

Potential Specialty Timber Markets for Hardwoods of Western Queensland, Australia

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Small volumes of timber from *Acacia* and *Eucalyptus* woodlands of western Queensland, Australia, have achieved high prices in specialty timber markets, which has aroused the interest of landholders. A postal survey of 225 domestic and international specialty timber product manufacturers was undertaken to determine current utilisation of these lesser-known species, establish their suitability for various product markets, ascertain desirable timber dimensions and condition, and estimate potential future domestic and international demand. An overall response rate of 31% was achieved. Responses indicated that current utilisation of these timbers is probably not more than 200 m³/yr. Nevertheless, respondents generally indicated that western Queensland hardwoods are highly suited to the manufacture of specialty timber products, including small-scale furniture items, custom knife handles and musical instruments, and that they have high export potential. Some furniture and musical instrument manufacturers indicated they would be willing to pay up to \$3,000/m³ and \$30,000/m³ respectively, for small volumes of high-quality appropriately processed western hardwoods. Large, well-directed marketing campaigns will be necessary to expand specialty timber markets for western Queensland hardwoods.

Keywords: *Acacia* woodlands, lesser-known timber species, specialty product suitability, timber market demand

INTRODUCTION

Traditionally, the timber species in *Acacia* and *Eucalyptus* woodlands of western Queensland have been viewed as fence-post material and an impediment to pasture development. Perhaps this is not surprising given the poor form of most trees, their typically small stem diameters, the prevalence of timber defects (resulting in low saleable product recoveries and high processing costs), remoteness from major

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timber markets, and the availability of high-quality cabinet timbers and construction hardwoods from eastern Queensland. Consequently, as landholders have strived to increase the productivity of their pastoral holdings, much of the resource has simply been windrowed and burnt, a management practice that was encouraged by the State Government until the mid-1980s (Rolfe 2000). By 1997, approximately 24 M ha (23%) of Queensland's *Acacia* and *Eucalyptus* woodlands had been cleared (National Land and Water Resources Audit 2001).

The poor utilisation of western Queensland hardwoods is a unique example of the global problem of market development and marketing of lesser-known timber species. In contrast to most of the literature in this field, which is concerned with lesser-known species from tropical rainforests, this study focuses on timber species from arid and semi-arid woodlands. Several factors are blamed for the poor utilisation of lesser-known timbers from tropical rainforests including, most importantly, low reliability of timber supply, and lack of information about the wood properties, processing characteristics, appropriate processing techniques and suitable uses for the timber (Kalafatis 1985, Eastin and Wright 1998, Rivera *et al.* 2003). Lack of information has sometimes resulted in lesser-known tropical hardwoods being employed in applications for which they are unsuited, thus giving them a 'bad' name (Kalafatis 1985), and contributing to their low market value compared with traditional rainforest hardwoods (Ahmad and Vincent 1992, Youngs and Hammett 2001, Rivera *et al.* 2003).

International research has indicated that the five most important factors affecting the choice of lesser-known timbers by timber users are, in order of importance, colour, grain, volume availability, suitability for use and price (Gresham 1995). Herbohn *et al.* (2001) asserted that a similar importance order of factors affected the choice of inputs by cabinet-makers using rainforest timbers in Queensland, including the low ranking of price as a determinant. Nevertheless, Kalafatis (1985) found that end-users of tropical hardwoods in the United Kingdom were highly sceptical about the benefits of switching from traditional to new, lesser-known species. The generally reactive nature of timber industries means that promotional activities, including exhibitions (Rivera *et al.* 2003) and the publication of 'glossy' promotional booklets (e.g. Teixeira *et al.* 1988), are often considered essential for establishing lesser-known species in the market.

Anecdotal evidence suggests that Australian and international timber product manufacturers have paid high prices for small volumes of western Queensland hardwoods, Goldfields timbers from Western Australia (Brennan and Newby 1992, Siemon and Kealley 1999) and timbers from the tropical savannas of northern Australia (Wannan 1995, Venn 2003) for use in specialty applications where the unique properties of these timbers (e.g. high density and hardness) are appreciated. Eager to develop a supplementary income stream, many western Queensland landholders have expressed their desire for an assessment of the commercial viability of small-scale timber production from the natural woodlands of western Queensland. However, it is unclear whether sufficient demand could be generated from high-value timber manufacturers to warrant expanded production of these timbers beyond the current 'cottage industry' level.

The Queensland Forestry Research Institute (QFRI) commenced a research project in 1997 to address the lack of information about wood properties of western Queensland hardwoods and their potential utilisation (Venn *et al.* 2002). That study

focussed on the *Acacia* and *Eucalyptus* woodlands of the Mulga Lands, Desert Uplands and, to a lesser extent, the Mitchell Grass Downs bioregions², which are illustrated in Figure 1. These bioregions cover approximately 50 M ha of Queensland and include a standing resource of approximately 18 M ha of *Acacia* and *Eucalyptus* woodlands. The aims of the project were wide-ranging, including: determining the geographical distribution, merchantable wood volumes and wood properties of selected tree species; estimating costs and recovery rates of harvesting and portable sawmilling operations; determining appropriate seasoning methods; and estimating graded (saleable) product recoveries. A crucial component of the study involved identifying potential markets for western Queensland hardwoods. The objectives of this market research were to:

- provide an indication of current utilisation of western Queensland hardwoods including reasons why the species are or are not being used;
- establish whether the timber properties of western Queensland hardwoods make these species suitable for the manufacture of particular specialty products;
- determine timber condition and dimensions required by particular product manufacturers to aid development of appropriate harvesting, processing and seasoning methods; and
- estimate potential domestic and international market demand for western Queensland hardwoods.

