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

Introduction

This leaflet provides information on the economic aspects of growing hardwood 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 in plantation development, 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 if it is established in a 'complying' manner according to the Code of Practice.

As all plantation and agricultural enterprises are different, it is recommended that if you decide that a hardwood 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

There are only limited areas within the New England that are suitable for growing high yielding hardwood timber plantations. These areas are characterised by having an annual average rainfall of at least 1,000mm and deep well drained soils. Within these constraints, such sites typically occur on the eastern margin of the region. While hardwood species and native shrubs are commonly planted for environmental and landscape purposes and for windbreaks or shelterbelts, there have not been many commercial hardwood plantations established in the region. State Forest of New South Wales has established some small "commercial" trials predominantly of Shining gum (*Eucalyptus nitens*) between Walcha and Nowendoc and near Nundle. A Tasmanian forestry company recently purchased property in the Walcha and Nowendoc areas and has established approximately 650 hectares of Shining gum plantations. This species has traditionally been grown in short-rotation (10 to 12 years) for pulpwood production, but also has potential to produce decorative or feature products such as joinery timber and plywood.

Other species with some potential include Sydney bluegum (*E. saligna)* and New England blackbutt (*E. campanulata*).

Unlike the more widely grown exotic softwoods, which are primarily used in framing/structural applications, Australian hardwoods have the potential to fill market niches for feature-grade or decorative products. To date, there has not been any New England plantation-grown hardwood harvested and sold into the market due to the fact they are not old enough to harvest as yet. However, some sawmills are value-adding the range of New England 'highland species' (stringybarks, white gums, red gums and blue gums) harvested from existing native forest stands, producing products such as kiln dried strip flooring and joinery timber that is being sold into local, Sydney and Brisbane markets.

Establishment costs

Establishment costs represent the initial financial outlay (or capital investment) in hardwood plantation 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 carried out by many farmers and Landcare groups in establishing windbreaks or tree lines, can cost anywhere between $1000 to $4000 per hectare at a stocking rate of more than 1000 trees/ha. Using existing farm equipment instead of heavy bulldozers with rippers and mound ploughs may cut costs, but the traditional use of milk cartons, 'watering-in' and fencing off small areas greatly increases costs. Such establishment methods where individual trees are often mulched, watered and protected by guards are generally not financially viable in a commercial situation unless high value species are planted and the trees are carefully managed.

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 in the order of $1800 to $2500 per hectare. Despite the possible 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. Eucalypt plantations are usually established 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 100-150 quality trees after approximately 30 to 40 years. 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 to 3 metres up the stem. A number of eucalypt species are, however, "self-pruning" and pruning is therefore not always required.

Both thinning and pruning incur costs - either through the use of contractors or the cost of the landholders time and equipment. 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. In some cases of high growth rates, first thinning where tree density is high may cost in the vicinity of $500/ha and is generally non-commercial. 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.

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 or processing equipment, and sell green-sawn timber to the market. Again, there are 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

As commercial hardwood timber plantations are relatively new to the New England region, the figures presented below were supplied by State Forests of New South Wales and relate to hardwood plantations on the North Coast of NSW. While this will provide some indication of financial performance, these must be viewed with caution in a New England context. If similar growth rates are achieved and similar products produced from the New England hardwood plantations it is conceivable that the figures would be similar. It might be reasonable to achieve a growth rate (mean annual increment or MAI) of approximately 15 cubic metres per hectare per annum (m^3/ha/yr) from the best sites in the New England. It must be noted that that the returns listed below assume access can be gained to pulp markets. Currently, this access is virtually non-existent for North Coast and for New England plantations and is something that needs to be addressed.

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

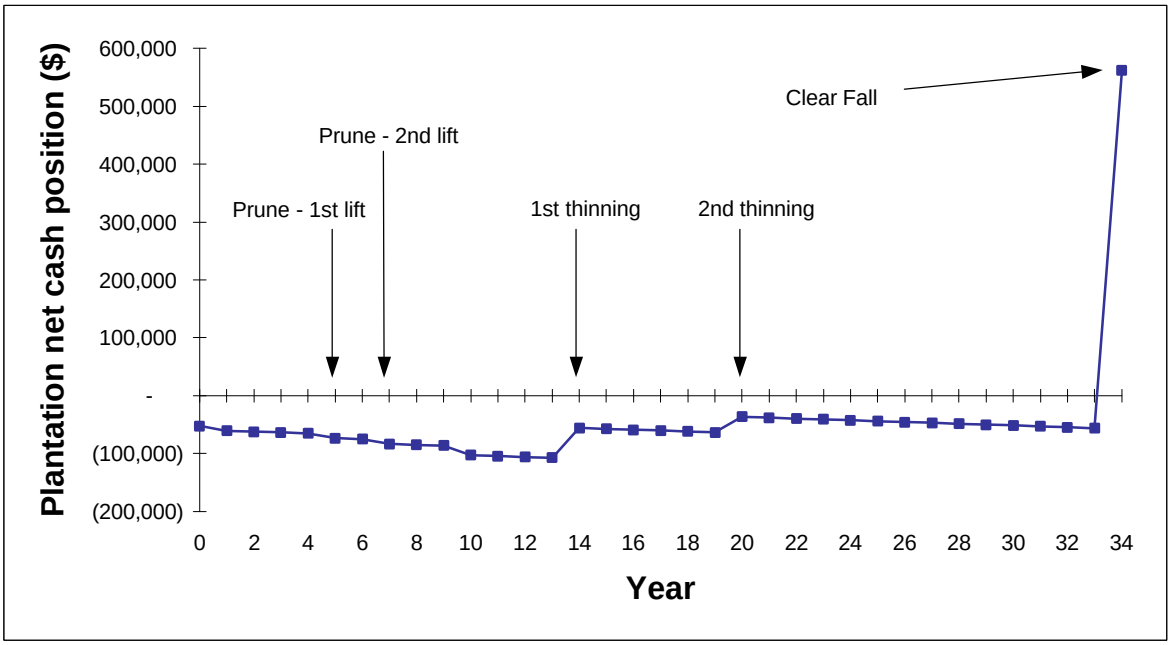
- Pulp logs - $8 - 15/$m^3$
- Small sawlogs - $15 - 25/$m^3$
- Large sawlogs - $30 - 60/$m^3$

