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SAWMILLING OF REGROWTH KARRI LOGS

K.J. White

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Weir Road Harvey WA 6220 (097) 29 1913
50 Hayman Road Como WA 6152 (097) 367 0333

SAWMILLING OF REGROWTH KARRI LOGS

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SUMMARY

A sawmilling study of regrowth karri (*Eucalyptus diversicolor* F. Muell) produced structural and some appearance grade material, after stockpiling under continuous water sprays for two years.

A preliminary grading indicated that spring and bow in the green sawn material were within the permissible limits given in the Australian Standards. When the material was regraded after three months storage under water sprays, most of the bow had reduced, but spring was still present in a number of pieces. Graded recovery of green structural timber was 30.2 per cent.

Kino veins associated with insect attack, and brownwood, were the major causes for downgrading of products, and were docked out when green grading. Storage of the logs under continuous water sprays for two years apparently had no adverse effect on timber quality or the natural colour of the sawn timber.

Only a small volume was milled into seasoned dressed appearance grades; less than 1.0 per cent of the total log volume made furniture grade, with standard and common grades being most common. The study indicated that insect attack and brownwood formation in regrowth karri could be of major importance because they reduce recoveries of value-added timber.

INTRODUCTION

Karri (*Eucalyptus diversicolor* F. Muell) occurs naturally in areas of the south west of Western Australia, from Wheatley on the Donnelly River in the north to Walpole in the south. Other occurrences are around Margaret River and Karridale to the west of the main forest area.

Management of the karri forest available for timber production originally involved group selection thinning, but is now based on clearfelling before areas are regenerated. Large volumes of karri regrowth will be available in the next few decades when regrowth forest is thinned.

This study was designed to assess sawmilling recoveries and defects in the sawn timber of regrowth karri, as part of the Department of Conservation and Land Management's (CALM) Small Eucalypt Processing Study.

MATERIALS AND METHODS

The regrowth karri for this trial was cut from an area at Channybearup (north-west of Pemberton), originally logged in the 1940s using the selection system which allows regrowth trees to grow in the gaps created. The site was a high quality karri and marri (*E. calophylla* R.Br.) stand, containing the mixture of regrowth and mature trees referred to as a two-tiered stand.

The fire history for the logging areas indicated no major wildfires over the past three decades. Prescribed burning for fuel reduction had been carried out every six or seven years.

Logging by a contractor produced a total volume of 85.9 m^3, and on-site supervision was under the control of CALM staff. Most logs in the trial were 4.8 m or longer (to a maximum 6 m) and diameter size classes ranged from 15 cm to 50 cm small end diameter under bark (s.e.d.u.b.).

Moisture Content Determination

At the mill sample logs for moisture content assessment were randomly selected from each trip as the logs were off-loaded.

Twelve logs, selected at random from different diameter and length classes, had a 50 mm sample disc cut 300 mm from each end. Details of felling date and sample number were attached by stapled tag to the end of the log. A sapwood to sapwood 100 mm wide section was cut from which 10 mm specimens for moisture content determination were cut at 50 mm intervals from the sapwood through the heartwood to sapwood on the other side. All samples cut had moisture content determined immediately after cutting, using the specifications in AS1080 (Standards Association of Australia 1972).

Moisture contents were reassessed just prior to milling after two years storage under continuous water sprays. There were problems in locating the original sample logs after two years, and new samples were selected.

Milling

The logs exceeding 40 cm s.e.d.u.b. were broken down on an old sizing carriage before being resawn on the breast bench. All other logs were broken down on a twin edger with overhead beam feed (which is limited to a maximum 40 cm diameter log) removing two wings at each pass through the saws. On the initial cut of logs less than 30 cm s.e.d.u.b., no recovery material was sought from the wings as only a minimal cut was made. The second pass was used to establish the structural face width of the finished product eg. 100 mm, 125 mm or 150 mm. These flitches were then resawn to produce backsawn material in structural sizes. Two small bundles of appearance grade material were also produced for separate seasoning trials.

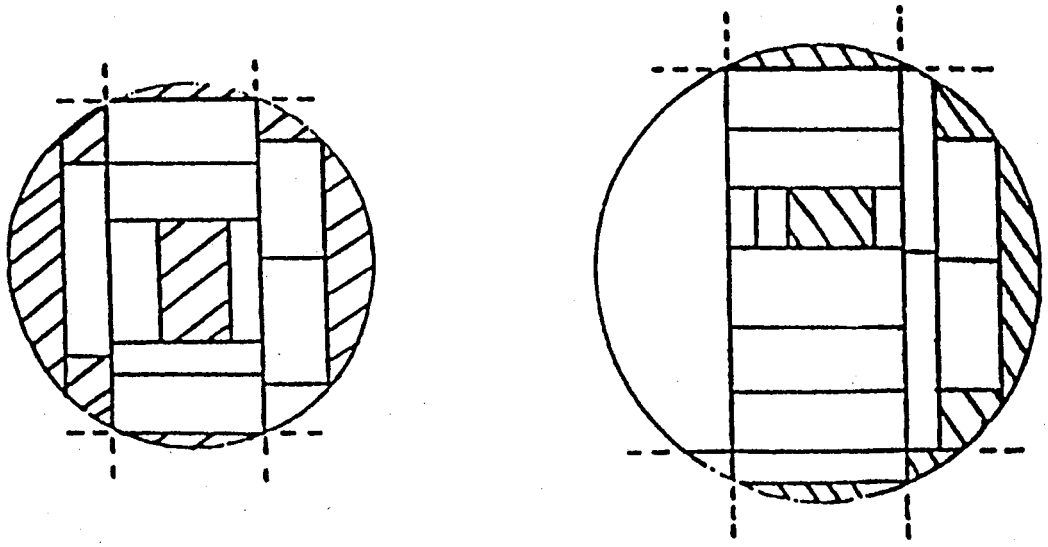

Figure 1. Sawing patterns used in karri sawmilling study, based on Machin (1981).

