



CHAPTER 2 - TIMBER PROPERTIES AND MARKET

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INTRODUCTION

Macrocarpa is undoubtedly the best known and most widely traded of the “alternative”, exotic timbers, (“alternative” to the major exotic, plantation species of radiata pine and Douglas fir). Information on trade of cypress timber can be found on www.maf.govt.nz However, volumes of timber cut and traded may well exceed any indigenous species, but no reliable statistics are available for timber that is often cut and used by the land owner.

Other cypresses known to be milled and traded include Lawson cypress, lusitanica and very small volumes of Leyland cypress, but macrocarpa dominates the market. The volumes of lusitanica milled may be greater than commonly assumed due to mistaken identification as macrocarpa.

The main source of macrocarpa is old shelterbelt material with only limited areas of mature plantation and very small areas of pruned plantation available, as yet. In turn, the nature of the shelterbelt resource means that much of the wood is of relatively poor quality, with large and/or dead knots or infestation by two-toothed borer, *Ambeodontus tristis* and, not infrequently, pith rot at the base of the tree or some rot around broken branches. This may result in wood that is only fit for firewood, garden sleepers, or other low grade uses. Only very limited volumes of high quality, clear heartwood are produced, estimated at around 2% by one sawmiller. Nevertheless, macrocarpa is widely recognised and sought after as a high quality softwood. It is worth asking the question - how many other species would have been able to sustain a comparable timber trade based on such a limited and poor quality resource?

Macrocarpa, lusitanica and Lawson cypress are approved timber species for building construction. (NZS 3602 2003). This Standard and/or the local Territorial Authority should be referred to for particular building end use approval.

TIMBER PROPERTIES OF THE CYPRESSES

Macrocarpa

A medium to lower density softwood of moderate strength and stiffness, but relatively low surface hardness with good working and finishing characteristics and relatively uniform wood properties from pith to cambium. It is very stable wood, easily sawn with minimal reaction wood, meaning that even small diameter logs of 15-20 cm, and young “teenage” trees, can be sawn. The wood has low shrinkage on drying, but can suffer some collapse when kiln dried. The sapwood is very light brown and typically occupies about five growth rings. The heartwood is darker yellow brown in colour. Heartwood is rated as class 3 for durability, higher than most exotic softwoods, but is not generally regarded as suitable for in-ground use, and nor is it durable in situations where it remains moist. The heartwood cannot be treated with preservative. There is a distinctive spicy odour when freshly sawn. The wood is often compared to kauri.

Lusitanica

Similar to macrocarpa in most respects, but generally somewhat lighter in colour and often with a much wider sapwood band (up to 14 growth rings in some cases). One sawmiller described it as typically weaker and more brittle than macrocarpa, but published data hardly support this. The heartwood is

commonly regarded as less durable. *Lusitanica* can be extremely variable in many aspects, and some traditional cypress "species" such as *Cupressus benthamii* are now regarded as poor performing provenances (especially as regards timber) of *lusitanica*.

Lawson cypress

Lighter in colour, especially the heartwood, but notably stronger and stiffer than the other cypresses. It also has the strongest and most persistent smell of any cypress and this is regarded as a negative for furniture by some processors. Otherwise it is similar to other cypress. There are very few plantations of Lawson cypress being established.

Leyland cypress

This hybrid has not been utilised to the same extent as the above species, but is likely to become more widely available as shelterbelts age and land uses change. Wood properties are similar to the other cypresses, but with heartwood that starts as a more distinctive yellow and fades to a pale colour more akin to Lawson cypress. Leyland cypress from horticultural shelterbelts makes up a significant part of the cut for one Bay of Plenty sawmill. These are small, unpruned logs, and being open grown they show excessive taper, but they mill very well producing good quality dressing grade timber with excellent stability and tight green knots. Trees as young as 8 years have been successfully milled, although these would have minimal heartwood. Based on the characteristics of the *Chamaecyparis nootkatensis* parent, heartwood durability may exceed that of *macrocarpa*, although this has not been tested.