Situation	Indicative yields	Indicative return ($/ha)	Comments
Hardwood plantations - New England	Yields from hardwood plantations in the New England are unknown.	Unknown for plantations.	Few hardwood plantations have been grown in the New England so growth rates and product yields are essentially unknown.
Hardwood plantations - North coast	Year 14 thinning – 85t pulp, 20m^3 small sawlog	$1,767	State Forests of NSW figures are provided for a North Coast situation. Note that markets for many of these products (eg. pulp) are yet to be developed.
	Year 20 thinning – 30t pulp, 30m^3 small sawlog	$1,195	
	Year 34 clearfell – 10t pulp, 15 m^3 small sawlog, 335 m^3 sawlog/veneer log	$20,648	

Cash flows

The cash flow patterns shown in Figure 1 are based on a 30 hectare hardwood plantation assuming the full range of thinning markets are available. In this example, it is clear that the cash position is negative until the final harvest year. 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 10-20 years of the plantation cycle helping to offset establishment and silvicultural costs. 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.

Figure 1. Cash flow implications of a hardwood plantation regime incorporating intensive silvicultural management and assuming available markets for the full range of 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. This however, assumes that contractors and sawmillers will be 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. It is possible that such schemes may be introduced here at some stage.

Profitability

The key factors which will determine the profitability of a hardwood 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.

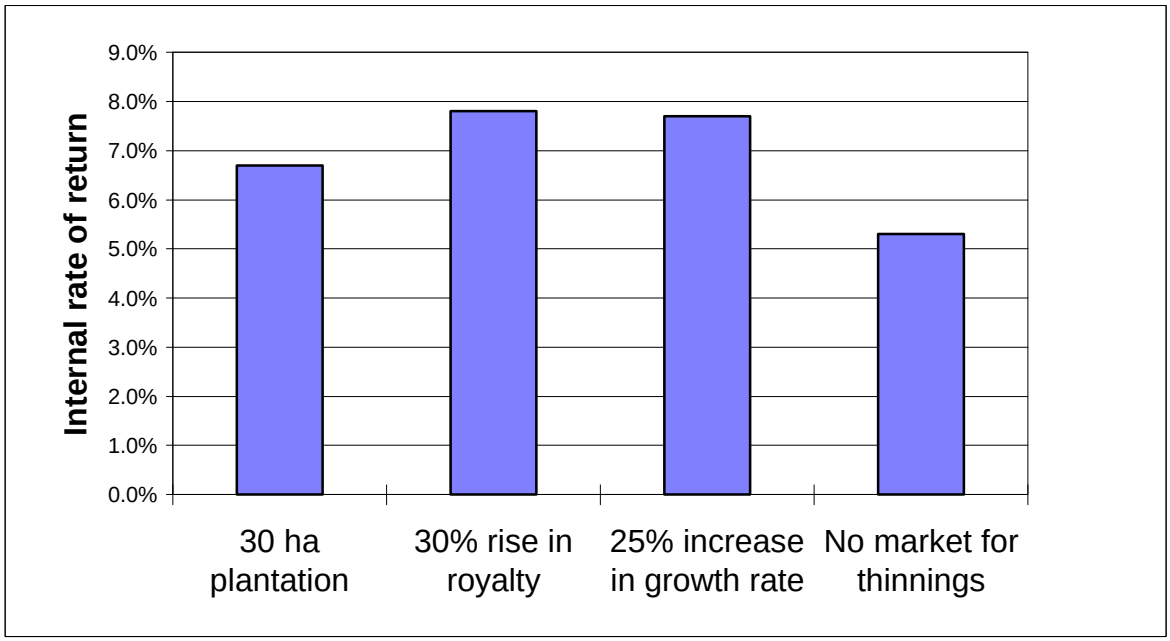
Profitability for forestry activities is often measured in terms of the Internal Rate of Return (IRR). The IRR is a measure of the return to the funds invested in the plantation.

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 plantation are illustrated in Figure 2.

Figure 2 should not be taken as measure of the returns from all hardwood plantations as these will vary significantly from case to case. It does however reveal how sensitive returns are to a range of factors. Access to thinning markets in particular is important.

Figure 2. Rates of return for hardwood plantation investment under intensive silvicultural management and assuming available markets for the full range of products



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The information contained in the leaflet was compiled from a range of industry sources

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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.