



# River She-oak provenance *research in south west Victoria*

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**In 1994, trials of river she-oak (*Casuarina cunninghamiana*) were established in south west Victoria to investigate growth and form, and the species suitability in farm forestry. River she-oak is a relatively fast growing tree and has been labelled as having excellent prospects for farm forestry (Bird, 2000).**

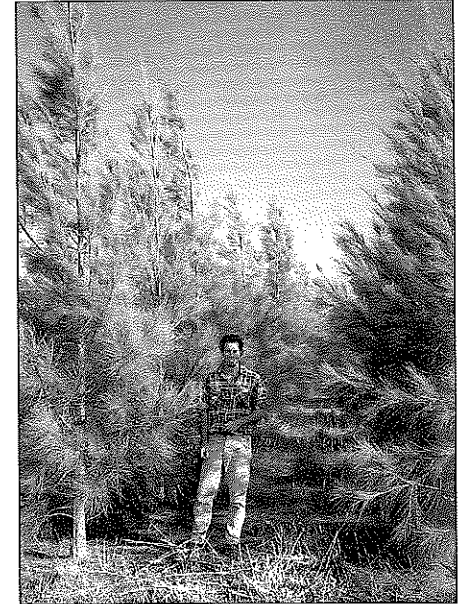
River she-oak is typically found in belts along streams from the border region of north east Victoria along a wide strip either side of the Dividing Range north to Cape York and across into NT (Doran and Hall, 1981). It is found over a quite wide rainfall distribution but growth is usually restricted when the annual rainfall drops below 500 mm. It has a moderate tolerance to salinity and does not compete heavily with pasture, as it is deep-rooted (Bird *et al.* 1994). Its preference is for reasonably deep, acid-neutral soil which is damp but not waterlogged.

River she-oak has pale sapwood with dark reddish or purple brown heartwood (Doran and Turnbull, 1997). The timber is heavy and hard, and has striking medullary rays that are

likely to enhance its value in appearance-grade products. It has been rated by Waugh (1996) as acceptable for appearance-grade products, sawn engineering products and round timbers. The sawn timber has a tendency to warp, split and twist but careful kiln drying can reduce these effects.

## Experimental Design

Three research sites (Table 1), comparing ten river she-oak provenances (Table 2) were established in SWVIC in September 1994. The trial was designed as a randomised complete block, with four blocks (two of which were fertilised) and two rip patterns. Each treatment plot traversed the block as a line-plot of 17 trees on a 2 m spacing, with another 3 trees on each end as a buffer. Initial



Rick Webb in a stand of river she-oak at Nareeb, 6 years.

spacing of the trees was high (1667 stems/ha) to encourage straight stem growth and light branching. The trees on cross rip lines were guarded at Dunkeld and Nareeb. All trees were guarded at Branxholme.

## Management

Planting lines were ripped on a 3 m x 4 m grid to a depth of 40-50 cm. Trees were planted alternately on cross ripped or single rip lines. Weed control was provided prior to planting, with applications of simazine (4 L/ha) and glean (30 g/ha). Herbicides were used late in the next 2 years where weeds persisted. Survival, height and diameter at breast height (DBH) measurements were recorded for all trees at approximately 5 years of age. Trees were form-scored in April 2000, to ascertain stem straightness (scores 1-4), branch thickness (scores 1-4) and presence of forking (scores 1-6), using CSIRO protocols.

## Results

Survival was high, except at Dunkeld (Table 1) where two of the Queensland provenances (No. 4 & 11) were eliminated and the survival of the remaining 2 (No. 1 & 12) averaged 44% and 12%, respectively. The survival of the NSW provenances on the site averaged 85%. The poor survival of Queensland provenances was due to frost damage and subsequent browsing by rabbits.

**Table 1. Site details for 1994 river she-oak provenance trial**

Site	Land zone	Rainfall (mm)	Survival (%)
Branxholme	Basaltic plains	725	96
Dunkeld	Basaltic plains	650	60
Nareeb	Laterised tablelands	600	97

**Table 2. River she-oak seedlots used in the 1994 provenance trial**

Number	Location	State	Source	Altitude (m)
1	Flagstone Creek Rd	Qld	ATSC - 17186	200
3	Glen Innes	NSW	ATSC - 15601	1000
4	Claireview	Qld	ATSC - 15574	10
5	Kangaroo Valley	NSW	ATSC - 15007	200
6	Brogo River	NSW	ATSC - 15006	85
7	Hunter River	NSW	ATSC - 13127	110
9	Wagga Wagga	NSW	ATSC - 14996	230
10	Coonabarabran	NSW	ATSC - 15001	670
11	Rollingstone	Qld	ATSC - 13519	20
12	Oasis	Qld	ATSC - 13513	460

