

Managing trees in a radiata pine woodlot

Sustainable Land Management Programme

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Introduction

Various tending regimes have evolved for radiata pine, in response to different site conditions, end uses, proximity to markets, and growers' circumstances. The landowner has to make crucial decisions within the first ten years of the rotation - initial stocking, tree form, whether to prune and thin, and if so when. Control of weeds, animal pests and tree diseases are other matters to consider. So must stock management, if understorey grazing is contemplated.

This information sheet summarises several tending regimes, appropriate for different sites in Taranaki. Which to select, ultimately depends on what sort of timber a landowner wishes to produce, and how much money he/she is able to spend on silviculture (tree management). Likely return from different yields and grades of timber is obviously a factor when deciding what to choose. Information sheet (44) covers the latter topic.

Initial stocking

For commercial plantations and farm woodlots, an initial stocking of between 800 and 1250 stems per hectare (sph) is most common because it enables different silvicultural regimes to be implemented in future years.

Stands are seldom planted at densities of 1200 - 2000 sph, but the cost of pruning and thinning such a stand is high. Often, subsequent tending boils down to a choice between single-lift (one) prune and thin, or not tending at all.

Occasionally, stands are planted at densities of 600-800 sph, using seedlings or cuttings with high GF ratings. This reduces initial planting costs and final thinning costs, but necessitates frequent pruning to control branch growth in the years between.

Agroforestry stands (where grazing is to be retained) were typically planted in pasture at densities of between 200 and 400 sph. In recent years, agroforestry stands have fallen from favour, as few farm foresters have been able to control tree form in the presence of stock. It is now recommended to concentrate on either forestry or grazing.



Figure 1 A pruned and thinned stand

Pruning and thinning

Pruning and thinning are carried out to improve tree growth and timber quality. Timing depends on how well trees are growing, on the site selected.

A shelter-belt or timber-belt has a lot of outside edge, with potential to grow extra volume of timber, being exposed to extra light and fertility from adjacent pasture. A good regime is:

- Prune all possible stems annually
- Prune as high as possible, leaving a green crown of one half to one third of the tree height at all times.

A small woodlot (with a high proportion of trees close to the stand edge), a woodlot on a windy site, or one that is damp, can have very variable trees. Here, a good regime is:

- 1st prune to half-height when trees are 4 to 5.5 metres
- 2nd prune to diameter 10 cm - "variable lift" until the desired pruned diameter is achieved.

In large woodlots growth is less variable, so a conventional regime can be applied. There are two choices:

Direct regime - the stand is waste-thinned directly to final crop at the completion of pruning, with the aim of maximum diameter increment thereafter to produce a valuable butt-log. The amount of pruning beforehand, determines yield of knot-free

clearwood (sometimes referred to as “diameter over stubs”).

A typical direct regime practised in Taranaki hill country on the advice of local forestry consultants is:

- 1st prune to half-height, years 3 to 5
- 2nd prune to 4.5 m, years 4 to 6
- 1st thin of large trees, year 7
- 3rd prune to 6.5 m, years 6 to 8
- final thin to 250-350 sph, year 9/10

Indirect regime: the stand is production-thinned several years after final pruning. The aim is to minimise branch growth during the years between, and thereby keep knot diameter small in framing timber milled from the upper log. Another rationale is to derive income from the stand meanwhile, by sale of thinnings for posts and poles; though often in practice, not enough of the thinnings meet specifications to be profitable. This regime may result in a longer rotation length in order to achieve the desired diameter on the pruned crop.

A typical indirect regime used in Taranaki on the advice of local forestry consultants is:

- 1st prune to 2.2m, year 4
- 2nd prune to 4.5 m, year 6
- 3rd prune to 6.5 m, year 8
- production thin to 250-350sph, yrs 12 to 14



Figure 2 An agroforestry stand

Agroforestry stands in grazed pasture require yet another regime. They are pruned 8-12 monthly to maintain the target DOS, which would otherwise be compromised at the wide spacing typical of agroforestry.

- Agroforestry regimes are not now recommended by forestry consultants in Taranaki, for reasons already stated.

A no-tending regime is possible in dense woodlots, planted at 1200 sph or greater. They are naturally “self-pruning”. Branches on the lower logs remain small-diameter, eventually die back, and drop off. In contrast to an un-thinned low-density stand, where branch growth is so massive that the logs can only be chipped for pulp or fibreboard manufacture, an un-thinned high density stand will produce small-diameter framing logs. The lower log has numerous small knots, so cannot be sold as clearwood, but because the knots are small, it is a good grade of framing timber, as is the upper log. To maximise returns, timely thinning is required.

Growers have sometimes obtained high per-hectare returns from untended woodlots. A no-tending regime is not currently recommended by forestry consultants in Taranaki, because the local market for small-diameter logs has not been lucrative. The regime’s advantage for farm forestry remains its low cost.



Figure 3 An untended stand

Control of weeds, pests and diseases

Weeds

Weed competition results in uneven establishment and variable height development. It can make silviculture operations complicated, slow, costly

and unpleasant. Weeds which must be controlled include gorse, broom, bracken, pampas, barberry, honeysuckle, blackberry and buddleia. Clearance of these weeds before planting reduces, but does not eliminate, post-planting weed control.

Grubbing or hand-cutting, with either a slasher or petrol-driven brush-cutter, are only feasible on small woodlots. In a large woodlot, spraying will be necessary. Spray damage to young trees can be avoided by using a funnel, spray-wand or similar. Another way is to drop a plastic container over each seedling when spraying around it. Particular care must be taken to ensure correct rates of herbicide are applied.