The paper begins by outlining the types of markets for which the unique hardwood timbers of western Queensland are potentially suitable. The market research methodology is then described, and results of the market research are presented. A discussion summarises key findings and draws policy implications.

PRODUCT SUITABILITY OF WESTERN QUEENSLAND HARDWOODS

The market survey targeted those timber industry sectors where the unique wood properties of western Queensland hardwoods would be most appreciated, and perhaps attract high prices. Many western Queensland hardwoods have high air-dry (12% moisture content) densities of between 1000 kg/m³ and 1300 kg/m³, high Janka hardness (13 kN to 18 kN), low shrinkage from green to air-dry (many about 1.5% radial and 2.5% tangential), and sound gluing properties (Cause *et al.* 2002). These species offer a variety of attractive timber colours from yellows through to light browns, chocolate browns and reds. Some species, such as *Acacia cambagei* (gidgee), can have highly attractive figuring. These properties, coupled with the small piece sizes, low log volumes per hectare, relatively low economically and ecologically sustainable harvest volumes, and high processing costs (low saleable product recoveries) (Venn *et al.* 2002, Venn *et al.* in press), suggested that high-value, niche and speciality markets would be most appropriate for western

² Australia has been divided into 85 bioregions according to the dominant landscape scale attributes of climate, lithology, geology, landforms and vegetation (National Land and Water Resources Audit 2001).

Queensland hardwoods. This indicated that manufacturers of items, such as billiard cues, clocks, fine furniture, custom knife handles, musical instruments, flooring (including parquet flooring), tool handles, and turned and carved objects, should be targeted by the survey.

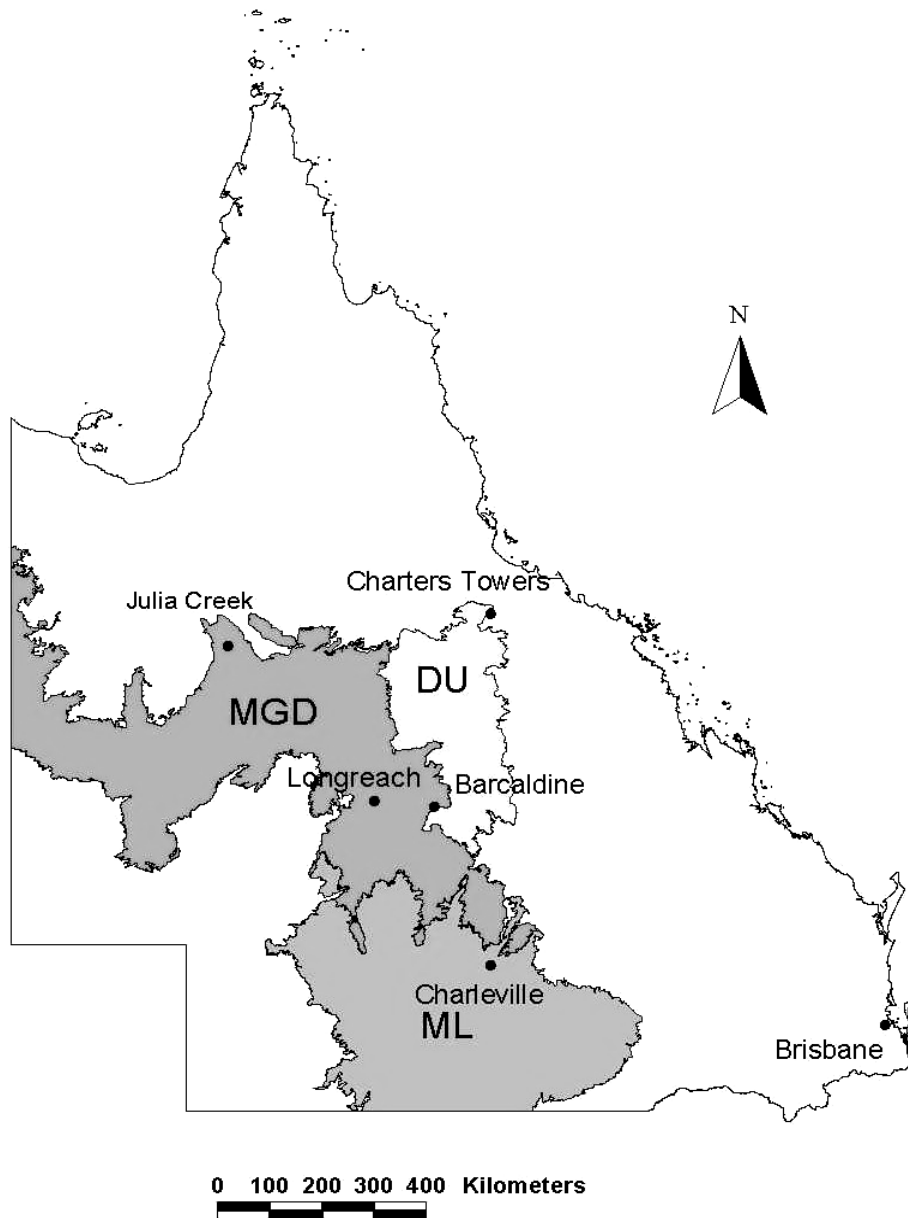


Figure 1. Location of the study area in western Queensland

Notes: DU = Desert Uplands, ML = Mulga lands, MGD = Mitchell Grass Downs.
Source: Rogers (2002).

