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2006/2007

SANDALWOOD ECONOMICS

Western Australian sandalwood (*Santalum spicatum*) is a native tree that has been extensively harvested from wild stands in Western Australia for its valuable heartwood for over 150 years, providing significant economic returns for the State of Western Australia.

As wild stands of sandalwood become depleted, an opportunity exists to develop a Western Australian plantation sandalwood industry on cleared farmland in the southern agricultural areas receiving between 350 and 600 mm annual rainfall. Over the past five years more than 5,000 hectares of native sandalwood have been established in plantations in southern WA.

This brochure provides an overview of the establishment costs and predicted returns of plantation grown sandalwood in the 400 to 600mm rainfall zone of the WA wheatbelt.

Establishment

Sandalwood depends on nutrients and water from host plants to survive and grow. Several techniques are being adopted to establish hosts and sandalwood plants. The most common method is to establish host plants in winter using nursery raised seedlings, and direct seeding sandalwood nuts adjacent to the established hosts in the following autumn. This is the method assessed in this economic analysis.

Yields and Value

The returns that can be expected from sandalwood will depend on the yield (tonnes per hectare) which can be influenced by soil type, rainfall and management practices. The quality of the product and market conditions at the time of sale will also influence returns. A well managed sandalwood plantation on optimum soils in the 400 to 600mm rainfall zone should yield four tonnes of commercial grade sandalwood per hectare at twenty years with potentially less in areas receiving 350mm. The price of sandalwood from plantations is expected to be less than sandalwood harvested from natural stands as the plantation grown trees may have less heartwood per stem diameter. Currently plantation grown sandalwood is expected to obtain a price in the order of \$5,500 per tonne. It is also assumed that a commercial thinning operation of sandalwood can be conducted at approximately age ten years.

This analysis does not take into account the environmental benefits that are derived from the establishment of a sandalwood plantation such as providing habitat, and groundwater and erosion control.

Returns

This brochure compares input costs and anticipated returns for three scenarios; an annual cropping system and two plantation sandalwood regimes, over a twenty year period. The two sandalwood scenarios include the sale of timber only and the sale of timber plus an annual nut harvest from year five. While currently the price per kilogram for nuts is quite high (\$30 to \$50/kilo), it is anticipated to drop considerably in the next few years as volumes increase and the need for seed for revegetation projects decline. However research is expected to increase regarding the development of sandalwood nut products. It is anticipated that in future a price of \$5/kilo after harvest and handling costs can be achieved. However a conservative price of \$3/kilo, consistent with the existing nut market, has been used in the calculations here.

There are many professional publications and information sources available with full details on all aspects of this emerging industry. For more information, contact details have been provided on the back page.

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W E S T E R N A U S T R A L I A

SANDALWOOD ECONOMICS

Overview

This analysis compares three management regimes:

1. Annual broadacre cropping system, using a continuous wheat rotation for simplicity;
2. Plantation sandalwood, revenue from timber harvest only; and
3. Plantation sandalwood, revenue from timber plus annual nut harvest from year five.

The following assumptions were consistent throughout:

- Discount rate: 7% (annual percentage decline in value of today's money)
- Rotation: 20 years
- All figures were calculated on a per hectare basis
- Land value was not considered in the calculations
- Landowner's time not included in the costings
- Wear and tear on machinery was not factored into any of the calculations
- Carbon values and comparisons have not been included
- Cost of fencing sandalwood plantations has not been considered in this analysis

Scale of enterprise and industry:

- Costs of landowner's time and machinery should be added if the sandalwood enterprise reduces earning from that time and machinery in any other uses.
- Assumptions about timber and nut price may not be valid if industry growth outstrips demand or if conducted at a small scale (e.g. less than 2 to 5ha).

Definitions:

- Discounted Cash flow - *A method of assessing the value of an investment based on predicted cash flows 'discounted' to take account of the reducing value of money over time.*
- NPV - *The Net Present Value of an investment project is the present value of the net cash flows.*

