

# South Australian Farm Tree Improvement Project

Progress Report - April 2012



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## 1.0 INTRODUCTION

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ForestrySA has been commissioned by PIRSA Forestry to report on the progress of the Farm Tree Improvement Project.

The Farm Tree Improvement Project (FTI) was established in 1992 by Primary Industries and Resources South Australia (PIRSA) to assess the suitability of different seed sources for a number of species and site types. Species were selected for characteristics such as fast growth rates, their tolerance of extreme conditions and for their value as a plant product. Trials were established across the state in the Murray Mallee, the Mid North, the South East and the Mount Lofty Ranges on a series of site types. As part of this project, seed production areas were also established in order to supply genetically improved seed from species of *Eucalyptus cladocalyx* (Sugar Gum), *Eucalyptus occidentalis* (Flat-topped Yate) and *Pinus halepensis* (Aleppo Pine) for farm forestry use over various sites.

The search included provenances with the ‘most desirable characteristics’ to more effectively enhance agricultural productivity by improving:

- shelter for soils, crops and stock
- surface and ground water management
- rehabilitation of degraded lands
- income from plant products

Generally, the ‘most desirable characteristics’ are:

- High planting stock survival, drought, disease resistance, rapid growth and good form e.g. straight trunks for timber or numerous straight stems for Broombush.

In 1994 a preliminary report was released outlining the aims of the Farm Tree Improvement Project including the locations and layouts of all trials established to that date. In 2003 an interim report was released that outlined the trial information including Species Performance Assessments (SPA) of those trials. This report provides an updated description of the trials progress including a calculation of volume production, the addition of new sites and the current status of the trials.

The long-term species suitability has been assessed by incorporating species suitability for the site type within the trial results. These results can only be a guide to the use of a suitable species on a suitable site.

Most of the original seed lots for the trials were obtained from the Australian Tree Seed Centre (CSIRO) in Canberra.

This report reviews the FTI site types (growing conditions) with an overview of each site including rainfall, soil and vegetation. It also reviews the relative performance of the selected provenances of some species plus analysis of new sites not previously included.

## 1.1 EXPERIMENTAL DESIGN

To minimise interaction between provenance plots within the trials, small plots with a maximum of eight trees planted in two rows were established. Trees were spaced at 2.5 to 3 metres for trial sites with high rainfall (>600mm) and 4.0 metres apart at sites with low rainfall (<600mm). To separate the plots, a buffer consisting of an unplanted row and an unplanted space was maintained at all sites however size was variable. Buffers of 5.0 to 8.0 metres as equivalent to the *between* row distance, and 3.5 to 6.0 metres equivalent to the *inter* row distance. To reduce suppression within trials, especially within those of mixed species, provenance plots of the same species or of species with comparable growth habits, were ordered into groups. Within each trial there are one to three replicates of each provenance planted in randomised incomplete blocks or as single row plot designs.

## 1.2 MONITORING

Monitoring of the sites is arranged according to the trial age and results which can be extracted at that time. Table 1 illustrates the types of monitoring performed at particular ages of the trials for consistent results among the localities. (Note not all trials were planted in the same year).

Table 1: Overview of trial monitoring by age, Farm Tree Improvement trials

Monitoring Type	Trial Age									
	0	1	2	4	5	7	10	15	20	30
Height and Survival Measurements	✓	✓	✓	✓		✓	✓	✓	✓	✓
DBH measurements				✓		✓	✓	✓	✓	✓
Estimates of Volume production					✓	✓	✓	✓	✓	✓
Colour photographs				✓		✓	✓		✓	✓



Figure 1: *Melaleuca uncinata*, Gumeracha Agroforestry Demonstration Area

## 1.3 SELECTION OF KEY SPECIES

To effectively use the project resources, the most suitable species were chosen based on factors of growth, site suitability and products. These key species were selected using the following criteria:

- Fast growing rates
- Suitability for varying sites e.g. arid, infertile, exposed, saline, poorly drained or eroded;
- Significance for plant products (timber e.g. value, durability, fuelwood quality, suitability for milling; brush for domestic fencing, fruit, honey, flowers or fodder).

A maximum possible score of three (3) was allocated for each criterion and then totalled. Species listed in Table 2 are in descending order of their current or potential contribution to sustainable agricultural productivity.

## 1.4 KEY SPECIES INFORMATION

Table 2: Overview of appropriate species including suitability score and total for FTI trials

Species	Growth	Site suitability	Products	Total	Comments
<i>Eucalyptus cladocalyx</i> Sugar Gum	3	2	2	7	Historically too widely planted, but can exceed 30m on favorable sites, relatively fast growth rates, heartwood moderately durable and sapwood treatable with preservatives, millable, burns well and has relatively straight form.
<i>Eucalyptus occidentalis</i> Flat-topped Yate	3	3	1	7	Fast growing, salt tolerant, mediocre and variable form, produces heavy and strong timber has a wide rainfall zone 350-650mm.
<i>Melaleuca uncinata</i> Broombush	1	2.5	3	6.5	Wide distribution, good for lowering ground water and a potentially viable farm enterprise. Fast growth rates, straight stems, high salt tolerance.
<i>Eucalyptus camaldulensis</i> River Red Gum	2	2	2	6	Most widely distributed Eucalypt on mainland Australia. Hard, durable timber, only moderate growth rates and salinity tolerance.
<i>Eucalyptus leucoxylon</i> SA Blue Gum	2	2	2	6	Widespread and adaptable species with high variation in phenotypes. Durable timber for in-ground use, good mill applications.
<i>Eucalyptus globulus</i> Tasmanian Blue Gum	3	1	2	6	Fast growth and suitable to changing site conditions. Possibly millable timber or pulpwood.
<i>Acacia melanoxylon</i> Blackwood	1	1.5	3	5.5	Prized cabinet timber, occurs on a wide range of sites, but shows poor form and growth on all but the best sites in SA. Need to find the provenance with reasonable form and growth rate, and well matched to less favorable sites.
<i>Cupressus macrocarpa</i> Monterey Cypress	2	1	2.5	5.5	The second most important agroforestry species in New Zealand.

## 1.4 KEY SPECIES INFORMATION cont...

Species	Growth	Site suitability	Products	Total	Comments
<i>Pinus halepensis</i> Aleppo Pine	1	2	2	5	A medium sized tree (up to 25 metres tall) that develops a broad crown with large limbs and very fine foliage texture. Very reliable for arid and semi-infertile sites, but slow growth rates.
<i>Callitris columellaris</i> Native Pine Callitris	1	2	2	5	Durable, malleable softwood. Suited to a range of sites including arid and deep infertile sands.
<i>Eucalyptus sideroxylon ssp. sideroxylon</i> Red Ironbark	2	1	2	5	Hard durable timber, form can be good. Moderate growth rate, suited to 450-600mm rainfall zones. Species is closely related to E. leucoxylon.
<i>Corymbia maculata</i> Spotted Gum	2	1	2	5	A tall tree which can reach 45m on favourable sites. Well suited to wetter sites, highly tolerant to pests and disease. Wood is hard, strong and very durable.
<i>Casuarina cunninghamiana</i> River She-oak	2	1	2	5	Good species for moist fertile sites. Timber has typical oak figure. Relatively good form and is useful for agroforestry.
<i>Casuarina cristata</i> Black Oak	1	2	1.5	4.5	Very hardy species suited to arid and infertile sites. Timber with oak figure sought after as craft timber.
<i>Eucalyptus astringens</i> Brown Mallet	2	1.5	1	4.5	Fast growth on well drained soils. Height and form is relative to the rainfall zone. Useful windbreaks, firewood and reducing ground fuels for fire protection.
<i>Acacia salicina</i> Cooba	1	2	1.5	4.5	Tolerates salinity and clay soils. Commonly poor form but timber is comparable to Blackwood from larger specimens, drought tolerant.
<i>Eucalyptus dundasii</i> Dundas Mahogany	1	2	1.5	4.5	Tall growth for the semi-arid mallee areas. Good form with durable timber for on-farm use as a bonus.
<i>Robinia pseudoacacia</i> Black Locust	1.5	1	2	4.5	Deciduous legume from North America. Can tolerate minimal rainfall of 400-500mm. Hard, durable timber, 'ship mast' provenances reputedly from superior form, but only likely to be suitable for moist fertile soils.
<i>Allocasuarina leuhmannii</i> Buloke	1	2	1.5	4.5	Attractive wood with oak figure, tolerant of heavy semi-waterlogged soils. Slow to moderate growth.
<i>Eucalyptus porosa</i> Mallee Box	1.5	2	1	4.5	Hardy, widespread and tolerant of a wide range of soils. Spreading crown for shade and durable timber for fencing and firewood.
<i>Grevillea robusta</i> Silky Oak	1.5	1	2	4.5	Moderately valuable timber, reasonable open grown form and light branching. Tolerant of calcareous soils and rainfalls to 500mm. Concerns are slow early growth rate and low frost tolerance.
<i>Casuarina glauca</i> Swamp Oak	1	2.5	1.5	4.5	Very useful for saline and poorly drained alkaline sites. Timber has an oak figure and is possibly marketable. Some forms are of poor quality and need to be identified and avoided.

## 1.5 ADDITIONAL SPECIES LIST

Species	Comments
<i>Acacia stenophylla</i> Shoestring Acacia	Drought tolerant, performs well in a range of soils and sites. Medium height and fast growing.
<i>Cupressus lusitanica</i> Mexican Cypress	Prefers fertile sandy clay-loam and minimum rainfall of 500mm. Slower growth rates than Radiata pine. Growth restricted in wet clay and alkaline soils.
<i>Eucalyptus botryoides</i> Southern Mahogany	Grows to 20m. Tolerates limestone, heavy clay and sandy soils. Salt tolerant, fast growth rates. Susceptible to frosts.
<i>Eucalyptus fasciculosa</i> Pink Gum	Average rainfall 450mm, tolerates sandy, clay and limestone soils. Moderate frost resistance.
<i>Eucalyptus kondininensis</i>	Western Australian species which tolerates high level of soil salinity.
<i>Eucalyptus viminalis</i> Manna Gum	Maximum mature height of 30m. Best sites have deep soils and good drainage. Does not tolerate compaction.
<i>Eucalyptus ovata</i> Swamp Gum	Fast growth rates, vary in height from 8-25m. Coastal trees are smaller than inland specimens.
<i>Eucalyptus cneorifolia</i> Kangaroo Island Narrow-leaved Mallee	Quick growing, suitable for windbreaks and erosion control. Grows in most soil types and has low moisture requirements.
<i>Eucalyptus largiflorens</i> Black Box	Requires a well drained acid pH soil. Moderate growth rates and low moisture requirements. Good specimens grow to 20m.
<i>Eucalyptus leptophylla</i> Slender-leaved Mallee	Small mallee tree to 10 m high. Red-brown loam, red sand, granite. Near outcrops.
<i>Eucalyptus cornuta</i> Yate	Fast growth, found in loamy gravelly soils usually associated with granite. The timber is strong. Suitable for wet and/or saline areas.
<i>Eucalyptus dumosa</i> White Mallee	Heartwood hard, moderately durable, useful for firewood. Typical mallee of 2-10m, occasionally 12m in favorable conditions of soil and rainfall.
<i>Melaleuca cuticularis</i> Saltwater Paperbark	Large shrub or tree with papery white bark. Common in the southwest of WA in saline depressions and swamps.
<i>Paulownia tomentosa</i> Chinese Empress Tree	A rapidly growing tree with heights up to 10-20m tall.
<i>Acacia dealbata</i> ssp <i>dealbata</i> Silver Wattle	An easily grown tree which grows to 25-30m. Planted for timber and acts as a good soil stabiliser.
<i>Acacia decurrens</i> Green Wattle	A tall shrub or small tree with bipinnate foliage. Can be cultivated for windbreaks or shelterbelts. Closely related to <i>A. mearnsii</i> and <i>A. filicifolia</i> .
<i>Acacia filicifolia</i> Fern-leaved Wattle	Related to <i>A. decurrens</i> and <i>A. mearnsii</i> . It is an ideal plant for windbreaks, shelterbelts or as a canopy species in native hedgerows.
<i>Acacia mearnsii</i> Black Wattle	A spreading tree to 15m tall. Very fast growing but short lived. Closely related to <i>A. decurrens</i> and <i>A. filicifolia</i> .