From the large diversity of western Queensland hardwoods, 11 species were selected for assessment in the postal survey on the basis of their relative abundance and favourable timber properties for high-value specialty timber product manufacture:

- *Acacia aneura* (mulga);
- *Acacia cambagei* (gidgee);
- *Acacia coriacea* (desert oak);
- *Acacia excelsa* (ironwood);
- *Acacia nilotica* (prickly acacia);
- *Acacia shirleyii* (lancewood);
- *Archidendropsis basaltica* (red lancewood);
- *Eremophila mitchellii* (sandalbox);
- *Eucalyptus populnea* (bimble box);
- *Eucalyptus similis* (Queensland yellowjacket); and
- *Grevillea striata* (beefwood).

With the exception of prickly acacia, which is an exotic that has become well-established in the study region, these species are native to the Desert Uplands and Mulga Lands.

MARKET RESEARCH METHOD

Preliminary investigations into potential markets revealed that western Queensland hardwoods are relatively unknown to the Australian and international timber industry and are only traded in small volumes. A postal survey appeared to be the only affordable means of obtaining market information. A list of 225 domestic and international manufacturers, retailers and merchants of specialty timber products was compiled from industry journals and magazines, the internet, the Australian Yellow Pages, contact with the European and Japanese Secretariats through the Queensland Department of State Development, and a small number of referrals by survey respondents. Table 1 provides a breakdown of these 225 potential respondents by product type. Potential respondents were mailed an information package, which included a covering letter, questionnaire, table of timber properties of western Queensland hardwoods, and colour images of the timber of several species.

A two-page covering letter outlined the nature and objectives of the research and included a list of the species under consideration, a brief description of the timber resource, a list of potential products and an indication of the type of feedback sought. Minor modifications were made to the covering letter to make it applicable to particular product manufacturer types.

Questionnaires were tailored to particular product manufacturer types and locations (i.e. domestic vs overseas); however, a core set of 11 identical questions were presented to all respondents. The questionnaires ranged in length from 15 to 20 questions on three or four A4 pages. A copy of the distributed questionnaire is available from the author upon request.

Table 2 was supplied to respondents to indicate average values for green moisture content, air-dry density, and radial and tangential shrinkage for the selected western Queensland hardwood species. This information provided evidence of the relatively high densities and low shrinkage rates of these timbers and facilitated comparisons with traditionally utilised species.

Table 1. Distribution of market survey questionnaires by manufacturer type

Manufacturer type	Location of potential respondent		Total
	Australia	Overseas	
Associations ^a	2	10	12
Cue makers	3	15	18
Flooring manufacturers	13	0	13
Furniture manufacturers	34	0	34
Knife manufacturers	0	14	14
Musical instrument makers	36	11	47
Timber merchants	43	18	61
Veneer manufacturers	13	0	11
Woodturners and carvers	13	0	13
Total	157	68	225

^a Associations included furniture manufacturer, timber merchant and woodturner associations.

Table 2. List of timber properties distributed to potential respondents

Trade name	Scientific name	Green moisture content (%)	Air-dry density (kg/m ³)	Radial shrinkage (%)	Tangential shrinkage (%)
Mulga	<i>Acacia aneura</i>	26.7	1101	1.6	2.2
Gidgee	<i>Acacia cambagei</i>	26.4	1283	1.5	2.3
Desert oak	<i>Acacia coriacea</i>	24.6	1099	1.6	2
Ironwood	<i>Acacia excelsa</i>	37.5	1122	1.6	2.6
Prickly acacia	<i>Acacia nilotica</i>	55.2	875	1	1.6
Lancewood	<i>Acacia shirleyii</i>	25	1020	1	1.8
Red lancewood	<i>Archidendropsis basaltica</i>	31.4	1218	3	4.4
Sandalbox	<i>Eremophila mitchellii</i>	20.4	1051	1.3	2.7
Bimble box	<i>Eucalyptus populnea</i>	37.2	1145	2.8	4
Qld yellow jacket	<i>Eucalyptus similis</i>	37.5	1034	2.5	3.3
Beefwood	<i>Grevillea striata</i>	42.3	990	1.5	3.5

Colour photographs of mulga, bimble box, sandalbox, gidgee, beefwood and red lancewood were produced from sample wood pieces to display colour and grain features. These six timbers were selected because they represent the range of colours and figures available, and are potentially available in larger volumes than the remaining five species included in the survey.