Knowledge of the mechanical strength properties of different timber is necessary for matching timber to appropriate end uses. In Table 1, strength properties are listed for the four cypress species and hybrids mentioned above, as well as *radiata* pine. The mean values are from multiple tests recorded by Forest Research for green timber and timber dried to 12% moisture content. The different strength properties are density, MoR (modulus

of rupture, a measure of bending strength), MoE (modulus of elasticity, a measure of stiffness), and hardness (resistance to indentation). It must be noted that the figures are from samples of small clear timber without defect. Knowledge of the effects of defects such as knots, splits, holes, compression and tension wood, and grain deviations, and other factors such as load duration, safety, and durability is necessary before any species can be recommended for a specific use.

Recent changes in the building code have resulted in untreated cypress timber being considered as similar to untreated pine, a classic case of comparing apples with oranges. The comments provided in Chapter 10 should help building inspectors understand the issues of using heartwood cypress timber as an exterior building material.

In Table 1, it can be seen that density for the cypress species is slightly lower than *radiata* pine; and the mean values of MoR and MoE are also slightly lower, except for Lawson cypress, which has higher mean values than *radiata* pine. Hardness mean values are considerably lower for all four types of cypress timber than for *radiata* pine.

The cypresses are used for a very wide range of end uses including: top quality clearwood, decorative veneer, furniture, joinery, weather boards, sarking, mouldings, panelling, boat building, etc. Timber with tight green intergrown knots is used for some of the above uses, also flooring, decking and structural uses, while poorer quality wood with dead encased knots goes into structural uses, especially "on farm" or "garden pagoda" type structural uses. The poorest quality timber is often used for garden sleepers. Note that though these end uses will tolerate large knots, all external uses need heartwood, or preservative-treated sapwood. Interior uses put little premium on heartwood over sapwood.

Table 1: Mean small clear strength properties by species, from Bier and Britton (1999).

Species	Density (kg/m ³)		MoR (MPa)		MoE (MPa)		Hardness (N)	
	Basic	12 %	Green	12%	Green	12%	Green	12%
Lusitanica								
Mean	360	402	45.39	69.55	5529	6471	2120	2623
Variation	341-388	370-412	38.64-55.6	55.5-84.50	4049-8338	4510-8883	1962-2320	2296-3900
Number of tests	78	75	78	75	78	75	20	20
Macrocarpa								
Mean	393	436	54.02	75.96	6583	7418	1937	3217
Variation	380-422	402-543	53.05-56.07	68.7-87.75	5544-7072	5787-7891	-	2482-3633
Number of tests	25	95	25	95	25	95	17	47
Leyland								
Mean	405	423	42.48	79.89	5540	6742	-	1874
Variation	395-425	413-449	42.45-42.49	73.11-82.62	4787-5923	6138-6985	-	-
Number of trees	89	87	89	87	89	87	-	25
Lawson								
Mean	422	435	49.94	96.61	8178	11755	1757	2475
Variation	321-490	410-542	41.8-66.7	76.9-133.1	6728-9260	8900-12990	1560-1870	2360-2540
Number of tests	103	117	103	117	103	117	11	11
Radiata pine								
Mean	407	463	40.00	89.04	5673	8877	2467	3980
Variation	370-536	380-615	23.97-86.8	60-122.9	2890-9286	4590-12850	1812-3635	2305-7292
Number of tests	> 1800	>1800	>1800	>1800	>1800	>1800	>1800	>1800



Cypress sarking

The one recognised problem in the processing of cypress timbers is some collapse and internal checking with kiln drying; however, the only end uses that normally require kiln dried timber are flooring and joinery.

The main limitation on the use of cypress timber, especially by larger processors such as joinery or furniture manufacturers, is the recognised uncertainty of supply, especially of better quality timber. While macrocarpa makes up the bulk of the local cypress trade and most, but by no means all, sawmillers express a preference for it, significant volumes of lusitanica may well be going through cypress channels unrecognised. It is often difficult to know whether this preference is based on solid reliable data or subjective and anecdotal assessment. Some sawmillers do speak glowingly of experiences with lusitanica and all sawmillers recognise lusitanica as an acceptable cypress for most uses, especially higher-value, interior uses. Both macrocarpa and lusitanica are being sold together as cypress timber.