**Note:** After the initial series of trials were established these additional species were planted e.g. Lenswood and Mt Bryan. Some species and provenances listed here were also planted to replace species which displayed poor survival.

## 1.6 SELECTION OF SITE TYPES

In the Murray Mallee, Mid North, South-East and the Mt Lofty Ranges a number of site types have been identified. Sites have been classified principally by using the dominant pre-settlement vegetation except for the Murray Mallee which uses soils (and rainfall factors) to provide the basis for characterising the site types.

The more significant site types were chosen for trial sites on the basis of widespread distribution or high potential beneficial impact of ‘farm tree planting’. The site types are briefly described below, and a locality map follows.

Table 3: Overview of FTI sites including Rainfall, Soil, Vegetation and Comments

Site Type	Location	Rainfall	Soils	Vegetation	Comments
<b>Mid North</b>					
<i>Shallow stoney &amp; calcareous</i>	Sherlock	300-400mm	Alkaline (pH 9) shallow stoney sandy loam over limestone, 200-700mm	<i>E. leptophylla</i> , <i>Melaleuca lanceolata</i> .	Areas of underlying sheet limestone
<i>Sandy loam</i>	Paruna	200-300mm	Alkaline (pH8.5) sandy loam over clay, 600-850mm	<i>Callitris preissii</i> , <i>E. anceps</i> , <i>E. cyanophylla</i>	Swale
<i>Deep sand</i>	Peebinga	250-350mm	Alkaline (pH8) deep sand >1m	<i>Callitris preissii</i> , <i>Leptospermum coriaceum</i>	Relatively infertile, widespread
<i>Sandy loam</i>	Pinnaroo	300-400mm	Alkaline (pH9), sandy loam over clay, 200-600mm	<i>E. socialis</i> , <i>E. gracilis</i> , <i>E. anceps</i>	Flats
<i>Loamy sand</i>	Murray Bridge	300-400mm	Alkaline (pH9) sandy loam over clay, 200-700mm	<i>E. odorata</i>	Prime cropping land
<i>Sandy loam</i>	Lameroo	300-400mm	Alkaline (pH8-9) sandy loam over clay with some pure sand	<i>E. socialis</i> , <i>E. gracilis</i> , <i>E. anceps</i>	Prime cropping land
<b>Murray Mallee</b>					
<i>Saline</i>	Redhill	400mm	Alkaline (pH8.5) brown loam over clay, 200-350mm	<i>Sea Barley Grass, saline spp.</i>	Some saline seeps and salt scalds
<i>Treeless</i>	Mannanarie	300-400mm	Alkaline (pH9) brown loam, 200-350mm	<i>Native grassland</i>	Mainly treeless
<i>Mallee Box</i>	Appila Springs	300-400mm	Alkaline (pH8) brown loam, 200-350mm	<i>E. porosa</i>	Compacted
<i>Mallee Box</i>	Mt. Bryan	400-500mm	Neutral (pH6.5) shaly red brown loam, 200-400mm	Grasses, possibly <i>E. porosa</i>	Rolling hills, northerly aspect
<i>Blue Gum &lt;15m</i>	Browns Hill	400mm	Acidic (pH6) shaly red brown loam, 200-350mm	<i>E. leucoxylon/ pruinosa woodland</i>	Rolling hills, easterly aspect
<i>Blue gum &gt;15m</i>	Bundaleer	500mm+	Neutral (pH7) red brown loam, 200-400mm	<i>E. leucoxylon</i> , <i>E. cladocalyx</i>	Tall forest form <i>E. leucoxylon</i>

Site Type	Location	Rainfall	Soils	Vegetation	Comments
<b>Mount Lofty Ranges</b>					
Stringybark/Pink gum.12-20 m.	Montarra	800-900mm	Acidic (pH5-5.5) brown clay loam, 200 - 400mm	<i>E. obliqua</i> , <i>E. fasciculosa</i> , some bracken	Rolling hills, upper to lower slope, north-easterly
Blue Gum >15m	Gumeracha— <i>Robinia pseudoacacia</i> / <i>E.globulus</i> / <i>Grevillea robusta</i> / mixed species	850mm+	Acidic (pH5.5) brown clay- loam, 200- 500mm	<i>E. leucoxylon</i>	Mid-slope, variable aspect
Blue Gum >15m	Cudlee Creek	850mm+	Acidic (pH 6) brown clay- loam, 200- 450mm	<i>E. leucoxylon</i> , <i>E. camaldulensis</i>	Mid-slope, moderate fertility
Red Gum Site (poorly drained)	Gumeracha— <i>A.melanoxylon</i>	850mm+	Acidic (pH6) sandy loam over clay/gravel, 300- 900mm	<i>E. camaldulensis</i>	Valley bottom, poor drainage
Red Gum Site (well drained)	Gumeracha— <i>E. cladocalyx</i> / mixed species	850mm+	Acidic (pH 5.5-6) brown clay- loam, 400- 600mm	<i>E. camaldulensis</i>	Lower slope, northerly aspect
Tall Stringybark >15m.	Lenswood	900mm+	Acidic (pH6) brown clay- loam, 200- 400mm	<i>E. obliqua</i> (tall), <i>E. rubida</i> , <i>E. viminalis</i>	Steep slopes, sheltered valleys, northerly aspect
<b>South East</b>					
Saline	Woolumbool	500mm+	On salty area, alkaline (pH 9) sand over clay >1m. Off salt, neutral	<i>E. fasciculosa</i> , sea barley grass.	Low lying, restricted drainage, some salt scalds
Treeless Plains	Struan	500-600mm	Alkaline (pH 8.5) black clay, 150 - 400mm	Treeless grassland	Black cracking clay, sometimes inundated
Pink Gum—deep sands	Coombe	400-500mm	Neutral (pH 7) deep sand, >1m.	<i>E. fasciculosa</i>	Deep infertile dune sands
Pink Gum/ shallow water table	Willalooka	400-500mm	On rise neutral (pH 7) sand over clay, 200 - 300mm on low flat	<i>E. fasciculosa</i>	Undulating: some rises, some low lying with restricted
Medium Stringybark Site 12-20 m	Penola	600-700mm	Acid (pH 6- 6.5) deep sand, > 1m.	<i>E. baxteri</i> / <i>E. obliqua</i> , <i>Acacia mearnsii</i> ,	Low dunes amongst shallow swamps, relatively
Red Gum Site (mod. well drained)	Kalangadoo— main trial Kalangadoo—Blackwood trial	700-800mm	Acidic (pH 5.5) sand over clay,400 - 900mm Acidic (pH 4) sandy clay, 300 – 400mm	<i>E. camaldulensis</i> , <i>Acacia melanoxylon</i>	Most mod. well drained, some swamps, excellent grazing land

**Note:** Eyre Peninsula's site type was omitted from this list as no site information was made available.

## 2.0 FARM TREE IMPROVEMENT TRIAL REGIONS AND LOCALITIES

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Figure 2: Location map of Regions and FTI trial sites

### 3.0 PLANTING AND MEASUREMENT SCHEDULE

Table 4: Overview of Planting and Measurement schedule, FTI trials

Locality	Site	Trial	Planting/Measurement Years										
			1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
5.1 Mid North	Pinaroo	FT001											
	Murray Bridge	FT005											
	Lameroo 'Bew's' 1990	FT002											
	Lameroo 'Bew's' 1992	FT009					R	R					
	Peebinga	FT008											
	Paruna	FT007				R							
	Sherlock	FT026					R				R		
5.2 Murray Mallee	Appila Springs	FT018											
	Bundaleer	FT004											
	Mannanarie	FT019											
	Redhill	FT017					R	R					
	Browns Hill	FT025				R	R				R		
	Mt Bryan	FT034							R		R		R
5.3 Mt Lofty Ranges	Cudlee Creek	FT003											
	Gumeracha Acacia (failed)	FT010											
	Gumeracha Acacia replant	FT038											
	Gumeracha Grevillea robusta	FT011											
	Gumeracha E. cladocalyx	FT012											
	Gumeracha Robinia pseudoacacia	FT013											
	Gumeracha Mixed Red Gum Site	FT014											
	Gumeracha Mixed Blue Gum Site	FT015											
	Gumeracha E. globulus	FT016											
	Montarra	FT024				R							
	Lenswood	FT039											
5.4 South East	Woolumbool	FT023					R						
	Struan (failed)	FT022				R	R						
	Struan (replant)	FT037											
	Penola	FT021				R	R	R			R		
	Kalangadoo	FT033				R	R	R					
	Willalooka	FT035											
	Coombe (Brookmans)	FT036											
5.5 Eyre Peninsula	Minnipa	-											

Trial Planted  
Trial Measured

R Replants due to poor survival or extension to trial

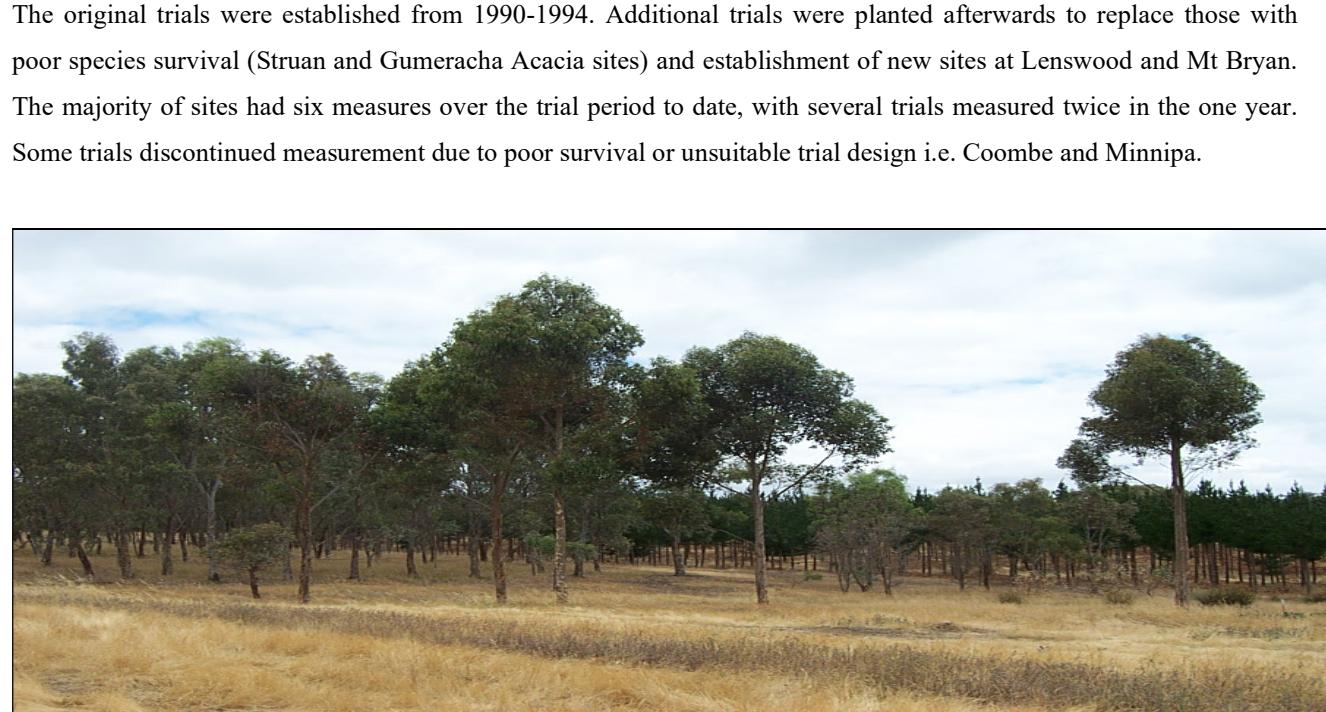


Figure 3: *Eucalyptus cladocalyx* seed production area, Age 9, Kersbrook HQ

## 4.0 TRIAL CRITERIA

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The 1994 preliminary report discusses the future management of the sites, and includes criteria for continued measurement of the trials. Sites recommended for inclusion in a future measurement program should only be considered if there is an obvious economic, social or environmental reason to continue measurement and meet the following criteria:

- **Recommended Trial Design:** Sites established that meet the minimum standard set out by the originating Project Officers, including; **Eight tree plots** (four plants x two rows), **Three replicates** (in a randomised incomplete block design), **Buffering** between these eight tree plots was to include an unplanted row and unplanted space separating plots to minimise interaction between plots and enable growth rates of the “open grown” plots to be compared with each other.
- **Unsuitable Trial Design:** Sites established with less than eight trees per plot, single row plots and single tree plots and trials with less than three replicates per taxa have not been considered for a future program due to insufficient measurement data being obtainable.
- **Taxa Survival:** There needs to be sufficient survival of taxa within the plots/replicates to enable comparisons on growth and performance to be made.

