

Economic Aspects of Growing Softwood Plantations on Farms in the New England Region

Introduction

This leaflet provides information on the economic aspects of growing softwood plantations for commercial timber production on farms in the New England region.

There is already a large amount of technical information on the establishment and management of plantations available through organisations such as State Forests of New South Wales, Greening Australia, NSW Agriculture, the NSW Office of Private Forestry, Landcare and private consultants. The information contained in this leaflet is designed to compliment this, specifically addressing the evident “information gap” concerning the economic issues in plantation development.

The Plantations and Reafforestation Act 1999 (PRA) and associated Plantations and Reafforestation (Code) Regulation 2002 are the key legislative instruments relevant to commercial plantation development in New South Wales. The PRA and Code of Practice requires that a detailed plantation planning process be carried out, and takes account of a number of individual legislative requirements under the one application and approval process. The consent authority is the Department of Land and Water Conservation. The PRA repeals the Timber Plantations (Harvest Guarantee) Act 1995, but incorporates a new legislative guarantee to be able to harvest a plantation in the future.

As all plantation and agricultural enterprises are different, it is recommended that if you decide a pine plantation program might fit into your overall property plan, advice specific to your situation should be sought. There are a number of organisations and professional forestry consultants available to assist you.

The current situation and future potential in the New England

Radiata pine (*Pinus radiata*) is the most commonly planted softwood species in the New England. The majority of the region is climatically suited to growing radiata pine, but the best sites are those where rainfall is highest and the soils are deep and well drained. Areas in the escarpment ‘mist zone’ are potentially subject to problems with the needle cast disease dothistroma.

Approximately 12,000 hectares of State Forest pine plantation have been established in the Armidale, Walcha, Niangala, Nundle, Nowendoc and Glen Innes areas over many years. State Forests of New South Wales as well as some major private forestry companies have identified these areas as key localities for pine plantation development in the future. A number of private landholders in the region have also invested in growing pine in the form of small block plantings, wide-spaced agroforestry-style plantings and narrow windbreaks for a variety of purposes including timber production, shelter and shade. For the future development of the plantation resource and the pine processing industry it is essential that a ‘critical mass’ of the resource be built up around the existing plantation, particularly around the Walcha area.

Similar to a flock of sheep or a mob of cattle, there is no such thing as a pine plantation that will only produce high-value products. A well-managed pine plantation naturally produces a wide spectrum of products from low-value early thinning residues such as woodchips to high value veneer/peeler logs from the final crop. On the other hand, a poorly managed plantation is likely to produce only low value products.

The quality of both the State and privately-owned pine resource varies across the region. This reflects varying silvicultural management regimes adopted over time primarily as a result of limited application of both private and State funds fuelled by a lack of markets for small diameter first thinnings. The resource-base in the region is comprised of some plantations of thinned and pruned high-quality high-value trees and a significantly larger area of lower-quality lower-value plantation. Trees are currently being harvested from a number of State Forest of NSW plantations providing logs to mills producing products ranging from pallet materials, landscaping supplies, perfect-round posts, structural/framing timber and high quality plywood products. At this

stage, markets for the products of early thinning operations remain virtually non-existent, however investigations into a number of possibilities are ongoing. Early thinning is essential in maximising overall plantation productivity, however, until markets are developed, this operation will be non-commercial.

From a global perspective, it is important to acknowledge that products such as radiata pine are more of a bulk commodity, than the niche-type Australian hardwoods. Pine is produced largely for building/structural purposes, although some feature-type products such as lining boards are also produced. Radiata pine is one of the most widely grown exotic plantation species, with New Zealand and Chile both having large areas of plantation. For this reason, it is important that a plantation industry

based on pine is competitive and/or fills under-utilised market niches.

There is currently interest from both small and large-scale pine processors in establishing new processing facilities in the Walcha-Tamworth area utilising the existing State Forests of NSW plantation resource. Pine plantations grown on private land in the region have the potential to be established and managed in such a way as to produce a quality product, and the recent interest from processors may soon result in a local market outlet for farm-grown pine. The State government and plantation investors offering joint-venture plantation growing arrangements with landholders in other areas are also currently being encouraged to investigate the potential of the New England region.