The postal survey was conducted over the period January to April 1999. The first page of the questionnaire was headed with a fax template, such that respondents could easily return their questionnaires by facsimile. Postal, e-mail and telephone contact details were also provided to allow alternative response options. No follow-up reminders were sent to potential respondents.

RESULTS OF THE POSTAL MARKET SURVEY

The number of responses received, by product manufacturer type and location, are reported in Table 3. An overall response rate of 31% was achieved; however, the international response rate was only 12%. International respondents generally provided limited information from which few meaningful conclusions can be drawn. No knife handle manufacturers responded and only two responses were received from manufacturers of billiard cues, making it difficult to assess these markets. Only for two product or service types were more than nine responses received. Therefore, statistical analyses are unlikely to be reliable and none have been performed.

Table 3. Survey response rate by manufacturer type

Manufacturer type	Location of respondent				Total	
	Australia		Overseas		No. of responses	Response rate (%)
	No. of responses	Response rate (%)	No. of responses	Response rate (%)		
Associations	2	100	1	10	3	30
Billiard cue makers	1	33	1	7	2	11
Flooring manufacturers	4	31	na	na	4	23
Furniture manufacturers	9	26	na	na	9	26
Knife manufacturers	na	na	0	0	0	0.0
Musical instrument makers	15	42	2	20	17	36
Timber merchants and suppliers	17	40	4	22	21	34
Veneer manufacturers	7	54	na	na	7	54
Woodturners and carvers	7	54	na	na	7	54
Total	62	39	8	12	70	31

The majority of musical instrument manufacturers who responded are small-scale producers. Nevertheless, they cover a range of musical instrument types, as indicated in Table 4. The majority of timber merchants were in the business of selling craft, cabinet and decorative timbers to specialty product manufacturers. Products manufactured by woodturners included items such as wooden boxes and bowls, golf tees, vases and clock housings.

Table 4. Number of instrument manufacturer respondents by instrument type

Instrument	Number of respondents
Guitars	5
Percussion	1
Violins	5
Woodwind	4
Other	2
Total	17

Current Utilisation of Western Queensland Hardwoods by Specialty Timber Users

Table 5 indicates that current utilisation of western Queensland hardwoods is uncommon among survey respondents. Utilisation varies considerably between manufacturing industries, with woodturners and carvers appearing to have much greater experience with these timbers than other manufacturers. The relatively high proportion of timber merchants stocking western Queensland hardwoods reflects the diversity of their clients, which include furniture and musical instrument manufacturers and woodturners. Two furniture manufacturing respondents had gained some experience with mulga, gidgee, beefwood and lancewood, which had been utilised because of their high density, grain, colour and 'interesting features'. Musical instrument manufacturing respondents asserted that they have only utilised western Queensland hardwoods in experimental quantities.

Table 5. Past and present utilisation of western Queensland hardwoods by manufacturer type

Manufacturer type	Total number of respondents	Number of respondents who have used western Queensland hardwoods	Proportion of respondents who have used western Queensland hardwoods (%)
Billiard cue makers	2	0	0
Flooring manufacturers	4	0	0
Furniture manufacturers	9	2	22
Musical instrument makers	17	6	35
Timber merchants and suppliers	21	11	52
Veneer manufacturers	7	0	0
Woodturners and carvers	7	5	71
Total	67 ^a	24	36

^a The remaining three survey responses were provided by associations, not manufacturers or suppliers.

Woodturners and timber merchants provided the only estimates on current prices for western Queensland hardwoods. The former reported prices from \$335/m³ for green roughsawn boards to between \$2,000/m³ and \$3,000/m³ for roughsawn, dried timber³. Timber merchants indicated that they purchase western Queensland hardwoods for between \$650/tonne to \$3,000/tonne for logs, and \$3,000/tonne to \$5,000/tonne for dressed timber⁴. The total trade in western Queensland hardwoods of all timber merchants who responded to the survey was in the vicinity of 35 m³ to 45 m³ per year. This timber was sold principally to furniture manufacturers, woodturners, craftspeople and musical instrument makers. Domestic timber

³ All monetary values are expressed in Australian dollars. In July 2003, AU\$1.00 = US\$0.65.

⁴ Prices per tonne can be converted to prices per cubic metre with the air-dry densities reported in Table 2.

merchants indicated that small volumes of western Queensland hardwoods are exported to the United Kingdom, the United States and New Zealand.

Although many woodturners and musical instrument manufacturers are using western hardwoods, it was indicated that the majority of these businesses consume annual timber volumes measured in kilograms, not cubic metres. Indeed, timber merchants asserted that they are unaware of any manufacturer utilising more than several cubic metres per annum of the species included in the survey. On the basis of survey responses, it is estimated that the current total traded volume of western Queensland hardwoods does not exceed approximately 200 m³ per annum.

Flooring, furniture, musical instrument and veneer manufacturers, who have not used western Queensland hardwoods, provided several reasons for this, including scarcity of these species, and lack of information and awareness about them. In Table 6, reasons for low utilisation of western Queensland hardwoods have been ranked by manufacturer type in descending order of the number of respondents who listed them as a constraint on their use of these species (importance rank). Musical instrument manufacturers indicated that their negative perceptions of the hardness, glueability and splitting properties of western hardwoods has limited their utilisation of these species.