## 5.0 FARM TREE IMPROVEMENT TRIAL RESULTS

### 5.1 RESULTS FOR THE MID-NORTH REGION

FT018	Appila Springs Reserve*	planted 1992	Last measured 2003
FT025	Brown's Hill – Hagger's*	planted 1993	Last measured 2003
FT004	Bundaleer Forest Headquarters*	planted 1990	Last measured 2003
FT019	Mannanarie – Young's	planted 1992	Last measured 2003
FT034	Mt Bryan – Quinn's*	planted 1994	Last measured 2003
FT017	Redhill – Dunsford's	planted 1992	Last measured 2003

\* Ceased measurement in 2003

#### 5.1.1 Appila Springs Reserve

- Location: The trial is located eight kilometres north-east of the Appila township. The plots are situated on a flat area on the approach to and above the public amenity known as Appila Springs.
- Site type: Mallee Box Site
- Rainfall: Approximately 380mm annually.
- Site History: Permission to use the site was granted by the Jamestown District Council in June 1992. The site first sprayed by the Appila Agricultural Bureau (A.A.B). The site was then fenced and plots 1-21 were planted on September 16 1992, plots 22-33 were planted on August 15 1993 by PIRSA and the A.A.B. Plots 34-36 were planted on 2/08/1994. The A.A.B conducted maintenance duties which included keeping the trial weed free.
- Number of Plots: 36
- Number of trees: 288
- Spacing: 4m between trees, 4m between rows.
- Plot size: Plots are of 8 trees each (two rows of four trees).

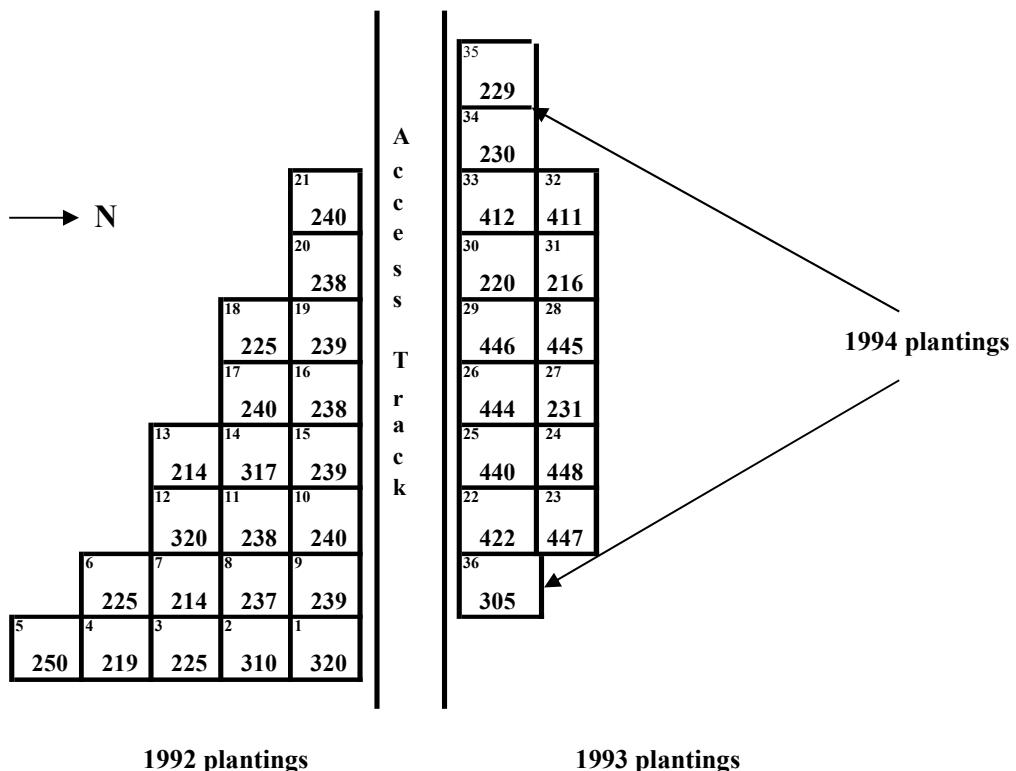


Figure 4: Overview of FT018, Appila Springs trial

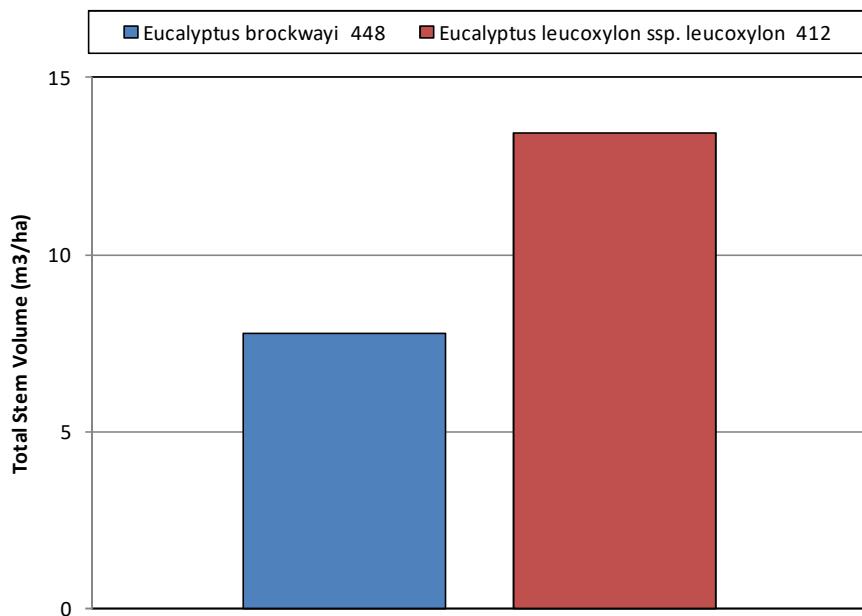
**Table 5: Species, Provenance No. and Collection details, FT018 Appila Springs**

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Callitris columellaris</i>	214	Blackwood Seeds	Mambray Creek SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	13046	Kangaroo Island SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	17012	Studley Park Vic
<i>Eucalyptus dundasii</i>	225	12260	Norseman/Esperance WA
<i>Eucalyptus astringens</i>	229	17670	Boyagin Rock WA
<i>Eucalyptus astringens</i>	230	17685	Ravensthorpe WA
<i>Eucalyptus astringens</i>	231	17686	Kundip WA
<i>Eucalyptus porosa</i>	237	J. Turner	Dawson SA
<i>Eucalyptus porosa</i>	238	12219	Golgol NSW
<i>Eucalyptus porosa</i>	239	J. Fairlamb	Tailem Bend F.R. SA
<i>Eucalyptus porosa</i>	240	Bulman/ Fairlamb	Yatina/Pekina SA
<i>Eucalyptus occidentalis</i>	250	13644	Thomas River Area WA
<i>Callitris preissii</i>	305	Dunsford	Red Hill SA
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	Blackwood Seeds	Flinders Range SA
<i>Melaleuca uncinata</i>	317	Clive Bowman	Lameroo SA
<i>Callitris columellaris</i>	320	M. Dowling	Wilpena/Hawker SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	411	Greening Australia	Monarto Sth SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	412	Trees For Life	Anstey Hill SA
<i>Eucalyptus odorata</i>	422	Greening Australia	Balaclava SA
<i>Eucalyptus longicornis</i>	440	CALM NS8438	Norseman WA
<i>Eucalyptus astringens</i>	444	CALM D921	Cuballing WA
<i>Eucalyptus astringens</i>	445	CALM 6855	Narrogin WA
<i>Eucalyptus astringens</i>	446	CALM 91038	Dryandra WA
<i>Eucalyptus brockwayi</i>	447	CALM 9042	Kondinin WA
<i>Eucalyptus brockwayi</i>	448	CALM 92073	Mt Thirsty WA

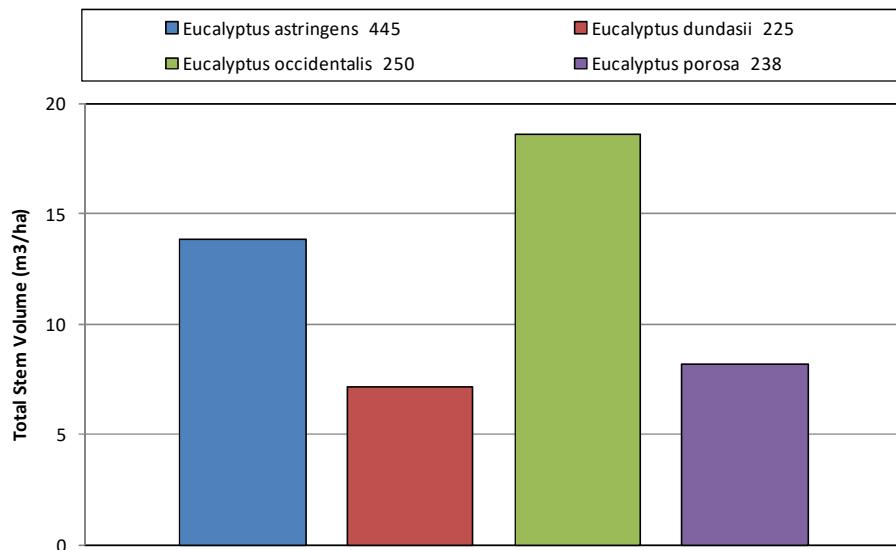
**Table 6: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 29/10/2003 (ages 9-11 years), FT018 Appila Springs.**

Species	Provenance	Age	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Callitris columellaris</i>	214	11	0.4	0.0
<i>Callitris columellaris</i>	320	11	0.0	0.0
<i>Callitris preissii</i>	305	9	0.0	0.0
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	11	3.8	0.2
<i>Eucalyptus astringens</i>	229	9	9.2	6.1
<i>Eucalyptus astringens</i>	230	9	0.0	0.0
<i>Eucalyptus astringens</i>	231	10	5.0	0.3
<i>Eucalyptus astringens</i>	444	11	7.7	11.5
<i>Eucalyptus astringens</i>	445	11	7.3	13.8
<i>Eucalyptus astringens</i>	446	10	0	0.0
<i>Eucalyptus brockwayi</i>	447	10	7.4	6.9
<i>Eucalyptus brockwayi</i>	448	10	7	7.8
<i>Eucalyptus dundasii</i>	225	11	7.3	7.1
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	10	7.2	10.4
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	11	4.8	2.6
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	11	5.4	2.2
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	411	10	7.2	10.8
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	412	10	7.4	13.4
<i>Eucalyptus longicornis</i>	440	10	2.4	0.0
<i>Eucalyptus occidentalis</i>	250	11	7.0	18.6
<i>Eucalyptus odorata</i>	422	10	5.4	0.3
<i>Eucalyptus porosa</i>	240	11	4.3	1.9
<i>Eucalyptus porosa</i>	237	11	5.2	3.7
<i>Eucalyptus porosa</i>	238	11	6.3	8.2
<i>Eucalyptus porosa</i>	239	11	4.6	2.0
<i>Melaleuca uncinata</i>	317	11	1.0	0.0

**Note:** Figures 5 & 6 below show best performing provenance according to TSV (m<sup>3</sup>/ha). All dominant provenance results below 1m<sup>3</sup>/ha are not graphed. Provenances 214, 230, 231, 305, 310, 317, 320, 422, 440 and 446 have insufficient data collection or poor survival. Form assessment is recommended for some of these species.