Establishment costs

Plantation establishment costs represent the initial financial outlay (or capital investment) in softwood production. These will vary according to the area of plantation established, site characteristics such as topography and accessibility, and factors such as ground preparation techniques and weed control requirements during the early growth phase.

Plantation establishment techniques using farm labour, farm tractors and other existing equipment, as currently carried out by many farmers and Landcare groups in establishing windbreaks or tree lines, cost in the order of \$800 per hectare at a stocking rate of about 1000 trees/ha. There is no provision for fertilising, fencing or roading/firebreaks. The practice of using milk

cartons and stakes as tree guards as adopted in many farm treeline plantings is not considered necessary or financially viable in commercial plantations.

Establishment costs incurred in a more thorough establishment regime including detailed plantation planning, bulldozers, mound-ploughs, spraying, planting and fertilising contractors, roading and firebreak establishment are greater, in the order of \$1,200 to \$1,800 per hectare. Despite the extra costs associated with this option, there are a number of advantages in using experienced professional contractors and heavy equipment, often resulting in a better performing plantation and more profitable plantation in the long run.

Silvicultural costs

Proper silvicultural management is essential to optimising tree growth and maximising the value of the end product. Softwoods are usually planted at densities of 800 to 1,200 seedlings per hectare, then progressively thinned in 2 to 3 stages removing inferior individuals to improve the growth of the retained stand, ultimately leaving a final crop of around 200-250 quality trees after approximately 30 to 35 years. In the absence of a market for thinnings, a non-commercial thinning (NCT) operation should be carried out early (year 5 to 8) to reduce stocking by approximately 25%. Retained trees may also be pruned to exclude the occurrence of lateral branches (causing knots in the timber) therefore producing a more valuable end product. Pruning may be carried out in 2 or 3 "lifts" each of about 2 metres up the stem.

Both thinning and pruning incur costs - either

through the use of contractors or the cost of the landholders time and equipment. Many of the silvicultural operations can be carried out by the landholder as a part of routine farm management. The costs vary according to site characteristics and the number of trees being pruned or removed. Pruning operations may cost from \$0.70-\$2.00 per tree. First (non commercial) thinning where tree density is high may cost in the vicinity of \$300 to 400/ha. Later, at lower stem densities the cost of thinning will fall to around \$150-300/ha. Where thinnings can be sold for woodchip, small sawlogs or posts, the operation may generate a positive return, or at least cover the costs of carrying out the operation. Where commercial thinning is possible, the costs of roading for log haulage must be considered and this can add as much as \$240 per hectare.

It should be noted that most forestry silvicultural operations are dangerous, even for experienced operators. There are a number of safety, training and insurance issues that must be considered by landholders attempting to carry out their own operations, and it may ultimately be deemed more

appropriate to hire contractors to carry out all or some of the work.

The table below outlines the major silvicultural costs associated with an intensively managed pine plantation.

Situation	Indicative silviculture costs (\$/ha)	Comments
Radiata pine plantation – non-commercial thinning (NCT) at year 5	300-400	Reducing stocking density from 1000 to 750 stems per hectare
Pruning costs (each of three lifts) in years 5, 7 and 9	245-500	Will increase with the height of each successive lift.
Radiata pine plantation – 1 st commercial thin (T1) at year 13	250	Reducing stocking density from 750 to 400 stems per ha.
Radiata pine plantation – 2 nd commercial thin (T2) at year 23	150	Reducing stocking density from 350 to 250 stems per ha.

Harvest related costs

The costs of the harvesting operation are influenced by factors such as site access, total volume of timber being harvested, roading costs and distance to the processing plant.