Table 6. Stated reasons for low utilisation of western Queensland hardwoods

Reason	Rank of reason for low utilisation of western Queensland hardwoods by manufacturer type			
	Flooring	Furniture	Musical instrument	Veneer
Poor availability	1	1	3	1
Timber perceived to be unsuitable			1	
Lack of information about timber properties	2	2		
Unaware of the timbers	2	3		
Customers demand traditional timbers		3	2	

Views on the Suitability of Western Queensland Hardwoods for Specialty Product Applications

Table 7 indicates that, on the basis of prior knowledge and of information supplied with the questionnaire, respondents generally believed that western Queensland hardwoods are highly suitable for the range of specialty product types they manufacture. Notably, while woodturner and carver respondents had the most experience in western hardwood utilisation out of the manufacturers surveyed (Table 5), they had the least desire to use these timbers in the future. More than 70% of flooring, furniture, musical instrument and veneer manufacturing respondents would like to use these timbers, although few had any previous experience with their use. Given that 87% of musical instrument manufacturers indicated a willingness to utilise western Queensland hardwoods, many who had believed the timber properties of western Queensland hardwoods made them inappropriate for their businesses

(Table 6) appear to have changed their opinion upon receipt of the wood property information accompanying the questionnaire.

Table 7. Respondents who believed western Queensland hardwoods are highly suitable for their business and will or will consider utilising these species in the future

Manufacturer type	Usable responses	Positive responses	Fraction of sample (%)
Billiard cue makers	1	1	100
Flooring manufacturers	4	4	100
Furniture manufacturers	8	7	88
Musical instrument makers	15	13	87
Timber merchants and suppliers	19	16	84
Veneer manufacturers	7	5	71
Woodturners and carvers	7	4	57
Total	61	50	82

Reasons for the high interest of flooring, furniture, musical instrument and veneer manufacturing respondents in utilising western Queensland hardwoods in the future are importance ranked in Table 8. The unique wood properties of western Queensland hardwoods are the main attraction for most respondents; however, a desire to use Australian timber species, as opposed to exotic timbers, is strong among musical instrument manufacturers. Flooring manufacturers view western Queensland hardwoods as an opportunity to develop niche, high-value domestic and export flooring markets. Some respondents expressed environmental concerns, referring to benefits from reducing the demand for traditional timbers sourced from tropical rainforests, and encouraging western Queensland landholders to reduce their land clearing intentions. Price competitiveness is not a high-ranking reason for the interest of manufacturers in western Queensland hardwoods, although some respondents appeared to assume that these timbers would be available at lower prices than the timbers they currently utilise.

Musical instrument manufacturers indicated that the acoustic properties of timber are critical for their purposes. Dry and stable timbers are required to ensure that pitch can be maintained over time, and respondent instrument makers believe that many western Queensland hardwoods have these properties. Western Queensland acacias, in particular, are highly regarded because they are 'unusually resonant'. Trials by woodwind instrument makers have proven the suitability of mulga, gidgee, red lancewood, sandalbox and beefwood for wooden flutes and flute parts. Mulga, gidgee and ironwood have also been utilised successfully in the manufacture of guitars, principally due to their hardness and appearance. Trials by one respondent with mulga, gidgee and lancewood suggested that their timber properties are unsuitable for percussion products (xylophones).

Table 8. Reasons for high interest in future utilisation of western Queensland hardwoods

Reason for interest	Rank of reason for high interest in using western Queensland hardwoods by manufacturer type			
	Flooring	Furniture	Musical instruments	Veneer
Timber properties, colours and features of western Queensland hardwoods	1	1	3	1
Patriotic desire to use Australian timbers in preference to exotic timbers and to encourage local industry	4	2	1	
Concern about future lack of availability of traditional timbers	3	4	2	
Niche market development opportunities with western Queensland hardwoods	2		6	
Environmental concern about timber harvesting practices in nations supplying traditional timbers	3	3	5	
Known or perceived demand for items manufactured from western Queensland hardwoods		3	5	
Perceived or assumed price competitiveness of western Queensland hardwoods	4	4	4	

One billiard cue manufacturer asserted that the timber properties of western Queensland hardwoods made them suitable for making the cue splice, which requires hard, dense and colourful timbers. Some furniture manufacturers provided an insight into their species preference, with one indicating that sandalwood and red lancewood are ideal, and another stating that mulga and gidgee have the most promise because of their 'strong colours'. Colour and figure are the major marketing features for veneer, and these characteristics of western Queensland hardwoods were considered highly marketable by veneer manufacturing respondents. Woodturners indicated a preference for dark and highly figured timbers, which they believe are available from the western Queensland hardwood resource. Nevertheless, virtually all respondents of all product types asserted the need for experimentation to determine suitable species and appropriate timber processing techniques, and research to reveal the preferences of consumers.

Timber Condition and Dimensions Required by Product Manufacturers and Suppliers

A range of timber specifications were provided by various product manufacturers, which is commensurate with the diversity of specialty product types examined by the survey. Table 9 reports preferred dimensions of western Queensland hardwood

boards. Timber merchants are not included, because of the great diversity of timber sizes they stock⁵. Woodturners also demand a wide range of wood forms and dimensions, including roundwood (unsawn timber). Table 9 reports the minimum dimensions of sawnwood demanded by this specialty timber user group.

