and initial growth. Continue pruning with this regime to a height that can be reached from the ground, typically 2.5m with loppers, at which point tree height should be ~5 metres. Early removal of lower branches also provides for safer, easier and quicker release spraying in the second growing season if required.

If the management objective is to achieve a final pruned stocking of 400 stems/ha, then ~550 (50%) of the trees should be pruned from the ground with this regime. These extra trees allow for selection of the best 400 for continued pruning from a ladder. This also allows for culling of trees that may have become infected with canker or have suffered form problems as a result of wind or possum damage.

Pruning by Stem Diameter

This regime is determined by the maximum DOS that management desires. For example, if a maximum DOS of 10-12cm is desired, then pruning could be undertaken to an upper stem diameter of approximately 8cm. An 8cm caliper is placed on the stem at the point where stem diameter is 8cm, with all branches below this point removed. When pruned 12 months later, stem diameter at the pruned height will have increased from 8cm to 10cm or more. The caliper is placed higher on the stem and further clearwood pruning undertaken, ensuring that the DOS remains below the desired maximum of 10-12cm. Start this pruning regime when a ladder is required. Select the best 300-400 relatively even spaced stems/ha.

Image 1

Image 2

Image 1 - Cypress aged 2. Tree height of about 2 metres, pruned to about 1 metre with secateurs.

Image 2 - Cypress pruned to about 2.5 metres from the ground using the half tree height method. Once a ladder is required, annual gauge pruning with an 8cm caliper ensures a consistent DOS for all trees.

Form Pruning

Double leaders and steep angled branches can be removed with small loppers from age 1-2 onwards.

Time of Year

Pruning should be undertaken in spring, when rapid growth commences. This will ensure a full growing season through which occlusion of the pruning wounds can occur.

Rogue Branches

Branches should be removed before branch diameter exceeds 2.5cm at the time of removal. Larger branches increase the pruning input and take longer to occlude. Even with annual pruning, some branches may grow excessively fast. Rogue branches above the section of stem to be pruned can be either removed or shortened (half the foliage removed) to slow branch development.

Pruned Height

There is no standard pruning height for cypress. Pruned veneer logs are often purchased in 2.7m and 5.4m lengths. Export logs are often traded in 3.0m and 6.0m lengths. Due to the high cost of pruning and the potential to carry high stockings, some NZ growers only prune to a little over 3m while retaining a pruned stocking of 600-800 stems/ha. Other pruned heights reported from New Zealand are 4.5m and 6.4m, with a lower pruned stocking. In Tasmania, where growth rates are unlikely to match those achieved in NZ, pruning to 6.4m with a final stocking of 300-400 stems/ha may be appropriate.

High quality pruning equipment is recommended including bypass loppers, holster (for carrying loppers when climbing ladder), pruning ladder (lightweight aluminum in 2.4m and 4.2m lengths) and safety harness for use with ladder. Safety must be a priority when working at any height above ground level.

THINNING REGIME FOR CYPRESS SPECIES

At present, there is no standard thinning prescription for cypress species. What has become apparent is that cypress species have the potential to attain very high basal areas, such that high stocking levels can be maintained. Silvicultural trials by Forest Research of New Zealand have indicated this for stands at 14 years of age. Plots standing at 400 stems/ha exhibited only slight increases in tree diameter compared to those at 800 stems/ha. However, total timber volume at 400 stems/ha was only 60% of that at 800 stems/ha. It may be possible to maintain high stockings of 600-800 stems/ha until mid-rotation to provide for a commercial thinning.

Early Thinning (non-commercial thinning to final pruned stocking)

- Little improvement in tree diameter growth.
- Branch development increases rapidly at lower stockings.
- Total volume production is reduced.
- Trees of poor form and health can be non-commercially thinned from age 6-10. While such trees can be thinned earlier, retaining them will help reduce branch development in neighbouring trees.

Late Thinning (mid-rotation)

- Little reduction in tree diameter growth.
- Branch development is significantly reduced.
- Total volume production is enhanced.
- Provides the opportunity for commercial thinning.

What is the correct time to thin to the final pruned stocking?

Unpruned trees and the knotty log above the pruned butt log have the potential to produce quality knotty sawlogs and veneer logs, provided that:

- Branch development is restricted, and knots are small. Large knots significantly reduce timber strength, appearance and drying characteristics.
- Knots are 'green' (branches are still alive). Dead branches result in bark encased knots, where bark surrounds the dead branch while stem diameter growth continues. Bark encased knots detract from timber appearance and often result in loose knots.

Maintaining higher stockings results in a gradual 'lifting' of the green crown as lower branches begin to die from a lack of light. The branches in the second log, above the pruned butt log, provide the indicator as to when to undertake thinning. Thinning should be undertaken when these lower branches show signs of loss of foliage and stop growing. Once thinning is undertaken, these lower branches are provided with the opportunity to resume growth and remain alive, increasing the chance of producing small, green knots.

MIXED SPECIES PLANTATIONS

C. macrocarpa and *C. lusitanica* have been shown to be silviculturally compatible when planted together in NZ. *P. radiata* will outgrow and suppress both species over a 10-15 year period, depending upon the stocking. Cypress species, have a relatively high degree of shade tolerance and tend to compete well with open-crowned eucalypts for at least 15-20 years. Thus, there appears to be scope for growing cypress with an appropriate nurse crop species. If utilising a nurse crop, it is desirable to retain the nurse species until the completion of pruning to reduce branch size and pruning inputs. A nurse crop will also provide additional wind shelter, increasing the height growth and form of the cypress.

Shelter

It is recommended that a faster growing shelter species such as *Pinus radiata* be planted around the perimeter of cypress plantations. Wind exposure can significantly reduce height growth and may increase susceptibility to canker infestation.

FURTHER READING

Brailsford, S., (1996). The Cypress Growers Handbook - Options for growing quality timber.
Miller J.T. & Knowles, F.B., (1996). Introduced Forest Trees in New Zealand: Recognition, Role and Seed Source (9) - The Cypresses, FRI Bulletin 124.

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