The landholder may choose to be paid a stumpage price for their trees (a price for the standing tree). In arriving at this price, the purchaser will take into account all their harvest-related costs (falling, snigging, merchandising, loading and haulage). Alternatively, the landholder may carry out some or all of the components of the harvesting operation themselves, and may even carry out some primary processing on-farm if they have access to saw-milling and processing equipment, and sell green-sawn timber to the market. There are a number of handling and treatment issues associated with

milling on-farm and advice should be sought as to whether this is the most appropriate path to take. Again, there are also a number of safety issues to consider if the work is to be carried out by the landholder.

Falling, snigging and log loading costs can range from \$15 to \$25 per cubic metre. Haulage costs are influenced by the distance to the sawmill, with costs of around \$5 to \$20 per cubic metre being typical. There are a number of less obvious costs that also need to be considered, including the costs associated with professional advice (eg. silvicultural consultants, management plans, harvesting plans), insurance, the cost of land out of production and the cost of finding a market.

Timber yields & returns

Plantation growth rates will vary dramatically according to site parameters, planting stock and the extent of silvicultural management. A productive radiata pine plantation may grow at a rate in the order 18 to 20 cubic meters of wood per hectare per year, while poorer performing plantations may only produce 8 to 10 m³/ha/yr. The table below presents indicative yields and financial returns (based on the landholder being paid stumpage prices) generated per hectare from a modelled well managed pine plantation grown on-farm in the New England region.

The figures are based on growth rates and yields supplied by State Forests of NSW and typical stumpage prices for pine as follows:

- Pulp logs - \$10/m³
- Pallet material - \$15/m³
- Posts - \$18/m³
- Small sawlogs - \$25/m³
- Large low quality sawlogs - \$35/m³
- Large high quality sawlogs - \$50/m³

Situation	Indicative yields	Indicative return (\$/ha)
Softwood (<i>Pinus radiata</i>) plantation - New South Wales	Year 13 thinning – 60t pulp, 13m ³ pallet material, 13m ³ posts	\$1,023
	Year 23 thinning – 49t pulp, 49m ³ small sawlog	\$1,720
	Year 30 clearfell – 75t pulp, 300m ³ sawlog	\$13,765

It is important to note that the returns listed above assume that the thinnings are sold. As mentioned in the introduction, this market is virtually non-existent at this stage, but is likely to develop over time.

Cash flows

The cash flow pattern modelled in Figure 1 is based on a 30 hectare *Pinus radiata* plantation established all at once, with the full range of silvicultural treatment being carried out including an early non-commercial thinning, three pruning lifts, two subsequent thinning operations and a final clearfall harvest. It is assumed that the full range of thinning markets are available. Early thinning sales are important as a means of offsetting thinning costs and helping the cash flow situation. Access to pulp, small sawlog or post/treated pole markets will generate some revenues within the first 10-25 years of the plantation cycle. This will have an important

effect on the rate of return on the plantation investment. Without these markets, returns are reduced markedly because the grower must wait 30-35 years for plantation income.

The cashflow pattern modelled in Figure 2 is based on a 30 hectare *Pinus radiata* plantation established all at once, but with minimal silvicultural treatment assuming that there is no market available for the thinnings. Note that in both cases (Figures 1 and 2), the net cash position remains negative until the year of final harvest.

Figure 1. Cash flow implications of a softwood plantation regime incorporating intensive silvicultural management and assuming available markets for the full range of products