The hybrid cypresses, mainly Leyland cypress, are less well known and are treated with some caution, because many sawmillers are uncertain about end user acceptance. Sawmillers generally recognise them as having equally good wood properties. The 'ovensii' hybrid, much favoured by many planters at present, is even less well known, but appears to be very similar to the Leyland cypress. Some processors market Leyland as a separate line because of its lighter colour and relative newness in the market.

LOG PRICES

Prices, grading criteria, and purchasing preferences vary widely between sawmillers, again reflecting the nature of the shelterbelt resource. There is no nationally accepted grading system for cypress logs, and their very nature makes this difficult. Different sawmills offer their own grading systems based on pruning, diameter, fluting, knot size, knot distribution (one side or uniform), dead versus green knots, sweep, log shape, presence of rot or two-toothed borer.

Some mills buy by log grade, which may be a preferred option for better quality plantations. Others prefer "run of bush" purchases with an average price paid for all grades. Regardless of the method of purchase, the size and nature of the resource means that single mills generally purchase whole stands, in contrast to radiata pine plantations where different grades may go to several different sawmills.

Because of their more irregular form, it can be difficult to accurately measure cypress log volumes, especially with rougher macrocarpa logs. Weight provides a more reliable measure, but the conversion from weight to volume can vary depending on the ratio of wetter heavier sapwood to drier lighter heartwood. Haslett 1986 (FRI Bulletin 119) quotes green density of 820 kg/m³ for macrocarpa and Leyland cypresses, 910 kg/m³ for lusitanica, presumably for heartwood.

Top prices paid for cypress logs would appear to be \$300-\$400/tonne on truck paid for top quality, pruned, macrocarpa and lusitanica veneer logs. These are normally selected on the skid site by the log buyer. Prices quoted for good quality, pruned sawlogs with SEDs (small end diameters) greater than either 30 or 40 cm, range from around \$140/tonne on truck to \$225/tonne on truck. Better quality unpruned sawlogs (tight green knots) are quoted at around \$80-\$110/tonne on truck, poorer quality sawlogs at around \$40-\$50/tonne on truck, down to \$30/tonne for "firewood" grade logs.

A recent quote for 21-year-old pruned Leyland cypress, for straight logs down to 200 mm SED, was around \$60/tonne on truck. Prices will vary according to location, sawmill experience and current market activities. It is advisable to seek offers from more than one operator.

Sawmillers do comment that it is difficult to predict the likely recovery from cypress logs, especially older macrocarpa logs, some yield much better than expected, others far worse. If the relationship between grower and miller is sufficiently good, payment on the basis of outcut (yield and grade of sawn timber) can be of benefit to both parties. Most sawmills

show little preference for heartwood over sapwood, especially for better quality, higher value, interior, finishing timbers.

TIMBER PRICES

Prices for sawn timber are similarly variable and again different grading rules are used by different traders. One point to note is that timber which is fully air dried is worth around twice as much as green timber off the saw, and if owners are in a position to stack and store sawn timber under cover for around 12 months, returns can be dramatically improved.

Good quality, clear heartwood straight off the saw is commonly quoted at \$800-\$1,000/m³ with several sawmillers saying that there are numerous markets at \$1,000/m³. Shorter lengths, under 2.0 m, often trade at some discount. Fully air dried, clear heart is commonly quoted at \$1,700 - \$2,000/m³ with one quoted retail price of \$2,500/m³ for all sizes. Some traders do allow very limited defects in their 'clears'. Number 2 clears, normally clear on three sides, trade at a discount to fully clear timber, but volumes are small (No. 2 clears come mainly from pruned logs) and not all traders recognise the grade.

Dressing grade timber, variously defined but basically tight, green, live knots, used for panelling, sarking, other appearance grades and structural uses, trades at around \$400-\$600/m³ green, off the saw, and at \$1,000/m³ plus air dried. Dressing grade Leyland cypress timber trades in the same price range.

Lower grade sawn timber with bark encased, dead knots or large green knots trades at around \$250 - \$350/m³, but because much of this material is used out of doors, there is more emphasis on heartwood. Note that garden sleepers, larger dimension, 2-m lengths of often very rough timber, used in landscaping, retail at around \$400/m³.