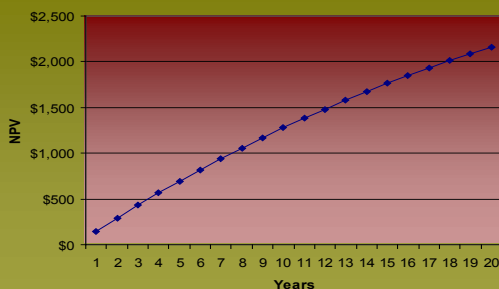
Input costs

Wheat - input costs (per hectare)				
	Year 1	Year 2/3	Year 10	Year 20
Undiscounted figures				
Seed and seed treatment	- \$16	- \$16	- \$16	- \$16
Fertiliser and freight (nutrient replacement)	- \$80	- \$84	- \$95	- \$115
Chemicals	- \$23	- \$23	- \$23	- \$23
Spray and fertiliser application	- \$16	- \$16	- \$16	- \$16
Contractors - seeding	- \$30	- \$30	- \$30	- \$30
Contractors - harvest	- \$40	- \$40	- \$40	- \$40
TOTALS (per hectare)	- \$205	- \$209	- \$220	- \$240

Wheat regime, base assumptions:

- Site/soil quality is optimum for this regime
- Seed and seed treatment cost is \$16 per hectare
- The fertiliser cost was calculated using a replacement value of kilos per hectare of nutrients removed from the soil per tonne; (P-3, K-4, N-23), total cost of \$75 (year one)
- Fertiliser cartage was \$24 per tonne
- Fertiliser and chemical application costs were \$4 per application. The analysis assumed two chemical and two fertiliser applications at a cost of \$16 per hectare
- Fees and levies costed at \$55 per hectare per year
- Contractors were employed for seeding and harvest at a cost of \$30 for seeding and \$40 for harvest
- The per hectare cost of replacing machinery was assumed to be unaffected by the area of wheat

Projected income - wheat



SANDALWOOD ECONOMICS

Projected returns

Returns over 20 years (per hectare)			
	Wheat regime	Sandalwood - timber only	Sandalwood - timber and nuts (from year 5)
Undiscounted figures			
Income	\$8,810	\$23,000	\$27,200
Less all costs	- \$4,430	- \$6,210	- \$6,210
Total benefits minus costs	\$4,380	\$16,790	\$20,990
Discounted figures			
Income	\$4,470	\$6,590	\$8,590
Less all costs	- \$2,305	- \$2,800	- \$2,800
NPV, 20 year project	\$2,165	\$3,790	\$5,790

Assumptions:

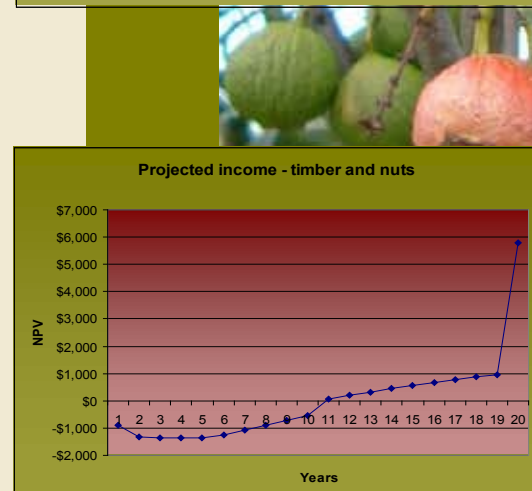
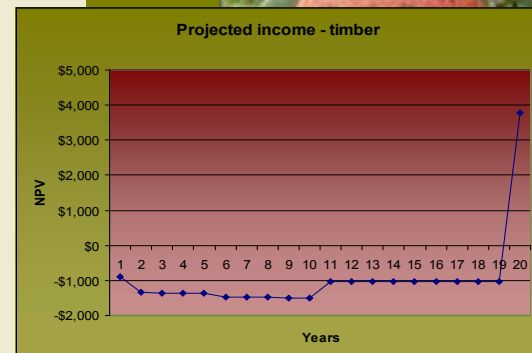
- **Wheat:** The wheat yield was 2.2t/ha, it increased by 2% annually to account for technology and variety advances
- **Wheat:** price for wheat used here is \$220/tonne (Free On Board) with production increasing over time
- **Wheat:** requires adequate growing season rainfall
- **Sandalwood:** will benefit from rainfall any time during the year
- **Sandalwood timber:** thinnings in year ten yielded 0.5 tonnes per hectare valued at \$2,000/tonne
- **Sandalwood nuts:** 300 trees/hectare produce 0.33 kilos of nuts per tree from year five (total of 100 kilos/hectare) @ \$3/kg (net harvest and handling) - **it is possible that nut yield may decrease over time.** Currently there are not enough mature plantations established to confirm this information
- **Sandalwood timber:** 300 trees yielded an optimum target of four tonnes of timber per hectare at year twenty valued at \$5,500/tonne