**Figure 5:** Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 10) for each dominant species, FT018 Appila Springs.



**Figure 6:** Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 11) for each dominant species, FT018 Appila Springs.

## Future Management of Appila Springs

Planted on a Mallee Box site in a relatively low rainfall zone (300-400mm), this trial meets the design criteria but fails to replicate the key species sufficiently enough to draw comparable conclusions. *E. occidentalis* is the dominant species in this trial with the provenance from Thomas River area displaying good growth and yield values. *E. leucoxylon* ssp. *leucoxylon* provenances from Anstey Hill SA and *E. astringens* from Narrogin WA also show good TSV (m<sup>3</sup>/ha) results and will also be recommended as suitable taxa for this site type.

*C. columellaris* (Wilpena/Hawker, Mambray Creek), *M. uncinata* (Lameroo), *C. preissii* (Redhill), *E. astringens* (Ravensthorpe and Dryandra) and *E. longicornis* (Norseman) have shown poor survival ability and are not recommended on this site type.

**Recommendation:** Final measure of this trial was in 2003. All operations have since ceased due to lack of suitable species replication.

## 5.1.2 Brown's Hill – Hagger's

Location: The trial is located approximately ten kilometres east north-east from Jamestown, off the Jamestown -Terowie Road on a property owned by John Hagers. The trial is not visible from any public roads.

Site type: South Australian Blue Gum

Rainfall: Approximately 400mm annually

Site History: The trial site was originally part of a grain (wheat) paddock and has subsequently been tilled for many years. The area was fenced before planting and planted by State Flora staff on August 25 1993. Plot 13 & 14 were replanted on 14/07/1998 due to poor survival.

Number of Plots: 72

Number of trees: 576

Spacing: 3m between trees, 3m between rows. Plots are 4m apart along the row and 6m apart across the row.

Plot size: Plots are of 8 trees each (two rows of four trees).

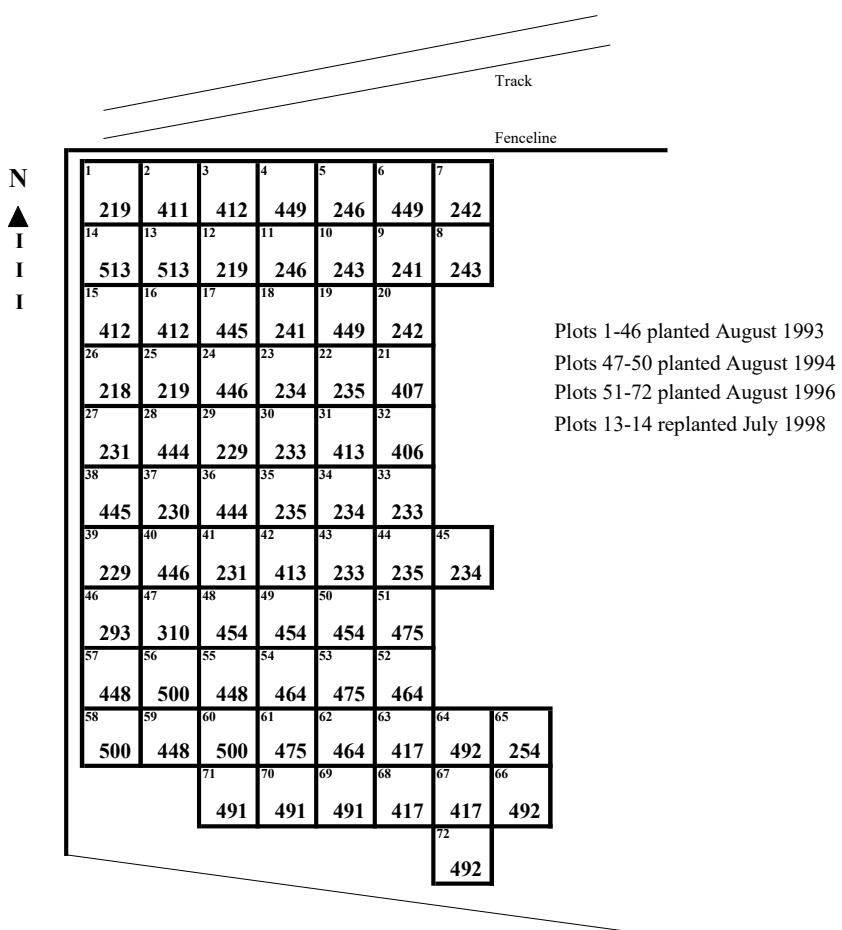


Figure 7: Overview of FT025 Brown's Hill trial

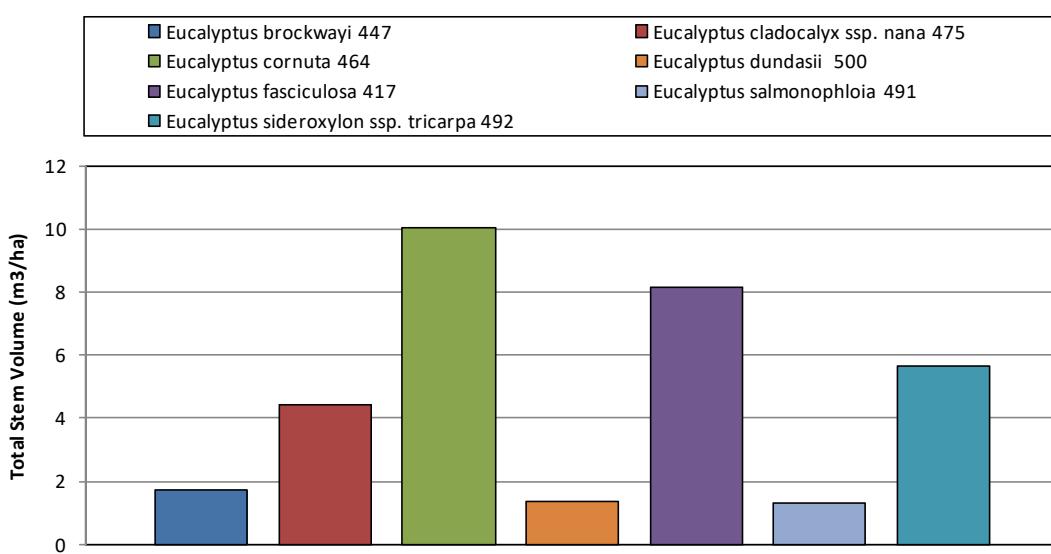
Table 7: Species, Provenance No. and Collection details, FT025 Brown's Hill

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	218	16524	Digby Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus astringens</i>	229	17670	Boyagin Rock WA
<i>Eucalyptus astringens</i>	230	17685	Ravensthorpe WA
<i>Eucalyptus astringens</i>	231	17686	Kundip WA
<i>Eucalyptus cladocalyx</i>	233	15268	Wilmington SA
<i>Eucalyptus cladocalyx</i>	234	16018	Vanilla SA
<i>Eucalyptus cladocalyx</i>	235	16022	Flinders Chase Nat. Pk. KI SA
<i>Eucalyptus occidentalis</i>	241	13633	Katanning WA
<i>Eucalyptus occidentalis</i>	242	13635	Rocky Gully WA
<i>Eucalyptus occidentalis</i>	243	13640	Bremer Bay WA
<i>Eucalyptus occidentalis</i>	246	15406	Pallerup Rock WA
<i>Casuarina glauca</i>	254	16363	Hawkesbury River NSW
<i>Pinus halepensis</i>	293	H18	Mellegue Romaine Tunisia
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	Blackwood Seeds	Flinders Range SA
<i>Melaleuca uncinata</i>	406	Greening Australia	Karoonda SA
<i>Melaleuca uncinata</i>	407	Greening Australia	Murray Bridge SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	411	Greening Australia	Monarto Sth SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	412	Trees For Life	Anstey Hill SA
<i>Eucalyptus cladocalyx</i>	413	Trees For Life	Kangaroo Island SA
<i>Eucalyptus fasciculosa</i>	417	Blackwood Seeds	Meningie SA
<i>Eucalyptus astringens</i>	444	CALM D921	Cuballing WA
<i>Eucalyptus astringens</i>	445	CALM 6855	Narrogin WA
<i>Eucalyptus astringens</i>	446	CALM 91038	Dryandra WA
<i>Eucalyptus brockwayi</i>	447	CALM 9042	Kondinin WA
<i>Eucalyptus brockwayi</i>	448	CALM 92073	Mt Thirsty WA
<i>Eucalyptus occidentalis</i>	449	CALM A92122	Jerramungup WA
<i>Eucalyptus cladocalyx</i>	454	Neil Smith	Cleve Hills SA
<i>Eucalyptus cornuta</i>	464	11256	Albany WA
<i>Eucalyptus cladocalyx</i> ssp. <i>nana</i>	475	Blackwood Seeds	Murray Bridge - Tailem Bend Rd SA
<i>Eucalyptus salmonopholia</i>	491	Unknown	Karonie-Coonana WA
<i>Eucalyptus sideroxylon</i> ssp. <i>tricarpa</i>	492	19103	Bodai NSW
<i>Eucalyptus dundasii</i>	500	Unknown	Not known
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	513	Unknown	Brown's Hill nr Jamestown SA

**Table 8: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 29/10/2003 (ages 7-10), FT025 Brown's Hill.**

Species	Provenance	Age	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Casuarina glauca</i>	254	7	0.0	0.0
<i>Casuarina pauper (cristata)</i>	310	9	2.2	0.0
<i>Eucalyptus astringens</i>	229	10	6.3	24.2
<i>Eucalyptus astringens</i>	230	10	4.9	3.9
<i>Eucalyptus astringens</i>	231	10	3.1	4.1
<i>Eucalyptus astringens</i>	444	10	6.5	15.1
<i>Eucalyptus astringens</i>	445	10	6.6	22.8
<i>Eucalyptus astringens</i>	446	10	6.7	17.5
<i>Eucalyptus brockwayi</i>	447	7	5.0	1.7
<i>Eucalyptus brockwayi</i>	448	7	3.7	0.8
<i>Eucalyptus cladocalyx</i>	233	10	8.7	35.4
<i>Eucalyptus cladocalyx</i>	234	10	6.7	24.7
<i>Eucalyptus cladocalyx</i>	235	10	8.5	30.3
<i>Eucalyptus cladocalyx</i>	413	10	6.5	14.2
<i>Eucalyptus cladocalyx</i>	454	9	4.2	2.4
<i>Eucalyptus cladocalyx</i> spp. <i>nana</i>	475	7	4.5	4.4
<i>Eucalyptus cornuta</i>	464	7	6.2	10.0
<i>Eucalyptus dundasii</i>	500	7	3.5	1.4
<i>Eucalyptus fasciculosa</i>	417	7	5.3	8.2
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	218	10	5.3	10.9
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	219	10	5.3	14.6
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	411	10	4.4	1.7
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	412	10	4.8	7.3
<i>Eucalyptus leucoxylon</i> spp. <i>pruinosa</i>	513	10	1.2	0.0
<i>Eucalyptus occidentalis</i>	241	10	8.2	13.9
<i>Eucalyptus occidentalis</i>	242	10	6.4	11.1
<i>Eucalyptus occidentalis</i>	243	10	7.2	21.5
<i>Eucalyptus occidentalis</i>	246	10	7.4	13.9
<i>Eucalyptus occidentalis</i>	449	10	7.5	19.1
<i>Eucalyptus salmonophloia</i>	491	7	3.6	1.3
<i>Eucalyptus sideroxylon</i> ssp. <i>tricarpa</i>	492	7	5.0	5.7
<i>Melaleuca uncinata</i>	406	10	1.7	0.0
<i>Melaleuca uncinata</i>	407	10	1.6	0.0
<i>Pinus halepensis</i>	293	10	6.9	6.6

**Note:** Figures 8 & 9 below show best performing provenance according to TSV (m<sup>3</sup>/ha). All dominant provenance results below 1m<sup>3</sup>/ha are not graphed. Provenances 254, 310, 406, 407, 491, 500 and 513 have insufficient data collection or poor survival.