Table 9. Dimensions of timber boards required by product manufacturers

Product	Thickness (mm)	Width (mm)	Length (mm)
Billiard cues	35	35	1600
Flooring	12 - 25	60 - 150	30 - 6000
Furniture	20+	75 - 100+	100 - 4000
Musical instruments			
Flute	40	40	70 - 700
Guitar - side	50	135	900 - 1000
Guitar - face and back	50+	230	550
Guitar - neck	40 - 75	140+	400 - 600
Guitar - fingerboard	10	50	300 - 500
Violin	50	50	750
Xylophone	20 - 50	38 - 50	150 - 350
Veneer ^a	100 - 250	150 - 250	2500 - 2900
Woodcarving ^b	50	100	500

^a. Reported dimensions required by veneer manufacturers are minimum sizes.

^b. Reported dimensions required by woodturners and carvers reflects the desired minimum board size when boards are required.

Generally, respondents indicated that western Queensland hardwoods could satisfy specialty timber consumer preferences for clear and figured timbers of dark red and brown colour. Uniformity of colour appears to be more important for musical instrument, flooring and furniture manufacturing, than in the other specialty timber markets examined. Most musical instrument and billiard cue manufacturers stressed a requirement for clearwood, which is totally free of sapwood, knots, splits and other defects. Flooring, furniture and veneer manufacturers are more accepting of defects, although some specified removal of sapwood.

Billiard cue and furniture manufacturers indicated a preference to purchase roughsawn, dried boards. Flooring manufacturers require kiln-dried timber and expressed their desire to ensure quality control by purchasing green-off-saw timber and undertaking all drying, dressing and grading themselves. Veneer manufacturers demand plastic-wrapped timber (to prevent degrade) in the form of billets (squared-off logs).

The dimensions and forms of timber required by musical instrument manufacturers vary according to the instrument being manufactured. In most instances, roughsawn, kiln-dried timber is preferable, although some respondents require dressed timber. The majority of instrument manufacturers indicated a preference for quartersawn timber due to its greater stability and resonance. Guitar

⁵ This reflects the timber merchants' customer requirements, and the capacity of merchants to undertake their own processing, drying and dressing activities. Several merchants indicated a preference to select trees and undertake all processing activities themselves.

manufacturers asserted their demand for ‘book-matched’ pairs for fronts and backs, and for sides⁶. Some respondents were concerned about processing and drying methods, stressing that it must be undertaken professionally in order for timber to be suitable for instrument making.

Potential Future Demand for Western Queensland Hardwoods in Specialty Timber Markets

The majority of respondents were unable to provide specific estimates of quantities they could consume and prices they would be willing to pay. It was generally indicated that further knowledge about timber properties, processing experience gained through testing, and market trials to determine consumer preferences, are necessary before estimates of quantities and prices can be made. Nevertheless, the majority of respondents were optimistic about potential future utilisation of western Queensland hardwoods, provided a consistent supply is guaranteed and product testing is successful. However, many respondents also asserted that considerable education and marketing campaigns would be necessary for these timbers to achieve their full potential in the market. Some timber merchants who have experience with western Queensland hardwoods believed that a specialty timber market is unlikely to develop, principally because only small logs are available. Most timber merchants attested that the domestic market alone cannot support a western Queensland hardwoods processing industry and that export markets are necessary. Table 10 summarises the information about potential future domestic market opportunities provided by respondents.

Table 10. Potential domestic demand for western Queensland hardwoods from specialty timber product manufacturers

Manufacturer type	Potential quantity (m ³ /yr)	Potential price (AU\$/m ³)
Billiard cue makers	Small (2-10)	High
Flooring manufacturers	Large (1000s)	600 - 1000 GOS ^a 800 - 1500 kiln dried
Furniture manufacturers	Small (~100)	1500 - 3000 roughsawn, dried
Musical instrument makers	Small (5-20)	~30,000 instrument pieces 1500 - 2000 exported boards
Timber merchants and suppliers	Small (100) for specialty end-uses Large (100s - 1000s) for high volume end-uses	600 - 3500 log 3000 - 8000 dried, dressed 600 - 1800 log delivered 600 - 1200 GOS ^a 1500 - 3500 dried
Veneer manufacturers	Large (1000s)	250/flitch
Woodturners and carvers	Small (100)	2000 - 3000 (up to 8000) roughsawn, dried

^a. GOS is ‘green-off-saw’.

⁶ For aesthetic appeal, many musical instrument manufacturers demand timber with matching colour, grain and other features. Consequently, timber for the front, back, and sides of a particular instrument is typically sourced from a single log.

Billiard cue manufacturers and woodturners are willing to pay high prices for western Queensland hardwoods, although volumes demanded are likely to be small. An Australian retailer of high quality timber products, who is supplied by more than 80 woodturners, attested that all of their suppliers use only small volumes of timber. Timber merchants supplying craft and decorative timbers reported that they would potentially stock only small volumes of western Queensland hardwoods, because there is limited domestic demand. It was suggested by timber merchants that many woodturners and craftspeople do not purchase timbers from them, instead preferring to obtain their supplies directly from landholders

Floor manufacturers reported an increasing demand for timber flooring in Australia. New technology, such as floating⁷ and composite floors, will allow the use of previously unsuitable timbers. Therefore, it was suggested that there is strong potential for western Queensland hardwoods in flooring markets. Narrow-board strip flooring, parquetry and floating floor panels were considered the most suitable for western hardwoods. It was indicated that further information is required regarding hygroscopic tendencies, drying degrade, gluing and response to finishes.