Cypresses do have the advantage that they can be readily sawn on mobile mills. With rough, shelterbelt material, this can allow the recovery of the limited volumes of higher quality timber on site and avoid the transport and mill processing of large volumes of low grade material. However, on-site milling adds extra costs for the grower and there is no guarantee that these costs will be recovered, especially if you are dealing with better quality plantation trees.

The grading of sawn timber is not an exact science and there is plenty of opportunity for disagreement on grades and value. Ideally both seller and purchaser should be present when timber is graded, but this is often not practical, especially with larger volumes. Equally, there is room for disagreement over log grades and values, but each log will be sawn into numerous planks of timber of varying grades, making the grading of sawn timber a much bigger task. Purchasers of sawn timber need to have clear, unambiguous, quantitative grading criteria and all potential sellers of sawn timber should demand a copy of these grading rules and grade prices in advance.

THE FUTURE

As is often pointed out, forecasting is dangerous especially going far into the future. However, it can be said that all cypress sawmillers expressed some concern, often great concern, about future supplies of sawlogs. One did suggest that there is more available than most think, but his confidence was still muted. However, the experience of eucalypt sawmillers in Northland has been that logs are still coming long after they had expected to exhaust the resource.

All the cypress millers expressed confidence in future demand for the timber, especially the better quality grades, and all stated that they would like to expand their cypress processing operations, but felt restricted by log supplies. Several made the point that larger end users such as joinery and furniture manufacturers would like to use locally grown cypress, but are not confident of future supplies of good quality timber. At present it is easier to use radiata pine or imported softwoods such as western red cedar or Fijian kauri.

The main shortfall is perceived to be in clear timber or the better dressing grades and this means that growers would be well advised to fully prune their cypresses and thin to ensure adequate diameters for clearwood recovery. From the end-users' point of view, the species grown is not critical and should be the species or hybrid best suited to the site.

Export prospects are also regarded as very promising for all the cypresses. A study by Alan Somerville suggested that New Zealand-grown cypress timber would be very well received in the Japanese market, though not at the extremely high prices reserved for locally grown Hinoki (*Chamaecyparis obtusa*). Nelson farm forester, Ross Higgins, comments that New Zealand cypress has been sold in Taiwan and there are good prospects in South Korea. All these countries are familiar with and favourably disposed towards cypress timber.

A study by a MSc. Student at Waikato University (Di Maio 1997), looking at international trade of softwoods in the Pacific Rim considered that New Zealand-grown cypresses could substitute for a group of timbers that include yellow cedar, Port Orford cedar, incense cedar, sitka spruce, western red cedar and redwood. All of these timbers are traded as high value softwoods suggesting a potential high value export opportunity for New Zealand-grown cypresses.

There is currently no indication that forest certification is an issue with cypresses. One retailer stated that they had only had one enquiry about certification in the last 10 years.

In addition, locally grown cypresses are recognised as being plantation or shelterbelt trees, planted by people and posing no threat to indigenous biodiversity.

Japanese market opportunities

Alan Somerville (ex Forest Research Institute) took some samples of New Zealand-grown cypress to Japan, and found that although we can't substitute directly into the highest quality bracket of the Japanese Hinoki market, we have good market prospects if we can produce a clear cypress timber product of uniform quality.

He found that the Japanese have very specific product dimensions. They use square beams called Hashira to build traditional post and beam houses. These beams are 105 mm and 120 mm square, and 3 m or 6 m long, knotty (hidden - foundations) or mostly three faces clear (visible placements). The highest quality Hashira beams sell for extremely high prices on their domestic market. They like the tight ring-widths and clear timber of old-growth Hinoki cypress.

Luigi Gea (Ensis) has suggested that there is the possibility that New Zealand could capture a part of the mouldings market, and only produce Hashira as a by-product from milled centres, with the very small defect core hidden inside the 105 mm and 120 mm square clear beams.

Key Points

- Cypress timber is developing a strong market profile.
- Cypress processors are concerned with the lack of resource.
- Cypress timber has both domestic and export potential.
- Cypress timber is often marketed as one line and not treated as individual species in the market.

Suggested reading:

Bier and Britton 1999

Clifton 1990

Di Maio 1997

Haslett 1986

Low, McKenzie, Shelbourne, and Gea 2005