**Figure 8: Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 7) for each dominant species, FT025 Brown's Hill.**

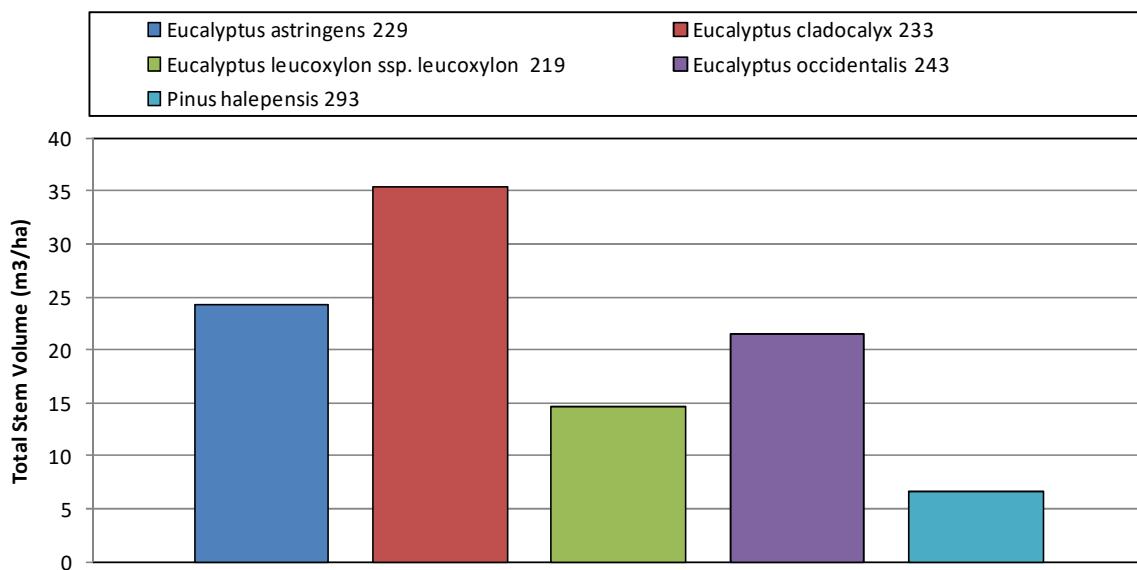


Figure 9: Best performing provenance according to Total Stem Volume ( $\text{m}^3/\text{ha}$ ) (age 10) for each dominant species, FT025 Brown's Hill.

## Future Management of Brown's Hill Hagger's

This trial is planted on a *E. leucoxylon* site in a 400mm annual rainfall zone. This trial meets the design criteria but fails to include sufficient species replicates and therefore has not been recommended for future measurement programs. *E. cornuta* (Albany) and *E. fasciculosa* (Meningie) show good TSV ( $\text{m}^3/\text{ha}$ ) growth and were the dominant species at age 7. *E. brockwayi* (Mt Thirsty) was the worst performing species is not recommended for future planting at this site type.

Provenances of *E. cladocalyx* (Wilmington) at age 10 show strong growth and TSV ( $\text{m}^3/\text{ha}$ ) production, as was the case in the previous report. *E. cladocalyx* provenances from Flinders Chase National Park and Wanilla also have shown some good TSV ( $\text{m}^3/\text{ha}$ ) production and are recommended for planting at this site type. *E. astringens* (Narrogin, Cuballing, Boyagin Rock and Dryandra) also showed strong results for this site type at age 10, provenance from Boyagin Rock being the most dominant of this species. Provenances of *E. occidentalis* (Bremer Bay and Jerramungup) and *E. leucoxylon* ssp. *leucoxylon* (Digby and Naracoorte) grew well and are recommended for this site type.

*C. glauca* (Hawkesbury River), *C. pauper* ssp. *cristata* (Flinders Range), *E. leucoxylon* ssp. *pruinosa* (Brown's Hill nr Jamestown), and *M. uncinata* (Karoonda and Murray Bridge) all performed poorly at Brown's Hill and are not recommended for future planting on this site type.

*E. cladocalyx* (Cleve Hills), *E. brockwayi* (Kondinin), *E. dundasii* (unknown provenance) and *E. salmonophloia* (Karonie-Coonana) although recommended by the last report have shown a decrease in performance and are not recommended for future planting on this site type.

**Recommendation:** Final measure of this trial was in 2003. All operations have since ceased due to lack of suitable species replication.

### 5.1.3 Bundaleer Forest Headquarters

Location: The trial is located adjacent to the ForestrySA Bundaleer Headquarters  
 Site type: South Australian Blue Gum  
 Rainfall: Approximately 460mm annually  
 Site History: Site was sprayed with Roundup at a rate of 1.5L/ha prior to planting. Post planting weed control by chipping and knapsack spray with Roundup. Trial planted by ForestrySA employees September/October 1990.  
 Number of Plots: 10  
 Number of trees: 85  
 Spacing: 4m between trees, 4m between rows.  
 Plot design: 9 tree plots (3 rows x 3 trees) for most species. Provenance 228 has one block of 4 trees (2 trees x 2 rows). There are other single trees of species randomly arranged in a separate block.

N	246	246	246	219	219	219	477	457
I	246	246	246	219	219	219	458	228
I	246	246	246	219	219	219	217	246
I	250	250	250	220	220	220	250	219
	250	250	250	220	220	220	220	
	250	250	250	220	220	220		
	217	217	217	477	477	477	228	228
	217	217	217	477	477	477	228	228
	217	217	217	477	477	477		
	458	458	458	457	457	457		
	458	458	458	457	457	457		
	458	458	458	457	457	457		

Figure 10: Overview of FT004 Bundaleer HQ trial

Table 9: Species, Provenance No. and Collection details, FT004 Bundaleer HQ

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	16012	Wirrabara SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	17012	Studley Park Vic
<i>Eucalyptus astringens</i>	228	12842	Dryandra SF WA
<i>Eucalyptus occidentalis</i>	246	15406	Pallerup Rock WA
<i>Eucalyptus occidentalis</i>	250	13644	Thomas River Area WA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	16097	Williamstown SA
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	458	12456	Nelson/Glenelg River SA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	477	16518	Brisbane Ranges NP Vic

**Table 10: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 29/10/2003 (age 13), FT004 Bundaleer HQ.**

Species	Provenance	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Eucalyptus astringens</i>	228	0.0	0.00
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	12.9	50.24
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	13.1	84.51
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	11.1	30.75
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	458	8.5	28.43
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	11.3	51.09
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	477	9.9	29.97
<i>Eucalyptus occidentalis</i>	246	13.6	87.14
<i>Eucalyptus occidentalis</i>	250	8.6	12.67

**Note:** Figure 11 below shows best performing provenance according to TSV (m<sup>3</sup>/ha). All dominant provenance results below 1m<sup>3</sup>/ha are not graphed. Provenance 228 has insufficient data collection – no heights were measured in 2003.

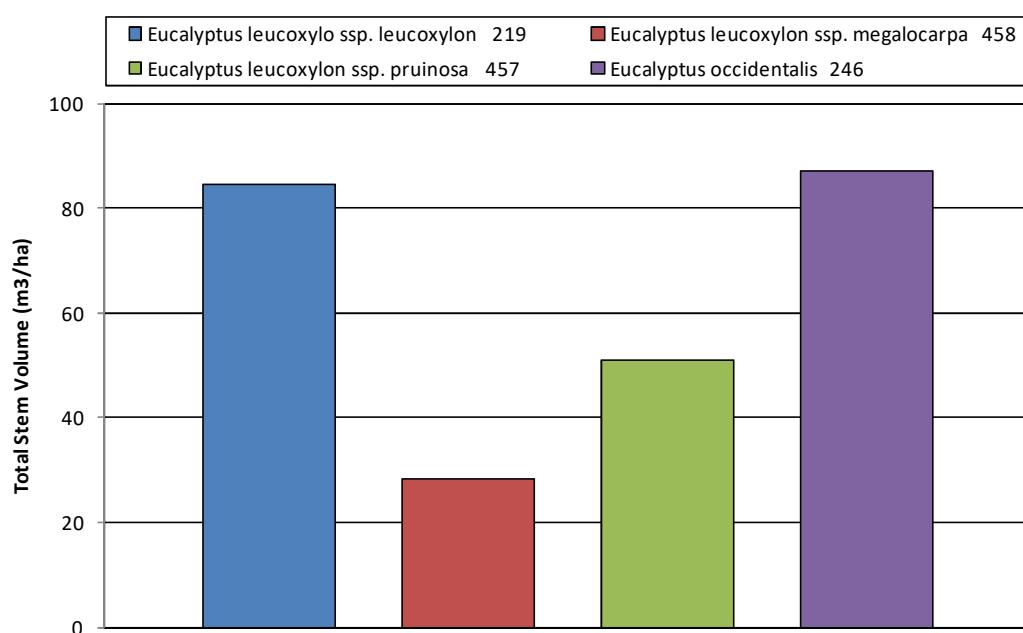


Figure 11: Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 13) for each dominant species, FT004 Bundaleer HQ.

## Future Management of Bundaleer Forest Reserve

Planted on a SA Blue Gum site this trial was established to the required design criteria but failed to replicate the key species sufficiently. This site is not recommended for future measurement operations.

*E. occidentalis* provenances from Pallerup Rock is the dominant species showing excellent TSV (m<sup>3</sup>/ha) results at Bundaleer Forest Reserve. *E. leucoxylon* ssp. *leucoxylon* (Naracoorte) also shows excellent TSV (m<sup>3</sup>/ha) results and is the second most dominant species. Studley Park and Wirrabara provenances for *E. leucoxylon* ssp. *leucoxylon* and *E. leucoxylon* ssp. *pruinosa* (Williamstown) have also produced high TSV (m<sup>3</sup>/ha) results and are recommended for future planting at this site type.

*E. leucoxylon* ssp. *pruinosa* (Brisbane Ranges) and *E. leucoxylon* ssp. *megalocarpa* (Nelson/Glenelg Rd) appeared to suffer in the site conditions compared to other *E. leucoxylon* subspecies. *E. astringens* (Dryandra SF) has no PDH recorded, therefore no TSV (m<sup>3</sup>/ha) comparison could be analysed. *E. occidentalis* (Thomas River Area) performed poorly and is not recommended for this site type.

**Recommendation:** Final measure of this trial was in 2003. All operations have since ceased due to lack of suitable species replication.

### 5.1.4 Mannanarie – Young's

Location: The trial is located approximately three kilometres east of Mannanarie on the Mannanarie to Yongala Road.

Site type: Treeless grassland Site

Rainfall: Approximately 360mm annually.

Site History: Prior to planting the site had been cropped. Two pre-planting sprays with Roundup® 360 at a rate of 2L/ha were applied. The trial was planted on September 1 1992 after the heaviest frosts were over. Planting was carried out by ForestrySA and a class from Peterborough Primary School. The site was fenced for stock.

Number of Plots: 60

Number of trees: 480

Spacing: 4m between trees, 4m between rows. Plots are 6m apart along the row and 8m apart across the rows

Plot size: Plots are of 8 trees each (two rows of four trees).

N	6	7	18	19	30	31	42	43	54	55
▲	218	221	216	217	317	233	248	242	246	249
I	5	8	17	20	29	32	41	44	53	56
I	217	215	220	219	237	256	243	247	245	241
I	4	9	16	21	28	33	40	45	52	57
	221	218	219	215	310	241	244	249	243	248
	3	10	15	22	27	34	39	46	51	58
	216	220	217	225	230	242	245	246	242	244
	2	11	14	23	26	35	38	47	50	59
	220	219	221	230	231	247	241	248	247	246
	1	12	13	24	25	36	37	48	49	60
	216	215	218	231	230	245	250	244	243	249

Figure 12: Overview of FT019 Mannanarie trial

Table 11: Species, Provenance No. and Collection details, FT0019 Mannanarie

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	215	9608	Rushworth Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	13046	Kangaroo Island SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	16012	Wirrabara SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	218	16524	Digby Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	17012	Studley Park Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	221	17425	Merrimur Res. Vic
<i>Eucalyptus dundasii</i>	225	12260	Norseman/Esperance WA
<i>Eucalyptus astringens</i>	230	17685	Ravensthorpe WA
<i>Eucalyptus astringens</i>	231	17686	Kundip WA
<i>Eucalyptus cladocalyx</i>	233	15268	Wilmington SA
<i>Eucalyptus porosa</i>	237	Turner	Dawson SA
<i>Eucalyptus occidentalis</i>	241	13633	Katanning WA
<i>Eucalyptus occidentalis</i>	242	13635	Rocky Gully WA
<i>Eucalyptus occidentalis</i>	243	13640	Bremer Bay WA
<i>Eucalyptus occidentalis</i>	244	13645	Esperance WA
<i>Eucalyptus occidentalis</i>	245	13647	Grass Patch WA
<i>Eucalyptus occidentalis</i>	246	15406	Pallerup Rock WA
<i>Eucalyptus occidentalis</i>	247	13634	Broomehill Area WA
<i>Eucalyptus occidentalis</i>	248	13638	Jerramungup Area WA
<i>Eucalyptus occidentalis</i>	249	13642	Ravensthorpe Area WA
<i>Eucalyptus occidentalis</i>	250	13644	Thomas River Area WA
<i>Casuarina glauca</i>	256	13128	Singleton NSW
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	Blackwood Seeds	Flinders Range SA
<i>Melaleuca uncinata</i>	317	Clive Bowman	Lameroo SA

Table 12: Mixed Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 29/10/2003 (age 11), FT019 Mannanarie.