It was suggested that western Queensland hardwoods are probably too hard, the supply too irregular and the dimensions of sawnwood too inconsistent for use in large-scale commercial manufacture of furniture. However, the timbers are considered ideal for small-scale furniture manufacture, where size and consistency of timber inputs are not as important. Potential volumes utilised by the furniture industry in Australia are likely to be small, with two respondents indicating potential consumption of between 1 m³ and 2 m³ per month, and another suggesting 4 m³ to 5 m³ per month.

Flooring and furniture manufacturers indicated a need for western Queensland hardwoods initially to be price-competitive with hardwood timbers currently on the market, such as brush box, Crow's ash, spotted gum and ironbark (\$600/m³ to \$1000/m³ green-off-saw; \$1500/m³ roughsawn, kiln-dried). It was asserted that higher prices could be achieved once western Queensland hardwoods gain market acceptance.

The manufacture of musical instruments is viewed by respondents as one of the best ways to add value to timber. It was argued that the high value of musical instruments, and the traditions in manufacture and playing, has resulted in adherence to established materials and practices and a reluctance of manufacturers to experiment with new timbers. However, as supplies of traditional timbers have declined, opposition to the use of non-traditional timbers, such as western Queensland hardwoods, has decreased. Musical instrument manufacturers have indicated a willingness to pay up to \$30,000/m³ for select western hardwood boards, including:

- \$10 for guitar fingerboards (approximately \$27,000/m³)
- At least \$35 for sets of backs and sides for guitars (approximately \$2800/m³)

⁷ In contrast to traditional timber flooring systems that involve long lengths of tongue and groove boards nailed directly into sub-floor framing, floating floor systems are usually in shorter lengths or in prefabricated panels or tiles, and are placed over a concrete or composite (e.g. particleboard or structural plywood) sub-floor. Floating floors may be installed over shallow battens or adhesive may be used to hold the flooring in place.

- \$30 to \$40 (approximately \$30,000/m³) for flute blanks and
- \$1500/m³ to \$2000/m³ for timber exported to international luthier⁸ suppliers.

The Australian musical instrument manufacturing industry is small. A total of 4 m³/yr would satisfy the potential western Queensland hardwood demands of the two largest guitar manufacturers (the only commercial-scale musical instrument manufacturers in Australia). An Australian timber merchant asserted that most Australian musical instrument manufacturers would only consume about 10 kg of western Queensland hardwoods annually. It was suggested that the marketing of western Queensland hardwoods timbers for use in the manufacture of musical instruments would benefit from studies to test their musical properties against traditional exotic woodwind instrument timbers such as African blackwood, boxwood, cocobolo, cocuswood and ebony, and traditional exotic stringed instrument timbers such as spruce, western red cedar, maple, mahogany and rosewood.

One veneer manufacturer claimed that veneering is the best route to establish a broader market for western Queensland hardwoods, stating that if the marketing of western Queensland hardwood veneers is successful, then the sale of sawn timber will follow. Another veneer manufacturer asserted he could potentially utilise 6000 m³ to 9000 m³ of western Queensland hardwood billets annually, if these timbers are found to be suitable for veneer.

Potential Export Markets for Western Queensland Hardwoods

Insufficient responses were received from international respondents to provide a direct indication of potential export opportunities for western Queensland hardwoods; however, the general view of Australian respondents was that these timbers have high potential in international markets, including the United Kingdom, the USA, Japan and New Zealand. Large custom knife handle markets reportedly exist in the USA, where ringed gidgee (gidgee exhibiting beautiful figuring) is highly regarded. One international timber merchant suggested that, while he was unaware of timber merchants selling these timbers, he knew of many who would be interested in being future distributors. However, it was indicated that in international markets, relatively expensive western Queensland hardwoods would be competing with comparatively less expensive timbers from South America and Africa that have similar properties. Unless superior qualities for the intended use can be demonstrated, it may be difficult to displace the low-cost alternatives.

Woodturners are keen to use new and unique timbers and some will pay high prices for them. There are reportedly millions of amateur and professional woodturners in the USA and Europe, and there potentially exists an export market for hundreds of cubic metres of high-quality, high-value western hardwood craftwood. Domestic flooring manufacturers indicated the potential for export of 'modest volumes' into niche flooring markets. Opinions about potential markets for western Queensland timber veneers varied notably among respondents. Some suggested that the uniqueness of these timbers create the potential for niche export

⁸ Luthery is the trade or craft of making and repairing stringed instruments, such as mandolins, violins, violas, cellos, guitars and double bass. A luthier is the title of the tradesperson or craftsman who undertakes this work.

market opportunities, particularly for furniture manufacture in Asian, European and North American markets. One supplier of veneer in the USA showed great interest in western Queensland hardwoods and believed a large market would exist there. On the other hand, three veneer manufacturers were pessimistic about the marketability of western hardwood veneers.