For post-plant spraying of broadleaf weeds or grass around pines, the currently favoured option is valzine (a mix of velpar, hezazinon and terbuthylazine) applied at 2 ml per m². For brushweed regrowth use tordon or velpar.

Young pines form a closed canopy at 6 to 8 years' age. Light suppression by the canopy thins out most weeds. Although still present they are no longer dense enough to be a problem. It is particularly important to delay pruning until canopy has closed where gorse is a problem.

In agroforestry stands, weed regrowth can generally be controlled by grazing, though pockets that get away may need to be sprayed from time to time.

Pests

Browsing animals are usually less of a problem for radiata than other pine species. It is not especially palatable, but stock can wreak havoc with young trees' growth form. Possums and goats can be troublesome, causing leader damage, or even dieback either by stripping off bark or creating entry points for fungus. Stock-proof fencing and initial pest control, before planting begins, reduce the need for ongoing pest management. Regular monitoring to detect return of pests, followed by shooting or poisoning as needed, will then suffice. Pine seedlings can also be soaked or sprayed with animal-repellent egg paste, to prevent initial browsing damage. For details of this and other control techniques e.g. bait stations, shooting, refer to the Council's pest management information sheets.

Insect pests are not usually a problem, except for the hylastes beetle which can ring-bark seedlings up to 3 years old.

Fungal diseases

Fungal diseases are a more serious hazard than insect attacks or other animal pests. Except in dry climates (less than 800 mm rainfall), radiata pine is susceptible to two main fungal diseases, Dothistroma and Cyclaneusma.

Dothistroma causes severe defoliation with consequent growth loss on stands up to 12-15 years old, particularly in areas with high rainfall and at sites where air is still and humid. Infected needles in the lower foliage are brown, and on closer examination, have distinct reddish bands. Increased air movement through a stand, after heavy pruning and thinning, will reduce attack. Dothistroma can be overcome with aerial application of copper oxychloride spray, three to five times in a rotation. A single application lasts two to three years.

Cyclaneusma occurs near the stem in the central crown of susceptible trees, particularly following mild wet winters. Infected needles are bright yellow. This fungus causes up to 90% defoliation, and a big loss in growth rate. Cyclaneusma is now present throughout stands in Taranaki. There is no known solution, except culling infected trees when thinning.

Armillaria is a root-rot fungus, and can cause considerable mortality in young pines if they are planted where native podocarp-tawa forest has been logged, or as a second-rotation in logged exotic plantations. A sign of infestation is that in 2 to 5 year old trees, needles drop, turn yellow, and finally brick red.

Nutrient deficiencies and fertilisers

Radiata pine is usually able to derive all the nutrition it needs, even from an infertile hill country soil. Taranaki has a good record where nutrient deficiencies are concerned. Occasionally, a stand will show symptoms because a particular nutrient is in short supply. If so, deficiency should be confirmed by foliage analysis (needle tests), to avoid confusion with herbicide damage or climate stress. The main deficiencies which may require treatment, and their symptoms are :

Nitrogen : all-over yellowing of tree, narrow crowns, small branches and short needles. Treat by applying urea at 200 kg/ha N.

Phosphorus : short needles of normal colour, with yellow tips in late summer. Treat by applying superphosphate at 70 kg/ha P.

Potassium : last season's foliage bright yellow on the mid to lower part of the tree. Treat by applying muriate of potash at 100kg/ha K.

Magnesium: last season's foliage golden-yellow. Treat by applying calcined magnesite at 100 kg/ha Mg.

Boron : death of the leader and top branch shoots in mid to late summer. Treat by applying ulexite at 5g/ha B.

Copper : severe twisting or "wobbling" of leaders and branches. Treat by applying copper sulphate at 5 kg/ha Cu.

Remedial fertiliser can be hand- broadcast in a small woodlot. In large woodlots, aerial topdressing may be more feasible.

Management costs

Whatever pruning and thinning regime is selected, tending costs will be incurred by the landowner. Some typical tending costs (winter 2000) are :

Per operation :

Pruning - \$450 to \$700 a hectare
Thinning - \$120-\$700 a hectare
Weed control - \$70-240 a hectare
Pest control - \$2-\$20 a hectare

Every year :

Fence and track maintenance - \$7-12 a hectare
Insurance, audit, consultancy - \$15-25 a hectare

Cost of insuring a woodlot against fire and other disasters is low, in comparison with the financial loss if it is destroyed. Audit and certification of a stand, by a forestry consultant after each silvicultural operation, provides a record of stand quality. Its availability may lead to a better price being offered, when the stand is ready to harvest.

Professional advice

It is a good idea to talk to professional foresters or woodlot managers, about silviculture and also about how to deal with any weed, pest, disease or nutrient problems that arise.

Remember though, that opinions about silvicultural management differ from one individual to the next. What is currently fashionable, may not be in another few years.

This information sheet, rather than recommend one particular regime, has outlined the tree management that a landowner needs to undertake in a growing woodlot :

- Choose a silvicultural regime that is affordable, in terms of available time and cash
- Clear weeds and pests before planting, to reduce the need for post-planting control
- Monitor for weeds, pests, diseases and nutrient deficiencies
- If signs appear, apply follow-up treatment

So long as a landowner attends to these matters, the pine woodlot should grow well in the years between planting and harvest.

For further advice or information contact:

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