Species	Provenance No.	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Casuarina glauca</i>	256	7.4	7.0
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	5.2	1.0
<i>Eucalyptus astringens</i>	230	8.3	19.3
<i>Eucalyptus astringens</i>	231	7.8	10.4
<i>Eucalyptus cladocalyx</i>	233	7.2	6.0
<i>Eucalyptus dundasii</i>	225	7.5	8.4
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	215	11.0	56.3
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	216	9.6	50.8
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	217	10.6	58.4
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	218	7.5	15.7
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	219	9.4	39.7
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	220	7.8	23.4
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	221	8.0	36.8
<i>Eucalyptus occidentalis</i>	241	11.0	71.6
<i>Eucalyptus occidentalis</i>	242	9.2	44.1
<i>Eucalyptus occidentalis</i>	243	9.1	48.7
<i>Eucalyptus occidentalis</i>	244	9.3	36.8
<i>Eucalyptus occidentalis</i>	245	10.9	63.5
<i>Eucalyptus occidentalis</i>	246	11.6	63.0
<i>Eucalyptus occidentalis</i>	247	11.5	59.3
<i>Eucalyptus occidentalis</i>	248	10.4	44.3
<i>Eucalyptus occidentalis</i>	249	11.1	56.8
<i>Eucalyptus occidentalis</i>	250	8.1	28.8
<i>Eucalyptus porosa</i>	237	6.6	7.7
<i>Melaleuca uncinata</i>	317	2.1	0.0

Note: Figure 13 below shows best performing provenance according to TSV (m<sup>3</sup>/ha). All dominant provenance results below 1m<sup>3</sup>/ha are not graphed. Provenance 317 was not graphed due to insufficient data collection.

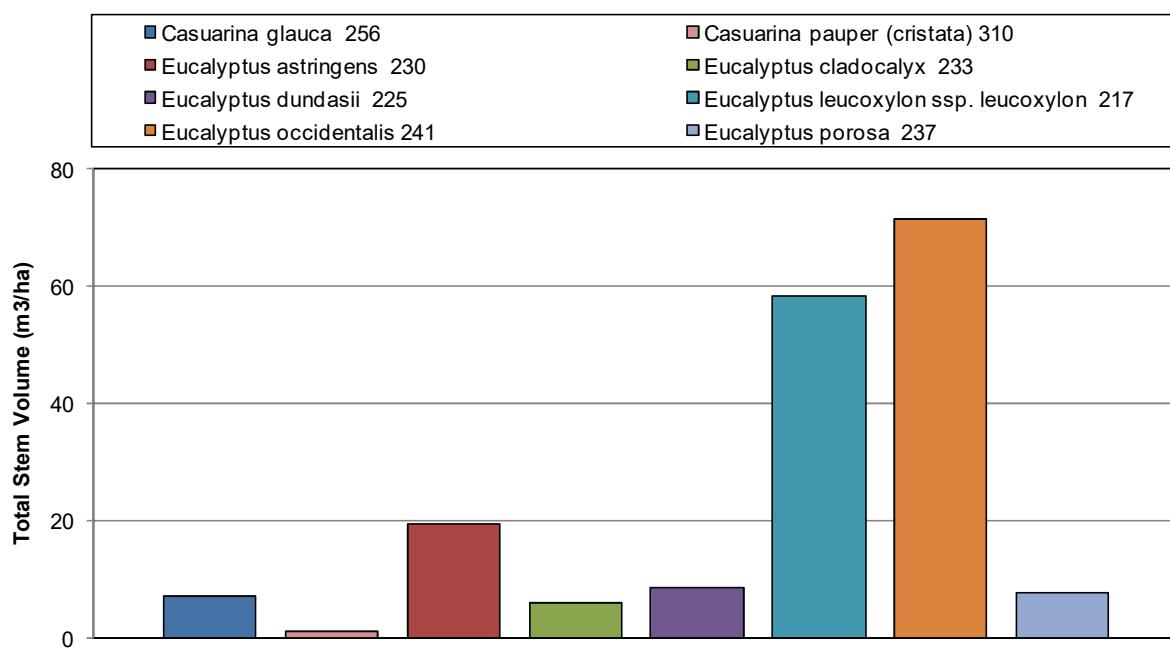


Figure 13: Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 11) for each dominant species, FT019 Mannanarie.

## **Future Management of Mannanarie – Young’s**

The Mannanarie trial is located on a treeless plain in a low rainfall zone (300-400mm annually). This trial meets the stipulated criteria and is recommended for potential future measurement programs.

This trial is dominantly by *E. occidentalis* and *E. leucoxylon* ssp. *leucoxylon* species. *E. occidentalis* provenances from Katanning, Grass Patch, Pallerup Rock, Ravensthorpe area and Broomehill area are the most productive at this site type. *E. leucoxylon* ssp. *leucoxylon* provenance from Rushworth, Wirrabara and Kangaroo Island also show promising results, all of the above are recommended for planting on this site type.

*C. glauca* (Singleton), *C. pauper* ssp. *cristata* (Flinders Range), *M. uncinata* (Lameroo), *E. porosa* (Dawson), *E. dundasi* (Norseman/Esperance), *E. cladocalyx* (Wilmington) displayed the poorest results at Mannanarie and are not recommended for this site type.

**Recommendation:** Consider continuation with tree measurement program.

## 5.1.5 Mt Bryan – Quinn's

Location: The trial is located approximately seven kilometres north of Mt Bryan towards Hallett on Petherton Road. The trial was planted in August 1994.

Site type: Fertile loam-clay site.

Rainfall: Approximately 430mm annually.

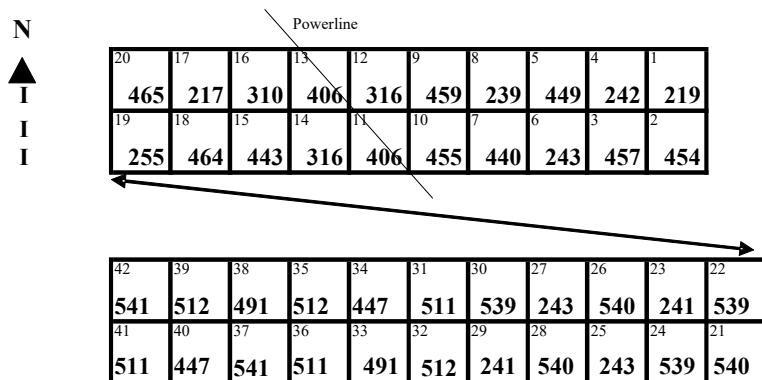
Site History: Unknown.

Number of plots: 42

Number of trees: 336 total

Spacing: 5x4m. 4m between rows 6m between plots

Plot size: Plots are of 8 trees each (two rows of four trees).



Plots 12 and 14 replanted 4/8/1998

Plots 21-42 planted 2/8/1994 (failed...eaten by goats) - replanted on 15/08/2000

Figure 14: Overview of FT034 Mt Bryan trial

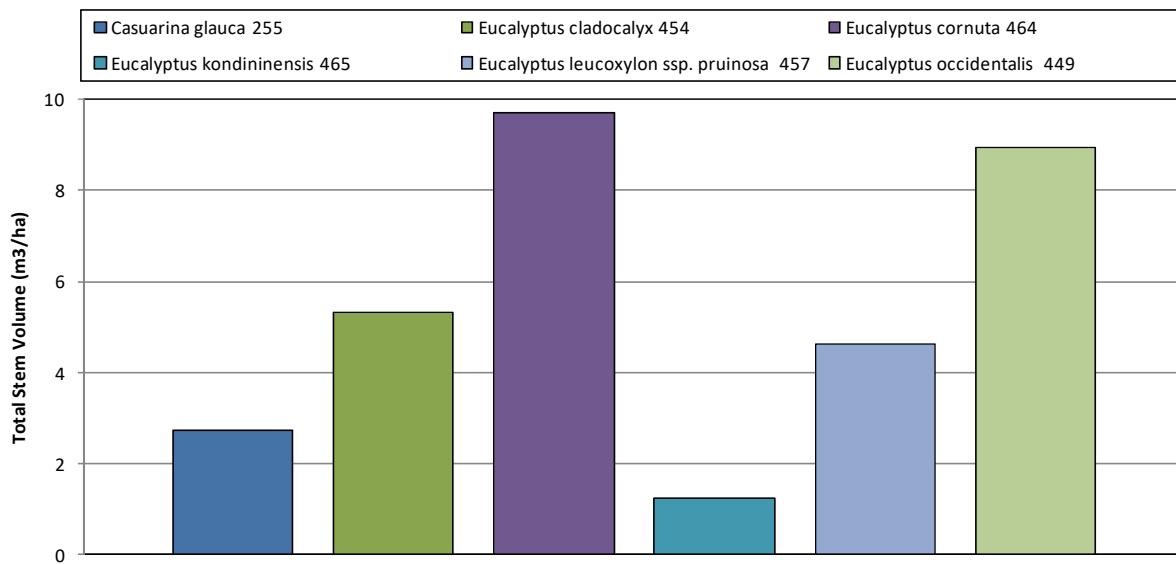
Table 13: Species, Provenance No. and Collection details, FT034 Mt Bryan

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	16012	Wirrabara SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus porosa</i>	239	Fairlamb	Tailem Bend F.R. SA
<i>Eucalyptus occidentalis</i>	241	13633	Katanning WA
<i>Eucalyptus occidentalis</i>	242	13635	Rocky Gully WA
<i>Eucalyptus occidentalis</i>	243	13640	Bremer Bay WA
<i>Casuarina glauca</i>	255	13141	Coffs Harbour (22km S) NSW
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	Blackwood Seeds	Flinders Range SA
<i>Melaleuca uncinata</i>	316	Lyn Dohle	Kangaroo Island SA
<i>Melaleuca uncinata</i>	406	Greening Australia	Karoonda SA
<i>Melaleuca uncinata</i>	407	Greening Australia	Murray Bridge SA
<i>Eucalyptus longicornis</i>	440	CALM NS8438	Norseman WA
<i>Callitris columellaris</i>	443	CALM 8766	Mt. Cooke WA
<i>Eucalyptus occidentalis</i>	449	CALM A92122	Jerramungup WA
<i>Eucalyptus brockwayi</i>	447	CALM 9042	Kondinin WA
<i>Eucalyptus cladocalyx</i>	454	Neil Smith	Cleve SA
<i>Callitris preissii</i>	455	Pam Kerley	Peebinga SA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	16097	Williamstown SA
<i>Melaleuca uncinata</i>	459	State Flora	Keith Saltpans SA
<i>Eucalyptus cornuta</i>	464	11256	Albany WA
<i>Eucalyptus kondininensis</i>	465	15380	Lake Joy WA
<i>Eucalyptus salmonophloia</i>	491	Unknown	Karonie Coonana WA
<i>Eucalyptus dundasii</i>	511	CALM 8532	5km E of Norseman WA
<i>Eucalyptus dundasii</i>	512	CALM 9081	8km NW of Davyhurst WA
<i>Eucalyptus occidentalis</i>	539	Unknown	Grass Patch WA
<i>Eucalyptus occidentalis</i>	540	Unknown	Bundaleer Seed Orchard 2003
<i>Eucalyptus brockwayi</i>	541	Unknown	Mt. Thirsty WA