The provenances from Queensland had the poorest growth and form at each of the three sites (Figures 1 & 2 and Table 3). Of the remaining NSW provenances, Wagga Wagga (9) and Hunter River (7) were growing well at all sites. Differences in form were harder to discern as trees were scored after had commenced. This would make the observed differences smaller than if the trees had not been managed. Analysis did confirm that the Wagga Wagga and Glenn Innes (3) provenances were performing well.

Stem form analysis revealed some significant differences among sites. Nareeb consistently out-scored Dunkeld, although this may be attributed to a higher pruning intensity at Nareeb. There were some significant site/provenance interactions, where provenances performed better at particular sites.

The effect of guarding on tree growth was significant, especially at the Dunkeld site, where hares were a problem. Mean tree height comparing guarded and unguarded trees was 4.7 m v. 4.3 m at Nareeb and 2.9 m v. 2.5 m at Dunkeld. The application of fertiliser (150 g/tree, Pivot 800) had no significant effect on height.

**Conclusion**

Frosts have troubled the river she-oak provenances from Queensland. Hunter River and Wagga Wagga usually had the best growth, with the latter having good form. Glen Innes had good form and reasonably good growth. The other NSW provenances also performed well and differences among them may become more apparent with time.

**References**

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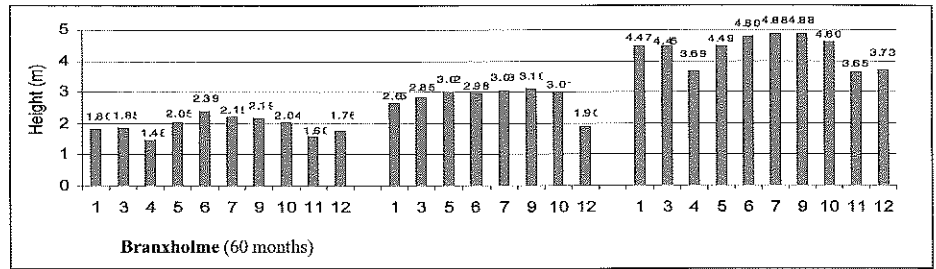
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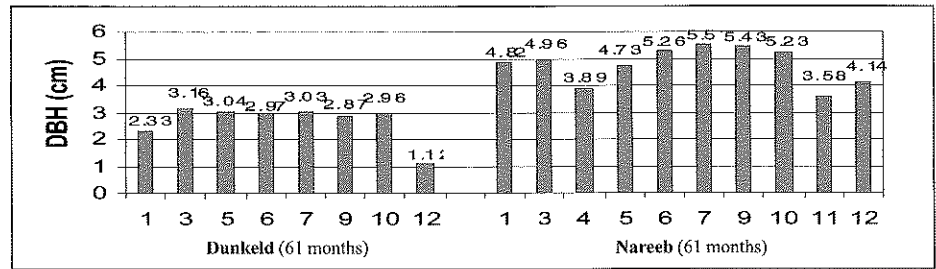
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**Figure 1. Height of river she-oak provenances**



**Figure 2. DBH of river she-oak provenances**



**Table 3. Percentage of trees having desirable characteristics**

Provenance	Branxholme			Dunkeld			Nareeb		
	S	F	B	S	F	B	S	F	B
1	18	71	46	8	71	58	56	86	86
3	55	85	81	13	82	72	78	96	93
4	15	52	41	1	18	43	22	91	68
5	47	84	44	10	82	64	88	95	83
6	62	84	72	11	69	54	72	80	80
7	44	86	67	9	74	50	54	72	77
9	67	86	87	23	87	67	83	76	90
10	54	87	81	23	74	74	61	88	80
11	23	76	53	1	32	26	19	77	47
12	43	66	81	2	57	5	11	69	64

S = Stems with 1-2 small bends or no bends (scores 3 & 4)

F = Stems with forking in top quarter or no forking (scores 5 & 6)

B = Light branching, with 1 branch > 1/3 diameter of main stem, or all branches < 1/3 diameter of main stem (scores 3 & 4)

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