By using the sawing pattern in Figure 1 (based on Machin 1981), almost all the material produced in both structural and appearance grade was backsawn. The resaw system used in Harvey mill at that time was a two man resaw bench fitted with a circular saw and Dunstan live feed timber return, and each flitch was cut or turned to maximise recovery.

The sizes milled were 38 mm or 50 mm thickness for structural and 25 mm thickness for appearance timber, with widths up to 150 mm. Lengths ranged from 1.2 m to 6.0 m.

The appearance grade material was seasoned from green to fibre saturation point (f.s.p.) in the progressive tunnel kiln described by Brennan and Glossop (1989) and from f.s.p. to final moisture content in the experimental high temperature kiln (Thomson 1988).

Visual Grading

After milling each piece of structural timber was given an initial grading at the docker using AS2082 (Standards Association of Australia 1979) and docked where required to enable pieces to make grade.

The green sawn structural timber was placed under waterspray in the stockpile after grading and bundling, and stored for three months before being re-graded and branded.

Appearance grades were assessed using TAS-G4 (Forest Products Association 1985) and AS2796 (Standards Association of Australia 1986), following drying and dressing.

RESULTS AND DISCUSSION

The distribution of log sizes in the trial is given in Table 1. The mean size of about 32 cm s.e.d.u.b. was larger than the expected production from thinning in regrowth karri forest.

Table 1
Distribution of karri logs by small end diameter classes.

Small end Diameter class (cm)	No. logs	%
15-19	1	0.6
20-24	15	8.9
25-29	44	26.2
30-34	54	32.3
35-39	37	22.0
40-44	14	8.3
45-49	2	1.2
50-54	1	0.6

The mean values and standard deviations of moisture contents before and after storage under water sprays for two years are given in Table 2. The results showed that heartwood had higher moisture contents than sapwood, and moisture contents increased under water storage.

Table 2
Moisture content variation in regrowth karri logs before and after stockpiling.

	MC%			
	Before Stockpiling		**After stockpiling**	
Treatment	**Mean**	**S.D.**	**Mean**	**S.D.**
Small end				
Sapwood	66.6	7.0	65.9	11.8
Heartwood	75.9	15.9	79.9	11.8
Cross section	71.8	12.5	67.5	6.9
Large end				
Sapwood	62.8	9.3	69.5	10.0
Heartwood	64.6	9.5	93.1	16.0
Cross section	61.1	6.1	76.1	14.2

The sawing pattern used for conversion of regrowth karri sawlogs presented few problems for the sawyers, as the majority of logs sawn were in the size classes 25-39 cm s.e.d.u.b. (Table 1). Smaller logs were difficult to saw.

The graded recoveries of green sawn structural timber are given in Table 3. The results showed that more than 80 per cent of the sawn production was structural grade 3 or better i.e. F11 stress grade or above. The recovery of structural timber was 30.2 per cent.

Table 3
Green-sawn graded recoveries of structural timber from milling regrowth karri logs.

Structural Grade	**Volume (m^3)**	**% of log volume**
Structural 1	8.773	10.5
Structural 2	2.553	3.1
Structural 3	9.259	11.1
Structural 4	1.113	1.3
Reject	3.489	4.2

The proportion of quartersawn material was negligible, and most boards were backsawn or partly backsawn pieces. The levels of growth stresses were not excessive, and any bow or spring came within the acceptable limits set by AS2082 (Standards Association of Australia 1979) when graded green.

Kino and brownwood associated with primary rot were the most common reason for downgrading or rejecting sawn structural grade products. While the rejection rate of 3.9 per cent for structural products was a good result, as mentioned previously these logs were larger than those normally cut from regrowth thinnings.

The small volume milled into appearance grades produced little furniture grade material (Table 4). The rejection rate in excess of 50 per cent for appearance grade products indicated that there is an urgent need to establish the extent of insect damage and associated brownwood present in regrowth karri stands.

Table 4
Recoveries of seasoned appearance grade timber.

Grade	Volume (m^3)	% of log volume
Furniture	0.018	0.02
Standard	0.278	0.33
Utility	0.028	0.03
Commons	0.450	0.54

Docking brownwood and insect galleries from the end of a long piece could enable the remaining section to make Structural Grade 3, whereas full length it would not make Structural Grade 4. This type of upgrading has only limited advantages, because the market for short structural grade material is restricted.

Bow and spring evident at the green-sawn stage were within the acceptable limits of the grade rules. Inspection after storage for three months under waterspray indicated that bow (which already conformed with the requirements of AS2082) reduced considerably while spring remained similar.

The appearance of structural material stored for three months after grading was generally good, with only limited checking on the upper faces exposed on the top bundle. Some areas of kino had weathered sufficiently to crystallise and fall from the end section of some structural pieces. No pieces had to be down-graded on the second inspection when the grade stamps were applied.

In general, continuous water spray storage for two years appeared to have no adverse affect on the sawn products. Although only the small bundles of appearance grade timber were milled, the major concern is the low percentage recovery of furniture grade material, due mainly to degrade by insect attack and brownwood. Detailed assessment of the occurrence of these particular defects is required.

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