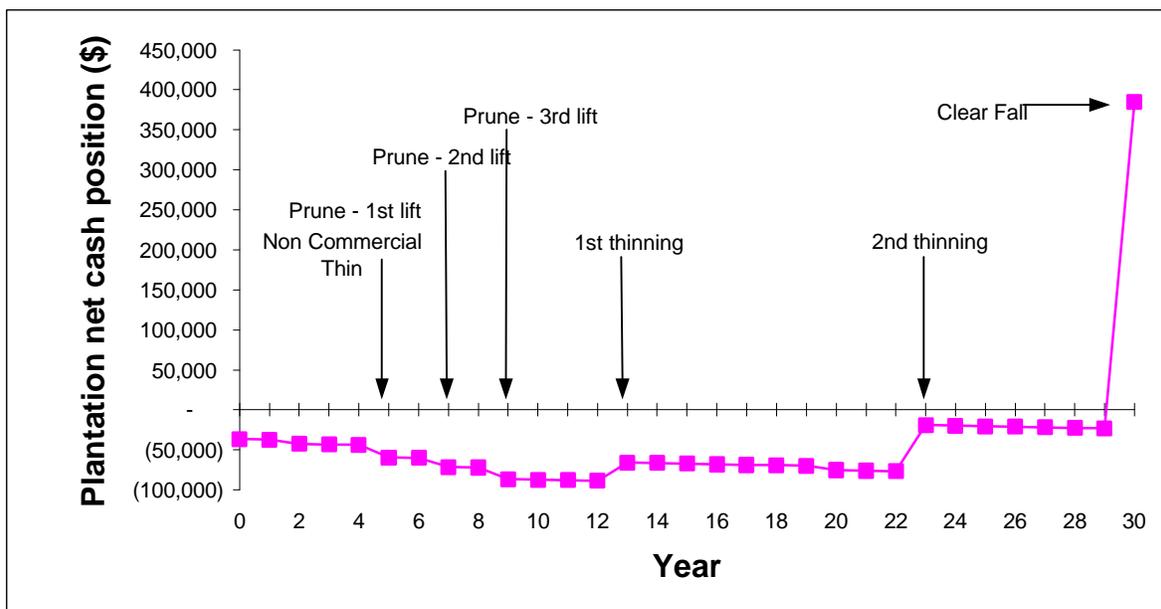
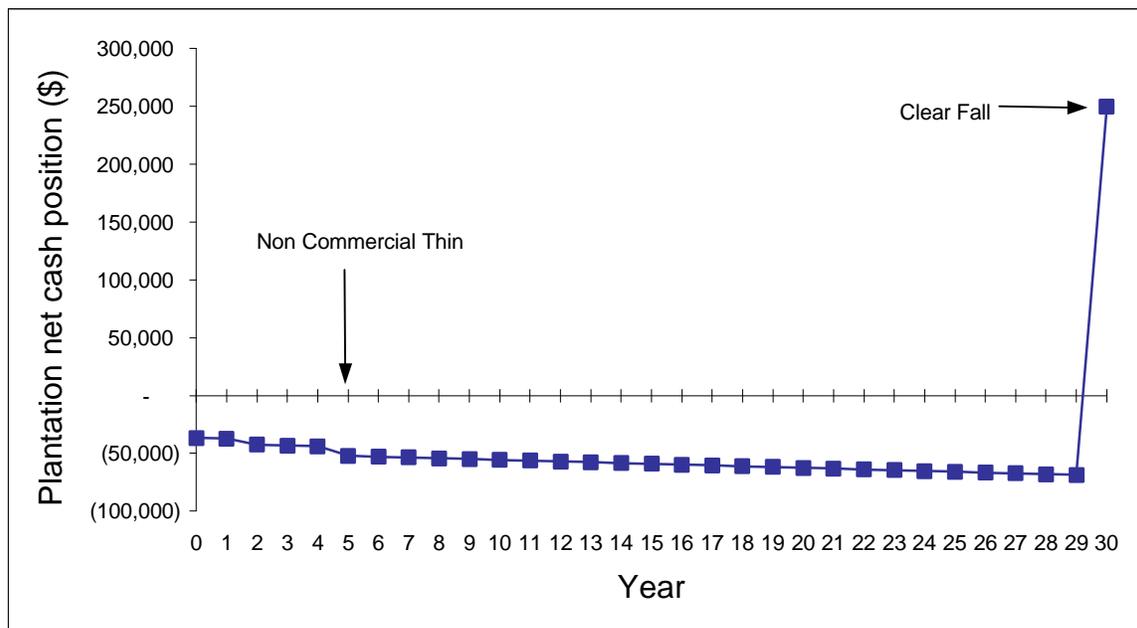


Figure 2. Cash flow implications of a softwood plantation regime with minimal silvicultural management assuming no available markets for thinning products



For most landholders, cash flow issues are critical to the success of their entire business. Staggered plantings of perhaps 1-4 ha per year may be desirable in many cases to help lessen the cash flow impact of large up-front establishment costs, but require contractors and sawmillers being prepared to move into a plantation and harvest smaller areas more frequently than in the “all up front” scenario.