**Table 14: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 29/10/2003 (age3 - 9), FT034 Mt Bryan.**

Species	Provenance No.	Age	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Callitris columellaris</i>	443	9	1.6	0.0
<i>Callitris preissii</i>	455	9	1.7	0.0
<i>Casuarina glauca</i>	255	9	5.7	2.7
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	9	3.9	0.3
<i>Eucalyptus brockwayi</i>	541	3	1.2	0.0
<i>Eucalyptus brockwayi</i>	447	3	1.5	0.0
<i>Eucalyptus cladocalyx</i>	454	9	5.5	5.3
<i>Eucalyptus cornuta</i>	464	9	6.6	9.7
<i>Eucalyptus dundasii</i>	511	3	1.7	0.0
<i>Eucalyptus dundasii</i>	512	3	1.3	0.0
<i>Eucalyptus kondininensis</i>	465	9	5.2	1.3
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	217	9	0.0	0.0
<i>Eucalyptus leucoxylon</i> spp. <i>leucoxylon</i>	219	9	4.9	0.9
<i>Eucalyptus leucoxylon</i> spp. <i>pruinosa</i>	457	9	5.9	4.6
<i>Eucalyptus longicornis</i>	440	9	3.3	0.3
<i>Eucalyptus occidentalis</i>	539	3	3.0	0.3
<i>Eucalyptus occidentalis</i>	540	3	3.2	0.5
<i>Eucalyptus occidentalis</i>	241	3	3.0	0.2
<i>Eucalyptus occidentalis</i>	242	9	4.8	4.5
<i>Eucalyptus occidentalis</i>	243	9	4.6	2.6
<i>Eucalyptus occidentalis</i>	449	9	6.4	9.0
<i>Eucalyptus porosa</i>	239	9	2.7	0.0
<i>Eucalyptus salmonophloia</i>	491	3	1.3	0.0
<i>Melaleuca uncinata</i>	459	9	2.7	0.1
<i>Melaleuca uncinata</i>	316	5	1.5	0.0
<i>Melaleuca uncinata</i>	406	9	1.1	0.0
<i>Melaleuca uncinata</i>	407	9	1.0	0.0

**Note:** Figure 15 below shows best performing provenance according to TSV (m<sup>3</sup>/ha). All dominant provenance results below 1m<sup>3</sup>/ha are not graphed. Provenances 217, 219, 239, 241, 310, 316, 406, 407, 440, 443, 447, 455, 459, 491, 511, 512, 539, 540 and 541 have insufficient data recorded due to trees size or poor survival. Poor survival in selected plots were replanted in 1998 and 2000.



**Figure 15: Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 9) for each dominant species, FT034 Mt Bryan.**

## **Future Management of Mt Bryan – Quinn’s**

This trial has various planting dates and destroyed by goats on one occasion, requiring termination of plots 21-42 of the trial. Re-plants occurred in plots 21-42 in 1998 and 2000. The original trial design was within the criteria but due to the losses from goats, insufficient replication now exists and quantifiable data cannot be collected.

From the most recent data, provenances of *E. cornuta* (Albany), *E. occidentalis* (Rocky Gully and Jerramungup), followed by *E. cladocalyx* (Cleve Hills) and *E. leucoxylon* ssp. *pruinosa* (Williamstown) were the best performing provenances and are recommended for future planting on this site type.

*E. dundasii* (5km E of Norsema and 8km NW of Davyhurst), *C. columellaris* (Mt. Cooke), *C. preissii* (Peebinga), *E. occidentalis* (Grass Patch, Bundaleer Seed Orchard and Katanning) and *E. salmonophloia* (Karonie Coonana) and all performed poorly. Many of these species/provenances were replants and therefore 3-5 years old at the time of measurement, only heights have been recorded to date.

*E. leucoxylon* spp. *leucoxylon* (Wirrabara and Naracoorte), *E. porosa* (Tailem Bend) and *M. uncinata* (Keith Saltpans, Kangaroo Island, Karoonda, Murray Bridge) all had poor survival and are not recommended for planting on this site type. *E. longicornis* (Norseman) and *C. pauper* ssp. *cristata* (Flinders Ranges) did not perform well and are not recommended for this site type.

**Recommendation:** Final measure of this trial was in 2003. All operations have since ceased due to lack of suitable species replication

## 5.1.6 Redhill – Dunsford's

Location:	The trial is located approximately three kilometres north-east of Redhill. It is situated on a salt-affected paddock.
Site type:	Saline site
Rainfall:	Approximately 400mm annually.
Site History:	The site was originally cropped but due to increasing salinity, yields declines as it reverted to grassing. Prior to planting the area was ripped once and sprayed twice. The trial was planted on September 10 & 11 1992 by ForestrySA. Plots 70-81 planted July 1993 and plots 82-85 planted August 1994. The area is only fenced for stock exclusion.
Number of plots:	85
Number of trees:	680
Spacing:	3m between trees, 3m between rows.
Plot size:	Plots are of 8 trees each (two rows of four trees).

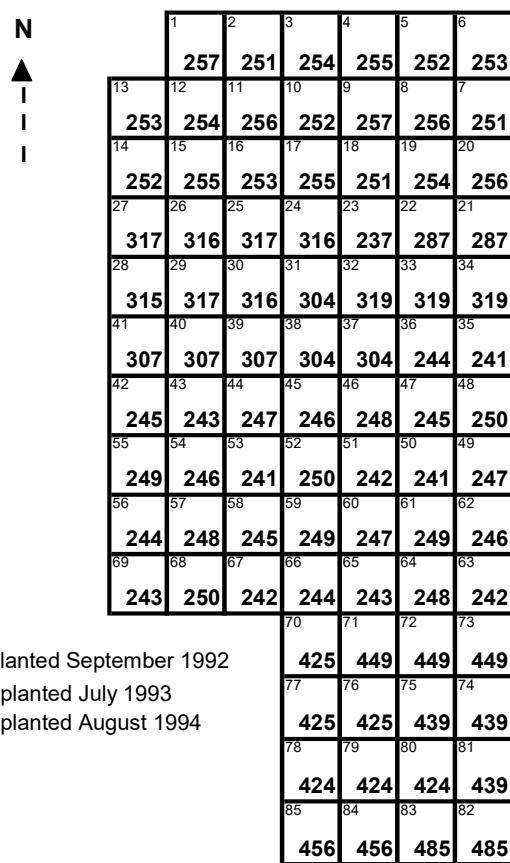


Figure 16: Overview of FT017 Redhill trial

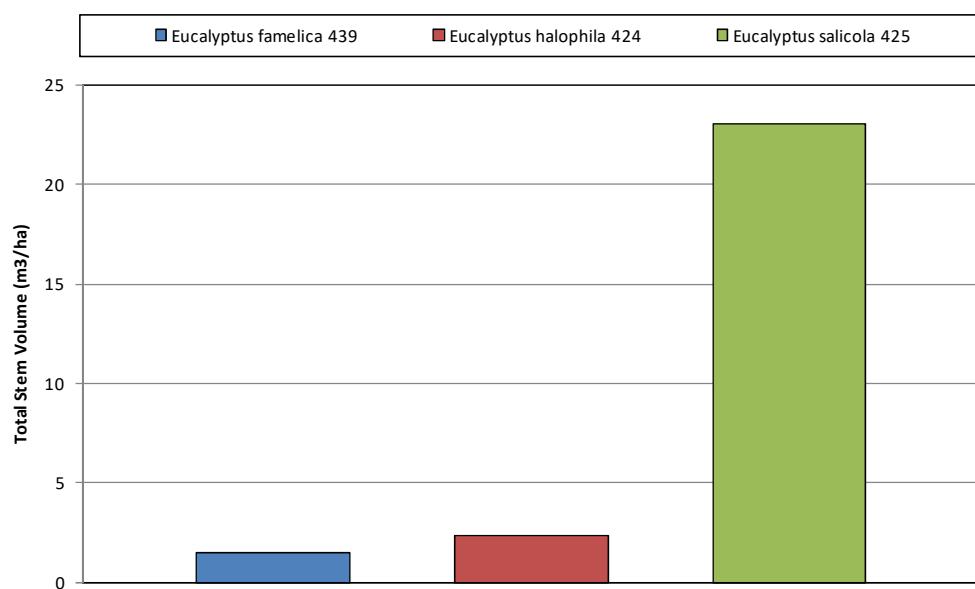
Table 15: Species, Provenance No. and Collection details, FT017 Redhill

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus porosa</i>	237	Turner	Dawson SA
<i>Eucalyptus occidentalis</i>	241	13633	Katanning WA
<i>Eucalyptus occidentalis</i>	242	13635	Rocky Gully WA
<i>Eucalyptus occidentalis</i>	243	13640	Bremer Bay WA
<i>Eucalyptus occidentalis</i>	244	13645	Esperance WA
<i>Eucalyptus occidentalis</i>	245	13647	Grass Patch WA
<i>Eucalyptus occidentalis</i>	246	15406	Pallerup Rock WA
<i>Eucalyptus occidentalis</i>	247	13634	Broomehill Area WA
<i>Eucalyptus occidentalis</i>	248	13638	Jerramungup Area WA
<i>Eucalyptus occidentalis</i>	249	13642	Ravensthorpe Area WA
<i>Eucalyptus occidentalis</i>	250	13644	Thomas River Area WA
<i>Casuarina glauca</i>	251	13146	Tuross Lake NSW
<i>Casuarina glauca</i>	252	13143	Mangrove Creek NSW
<i>Casuarina glauca</i>	253	15934	Myall Lakes NSW
<i>Casuarina glauca</i>	254	16363	Hawkesbury River NSW
<i>Casuarina glauca</i>	255	13141	Coffs Harbour (22km S) NSW
<i>Casuarina glauca</i>	256	13128	Singleton NSW
<i>Casuarina glauca</i>	257	13987	Coffs Harbour NSW
<i>Eucalyptus camaldulensis</i>	287	15037	Lowan Valley - Saline Vic
<i>Melaleuca cuticularis</i>	304	CALM No. P9088	Stirling Range Nat. Park WA
<i>Acacia stenophylla</i>	307	Walladge	'Riverland' SA
<i>Acacia salicina</i>	315	Pedlar	Near Yacca SA
<i>Melaleuca uncinata</i>	316	Lyn Dohle	Kangaroo Island SA
<i>Melaleuca uncinata</i>	317	Clive Bowman	Lameroo SA
<i>Eucalyptus kondininensis</i>	319	9885	Lake Kondinin WA
<i>Eucalyptus halophila</i>	424	CALM D679	Dalyup WA
<i>Eucalyptus salicola</i>	425	CALM 91101	Lake Harvey WA
<i>Eucalyptus famelica</i>	439	NS 3871	Ravensthorpe WA
<i>Eucalyptus occidentalis</i>	449	CALM A92122	Jerramungup WA
<i>Eucalyptus camaldulensis</i>	456	Unknown	Pt Lincoln SA
<i>Eucalyptus camaldulensis</i>	485	Unknown	Mt Barker SA