Cost comparisons

Sandalwood - establishment and management costs (per hectare)				
	Year 1	Year 2/3	Year 5/10	Year 20
Undiscounted figures				
Site preparation	- \$150			
Pest control	- \$40	- \$40		
Weed control	- \$120	- \$100		
Seedlings	- \$450			
Plant seedlings	- \$120			
Purchase sandalwood seed		- \$150		
Plant sandalwood seed		- \$120		
Re-planting contingency (10%)		- \$120		
Pruning			- \$150 (@year 5)	
Thinning			- \$100 (@year 10)	
Harvest				- \$4,500
TOTALS (per hectare)	- \$880	- \$490	- \$250	- \$4,500

Sandalwood regime, base assumptions:

- Site/soil quality is optimum for this regime
- Host seedlings: 1,250 per hectare purchased at 36cents each
- Seedling cost can be reduced with increase in scale
- Sandalwood seed: three kilos per hectare purchased at \$50/kg
- Allow for 10% host seedling infill
- Fertiliser cost as per wheat, replacing nutrients removed in crops - estimated @ \$50/hectare over 20 years
- Some annual maintenance may be required (ie maintain fire breaks, control pests)
- Establishment costs can be reduced by direct seeding of host plants, consult your revegetation advisor for more information on techniques and costs
- The final stand harvested at year twenty was 300 stems per hectare with a stem diameter between 120 and 130mm producing a four tonne per hectare target with contract harvesting costs at \$15 per stem



Where to go for more information:

Potential growers of Western Australian sandalwood plantations have the option to fund their own plantings or to enter a sharefarming arrangement with the Forest Products Commission. Opportunities also exist to use investor money to establish plantations and share risks and profits with private investors. The key contacts currently are:

Avon Sandalwood Network: The Avon Sandalwood Network Inc (ASN) is a grower driven association who's primary role is to support private sandalwood growers, and further develop the WA sandalwood plantation industry. The ASN has over 130 members, and conducts regular field days and workshops, enabling current and prospective growers to gain exposure to all aspects of this industry including the latest information on agronomy, markets, research and development. The ASN produces several sandalwood information newsletters per year, and has a vast range of information available.

Through the Avon Catchment Council / Greening Australia Native Plant Industries Project that supports the ASN, phone based advice and site visits are available for current and prospective growers. For more information contact Tim Emmott from Greening Australia (WA) on (08) 9621 2400 or temmott@gawa.org.au

Forest Products Commission: The Forest Products Commission (FPC) aims to plant 4,800 hectares of Western Australian sandalwood on cleared farmland by 2008. With a focus on areas receiving 400mm rainfall and above, they have developed sharefarming packages which can be tailor made to suit each individual situation. Collaboration with FPC helps to share the risks associated with establishment, plantation maintenance, marketing and sale of product. There is a requirement to plant a minimum of 20 hectares. To discuss the opportunities available - ring Mike Carter on (08) 9302 7488. **Note that returns in a sharefarming arrangement will be different to those presented here.**

References:

- Peter Jones, Renew Environmental Services, RIRDC report 'Sandalwood oil (WA Sandalwood)'
- Peter Jones, Forest Products Commission Information Sheet, Issue 1, May 1999 'Growing Sandalwood (*Santalum spicatum*) on farmland in Western Australia'
- Peter Jones, Forest Products Commission Sandalwood Information Sheet, Issue 3, July 2002 'Estimating Returns on Plantation Grown Sandalwood (*Santalum spicatum*)'
- Avon Sandalwood Network Inc Information Resources

Acknowledgements

This resource has been funded by the Avon Catchment Council.

Avon Catchment Council projects are delivered with investment from the State and Australian Governments through the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust programs.

Photos courtesy of Grant Pronk, Aaron Edmonds, Tim Emmott and Monica Durcan.

Thanks also to: Louise Evans, Regional Economist - Department of Agriculture and Food,
Peter Eckersley - Eckersley Rural Consulting,
Peter Jones, Renew Environmental Services,
David Guille, Forest Products Commission
and Tim Emmott, Greening Australia WA for their assistance.



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Disclaimer

The details provided in this information sheet have been collated from the best available information at the time of writing. Please check with a reputable revegetation advisor prior to making any decisions based on the information presented here.