Joint venture arrangements with State Forests of NSW or forestry investment companies (though not yet widely available in the New England) would also provide a mechanism for reducing plantation costs.

A typical scenario in other parts of the State involves payment of an annuity to the landholder (typically around 5 to 8% of the value of the land indexed to the CPI) by State Forests or the forestry company to “lease” their land to grow plantations. A number of cost-sharing options are possible whereby the landholder can also be paid to carry out some of the plantation establishment or silvicultural management operations. With increasing processor interest in the existing softwood resource in the region, it is possible that such schemes may be introduced here at some stage.

Profitability

The key factors that will determine the profitability of a softwood plantation enterprise include:

- Establishment costs and tree survival;
- The length of the rotation - long rotations require higher harvest returns to financially perform as well as short rotation plantations;
- Access to markets for both final harvest products and thinnings;
- The costs of silvicultural and on-going management operations;
- Timber growth rates, product yields and quality;
- Stumpage prices or, if selling sawn timber, sawn timber prices;
- Distance to the sawmill or processing plant. As a general rule, the profitability of plantations drops significantly if transport distances exceed

100km unless high value products such as veneer logs are being produced.

Profitability for forestry activities is often measured in terms of the Internal Rate of Return (IRR). The IRR is a measure of the return to the funds invested in the plantation.

In the case of farm forestry (as opposed to a large “stand-alone” plantation) an accurate picture of the IRR should include a consideration of the effect of the enterprise on the whole farm business. There will be interactions between the plantation and the business including shelter effects, possible displacement of other activities and, perhaps most importantly, a modification of normal farm cash flow patterns.

The effect of some of the factors outlined above on the returns from a 30 hectare intensively managed radiata pine plantation and a 30 hectare radiata pine plantation under a minimal management regime on a 'typical' New England property are illustrated in Figures 3 and 4, respectively. Note that these analyses do not include any interaction with the existing farm business.

Figures 3 and 4 provide indicative rates of return only - these will vary from case to case. Clearly however, returns are very sensitive to a range of factors, particularly access to early thinnings sales.

Figure 3. Rates of return for softwood plantation investment under intensive silvicultural management and assuming available markets for the full range of products