From the information provided by musical instrument manufacturers, it is not possible to make an assessment of the volume of western Queensland hardwoods that could be sold into international musical instrument markets. Two Australian exporters of musical instrument timbers suggested that, if timely supply could be guaranteed, European and North American musical instrument manufacturers would be interested. A number of manufacturers commented that they were successful in selling instruments made from Australian timbers overseas, and that they often have customers demanding native Australian timbers. North Americans, in particular, have shown keen interest in Australian timbers, viewing them as a novelty.

The need for wood to be attractively presented for sale into the European, North American and Japanese markets was frequently mentioned, as was the necessity of a large marketing campaign. Respondents also stressed the desirability of ecolabelling western Queensland hardwoods for sale overseas, particularly to the USA and Europe. Ecolabelling was not considered important for the domestic and Asian markets.

Potential Limits to the Utilisation of Western Queensland Hardwoods

Respondents were provided with the best information available in 1999 about the properties and potential for utilisation of western Queensland hardwoods. However, the survey preceded studies on harvesting, portable milling, drying, grading and veneering reported in Venn *et al.* (2002). That research highlighted the reality of processing western Queensland hardwoods: small logs with high levels of defect, yielding small volumes of utilisable timber and about 2% of log volume as clearwood. Venn *et al.* (2002) reported that this results in production costs up to approximately \$1000/m³ green-off-saw, which is likely to limit the potential for suppliers of western hardwoods to compete with suppliers of traditional timber species in larger-scale domestic markets, including furniture and flooring. Although some manufacturers are successfully marketing timber defects as features of their products, defect remains undesirable in many products, particularly in export markets.

It is evident that western Queensland hardwoods are particularly unsuited to products requiring long or wide clear lengths of timber, such as strip flooring. Many furniture manufacturers continue to demand wide, long (>2.0 m) lengths of clear wood (Sewell 2001), indicating that western Queensland hardwoods are not suited to all types of furniture manufacture. Sliced veneer trials conducted since the market survey have indicated that western Queensland hardwoods have low suitability for veneer manufacture (McGavin *et al.* 2002). Therefore, despite the optimism of survey respondents, these timbers are not likely to be suitable for all markets assessed. Parquetry flooring, small-scale furniture manufacture, knife handle blanks, musical instruments, wood blocks for woodturners and manufacturers of assorted 'knick-knacks', such as plaques and clock faces, are likely to be the most suitable product types for western Queensland hardwoods.

DISCUSSION

The reported views of respondents have not yet been substantiated by experimental production or experience in the market. Current consumption of the western Queensland hardwood species considered in this study is estimated to not exceed 200 m³/yr. Reasons provided for low utilisation of these species are similar to those reported by others for lesser-known tropical rainforest timbers – poor availability, a lack of awareness about the resource, lack of information about timber properties, and a market preference for traditional timbers. Many timber merchants and musical instrument manufacturers complained about unprofessional supply chains (e.g. not returning telephone calls and taking many months or even years to supply a small order), which led to frustrating and costly dealings with suppliers. Nevertheless, most respondents believed western Queensland hardwoods have great market potential, a high proportion indicated a willingness to stock or use these timbers in the future, and virtually all requested to receive further information about the timbers as it becomes available.

The manufacturers with the most experience in utilising western Queensland hardwoods – namely, woodturners and musical instrument manufacturers – are those whose future demand is likely to remain small. Domestic market expansion will therefore be dependent on attracting larger volume consumers. Large-scale domestic flooring and furniture manufacturers asserted that western Queensland hardwoods would need to be price competitive with traditional timbers. However, high western hardwood milling costs will limit price competitiveness in these markets. Small log sizes and prevalence of defects are also major constraints on suitability of these species for furniture, flooring and veneer production. Small-scale furniture and niche flooring manufacturers, who are willing to pay high prices for western Queensland hardwoods, appear to be the most suitable domestic purchasers to target with these species.

It appears that export markets will need to be developed if the demand for high-value western Queensland hardwoods is to be substantially increased. While few usable responses were received from overseas, domestic timber manufacturers were confident that export markets for western Queensland hardwoods could be established, particularly in North America and Europe. Timber merchants with experience supplying overseas markets suggested that international knife handle manufacturers, musical instrument manufacturers, and woodturners could become important customers for suppliers of western Queensland hardwoods. However, it was indicated that they would have to be price competitive with current timber supplies to these markets. Ecolabelling was recommended for export to Europe and North America, but considered to have relatively low importance in Australia. As has been recommended for lesser-known rainforest timber species, it was asserted by domestic and international survey respondents that a large, well-directed marketing campaign would be necessary to establish export markets for western Queensland hardwoods.

The survey illustrated the importance and benefits of informing the market about the unique timber properties of western Queensland hardwoods; lack of information was cited by manufacturers as one of the major reasons for not utilising the timbers, although the unique timber properties were listed as the most important reason manufacturers are keen to utilise the timbers in the future. While the basic wood

properties and primary processing characteristics of western Queensland hardwoods are now relatively well researched, there remains uncertainty about appropriate machining, jointing and gluing techniques. The development of these methods will further aid market development for western Queensland hardwoods.

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