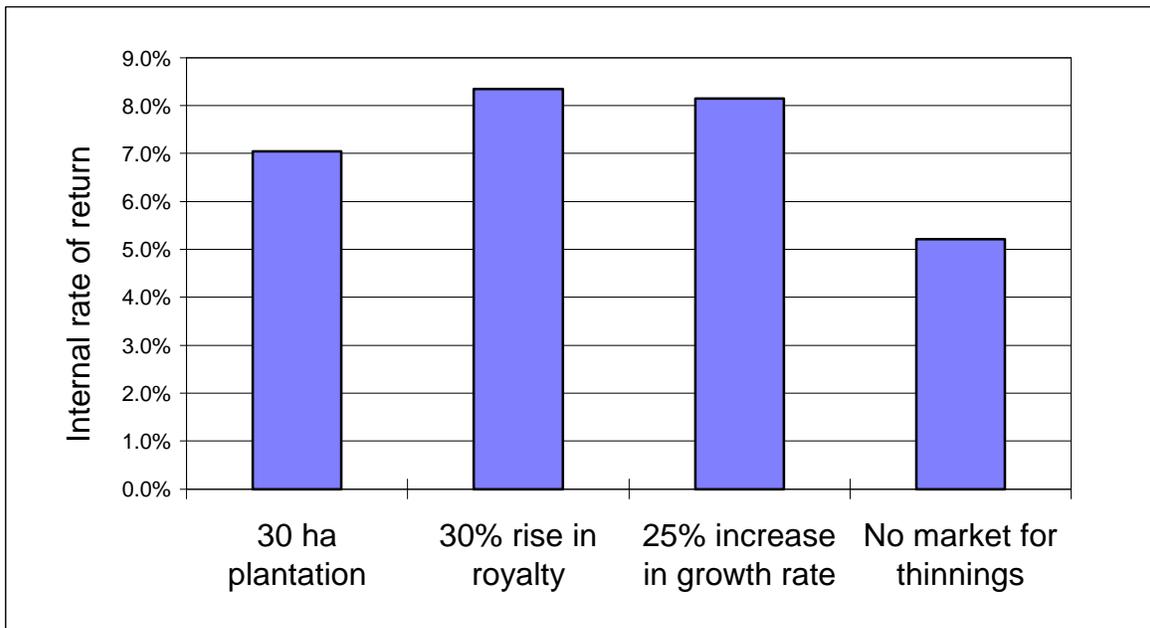
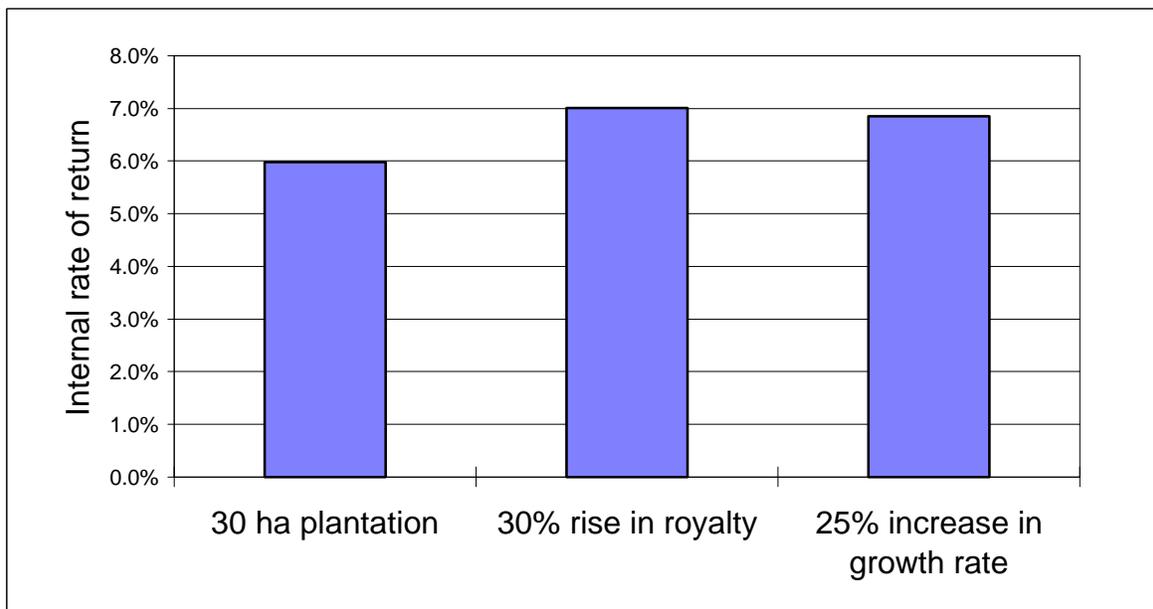


Figure 4. Rates of return for softwood plantation investment under minimal silvicultural management assuming no available markets for thinning products



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DISCLAIMER

There are a number of variables that affect commercial timber production and each individual situation will differ. The figures presented in the leaflet are intended to present a general picture of potential growth, production and financial scenarios associated with commercial timber production on farms, and do not necessarily represent actual realised production or returns. It is recommended that prospective growers and producers seek professional advice before commencing a forestry program on their farm.