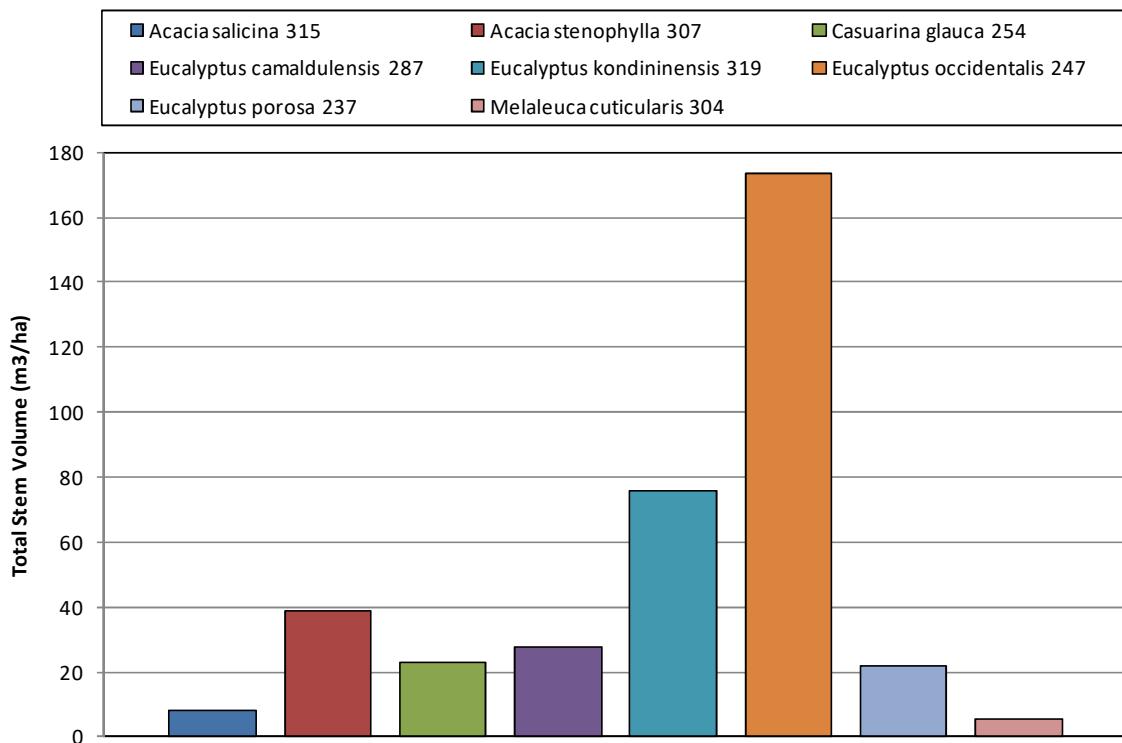
**Table 16: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 24/11/2003 (ages 9 - 11years), FT017 Redhill**

Species	Provenance No.	Age	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Acacia salicina</i>	315	11	5.1	8.0
<i>Acacia stenophylla</i>	307	11	8.3	38.7
<i>Casuarina glauca</i>	251	11	7.9	21.1
<i>Casuarina glauca</i>	252	11	7.4	14.2
<i>Casuarina glauca</i>	253	11	7.4	16.0
<i>Casuarina glauca</i>	254	11	8.0	22.9
<i>Casuarina glauca</i>	255	11	8.6	22.0
<i>Casuarina glauca</i>	256	11	7.9	22.8
<i>Casuarina glauca</i>	257	11	7.8	13.6
<i>Eucalyptus camaldulensis</i>	456	9	1.9	0.0
<i>Eucalyptus camaldulensis</i>	485	9	6.4	14.4
<i>Eucalyptus camaldulensis</i>	287	11	10.2	27.9
<i>Eucalyptus famelica</i>	439	10	4.4	1.5
<i>Eucalyptus halophila</i>	424	10	4.2	2.3
<i>Eucalyptus kondininensis</i>	319	11	11.6	75.9
<i>Eucalyptus occidentalis</i>	241	11	14.6	158.3
<i>Eucalyptus occidentalis</i>	242	11	14.3	154.4
<i>Eucalyptus occidentalis</i>	243	11	11.7	142.2
<i>Eucalyptus occidentalis</i>	244	11	11.7	98.8
<i>Eucalyptus occidentalis</i>	245	11	14.1	159.9
<i>Eucalyptus occidentalis</i>	246	11	14.3	168.9
<i>Eucalyptus occidentalis</i>	247	11	14.5	173.4
<i>Eucalyptus occidentalis</i>	248	11	13.6	126.2
<i>Eucalyptus occidentalis</i>	249	11	14.2	134.0
<i>Eucalyptus occidentalis</i>	250	11	11.9	97.0
<i>Eucalyptus occidentalis</i>	449	11	14.4	144.2
<i>Eucalyptus porosa</i>	237	11	7.5	21.7
<i>Eucalyptus salicola</i>	425	10	8.5	23.0
<i>Melaleuca cuticularis</i>	304	11	4.5	5.6
<i>Melaleuca uncinata</i>	316	11	2.7	0.0
<i>Melaleuca uncinata</i>	317	11	2.4	0.0

**Note:** Figures 17 & 18 below show best performing provenance according to TSV (m<sup>3</sup>/ha). All dominant provenance results below 1m<sup>3</sup>/ha are not graphed. Provenances 316, 317 and 456 have insufficient data recorded due to tree size or poor survival. Provenance 485 was not graphed because there were no other age 9 provenances with a result to graph against.



**Figure 17: Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 10) standing volume for each species, FT017 Redhill**



**Figure 18:** Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 11) for each dominant species, FT017 Redhill.

### Future Management of Redhill – Dunsford’s

This trial was planted on a saline site type which became boggy and inundated during the winter prior to planting. Establishment of this trial has helped to remediate the wet site conditions by utilising excessive surface water. This trial complies with the stipulated criteria and has good tree survival.

The best performing species at this site were all provenances of *E. occidentalis* with this species displaying a tolerance for saline conditions (age 11). *E. kondininensis* (Lake Kondinin) shows very promising results and are recommended for future plantings on this site type.

*A. salicina* (Yacka), *E. camaldulensis* (Pt Lincoln), *E. famelica* (Ravensthorpe Area), *E. halophila* (Dalyrup), *M. cuticularis* (Stirling Range Nat. Park) and *M. uncinata* (Kangaroo Island and Lameroo) provenances did not perform well and therefore are not recommended for future use on this site type.

**Recommendation:** Consider continuation with the tree measurement program.

## 5.2 RESULTS FOR THE MURRAY MALLEE

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FT002	Lameroo – 1990 'Bews' ^	planted 1990	Last measured 2003
FT009	Lameroo – 1992 'Bews'	planted 1992	Last measured 2003
FT007	Paruna ^	planted 1992	Last measured 2003
FT008	Peebinga ^	planted 1992	Last measured 2003
FT005	Murray Bridge ^	planted 1990	Last measured 2003
FT001	Pinnaroo*	planted 1990	Last measured 1997
FT026	Sherlock- Woidt's ^	planted 1993	Last measured 2003

\* Ceased measurement in 1997

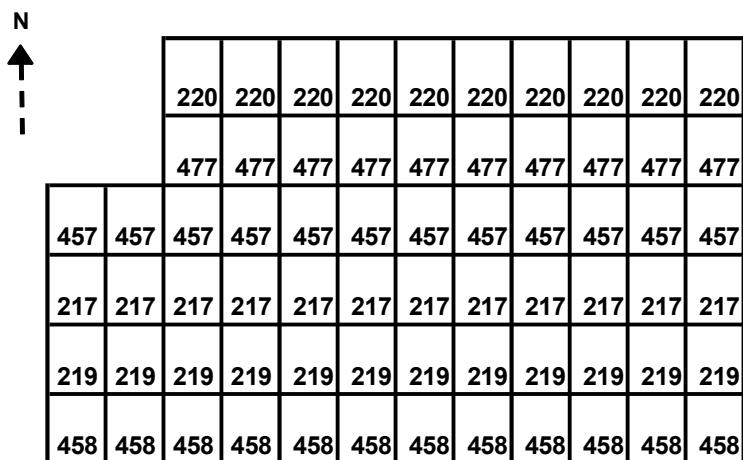
^ Ceased measurement in 2003

### 5.2.1 Lameroo Bews Trials

Location:	Consisting of two trials the site is located approximately eight kilometres west of the Lameroo township at the 'Bews' cross-roads. The site is adjacent to a Botanic Gardens species plantation and a go-kart/motocross track.
Site type:	Loam Site
Rainfall:	Approximately 380mm annually.

#### 5.2.1.1 Lameroo 'Bews' 1990

Site History:	This site was sprayed and ripped prior to planting. The trial was planted by council staff aided by Landcare on 27/9/1990. Rabbits were controlled by the council using 1080 baits. Each tree was staked and protected from vermin by a car tyre. The trial was watered 2 or 3 times by the council in the 1 <sup>st</sup> year. Weeds were slashed in early summer.
Trial Design:	Single row plots
Number of Plots:	68
Number of trees:	544
Spacing:	4m between trees, 5m between rows



**MALLEE HIGHWAY**      Lameroo 8 Km →

Figure 19: Overview of FT002 Lameroo 1990

Table 17: Provenance No., Species and Collection details, FT002 Lameroo 1990

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	16012	Wirrabara SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	17012	Studley Park Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	16097	Williamstown SA
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	458	12456	Nelson/Glenelg River SA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	477	16518	Brisbane Ranges NP Vic

Table 18: Mixed species Predominant Height (m) and Total Stem Volume ( $\text{m}^3/\text{ha}$ ) comparison at 03/11/2003 (age 13), FT002 Lameroo 1990

Species	Prov	PDF (m)	TSV ( $\text{m}^3/\text{ha}$ )
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	8.0	13.0
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	9.2	24.6
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	7.0	15.1
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	458	7.1	33.7
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	8.7	23.7
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	477	8.0	26.5

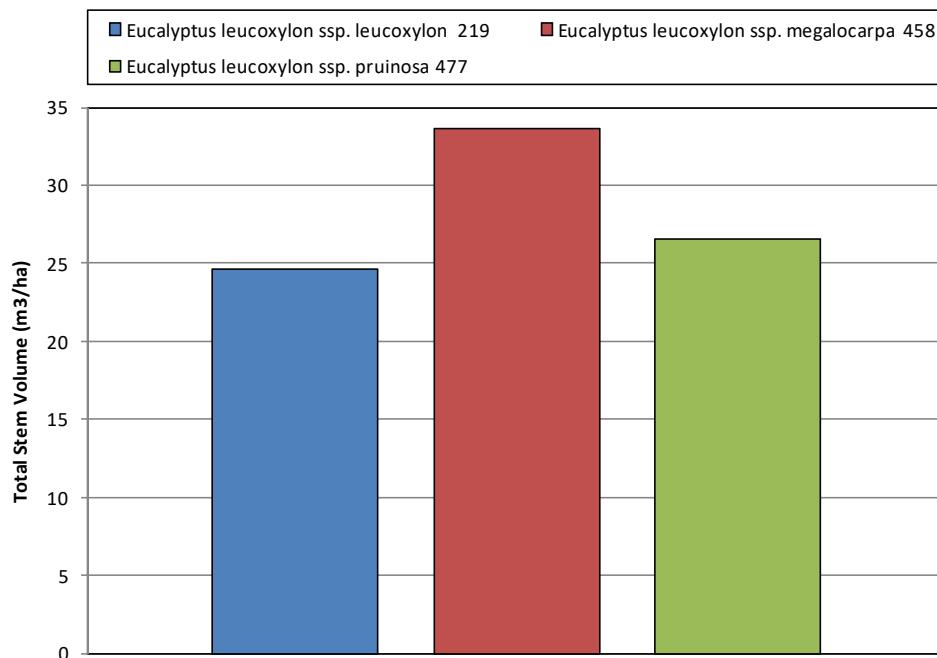


Figure 20: Best performing provenance according to Total Stem Volume ( $\text{m}^3/\text{ha}$ ) (age 13) for each dominant subspecies, FT002 Lameroo 1990

## Future Management of Lameroo ‘Bews’ 1990

This trial located on the Mallee Highway at Lameroo has single row plots and little replication and therefore is not recommended for future measurements. This trial consists of *E. leucoxylon* and related subspecies. *E. leucoxylon* ssp. *megalocarpa* (Nelson/Glenelg River) is the highest yielding provenance/subspecies and is recommended as suitable for this site type. *E. leucoxylon* ssp. *leucoxylon* (Studley Park Vic and Wirrabara) have shown the poorest TSV ( $\text{m}^3/\text{ha}$ ) results and are not recommended on this site type.

*E. leucoxylon* ssp. *pruinosa* provenances from Williamstown and Brisbane Ranges NP and *E. leucoxylon* ssp. *leucoxylon* (Naracoorte) have good TSV ( $\text{m}^3/\text{ha}$ ) results are recommended for this site type.

**Recommendation:** Measurement ceased at this trial in 2003.

### 5.2.1.2 Lameroo 1992

**Site History:** The surrounding area was sprayed then ripped to 45 cm depth. The trial was planted on 17/06/1992. Plots 54-57 planted 30/6/1993. Plots 54 and 55 were replanted on 1/08/1994 due to poor survival.

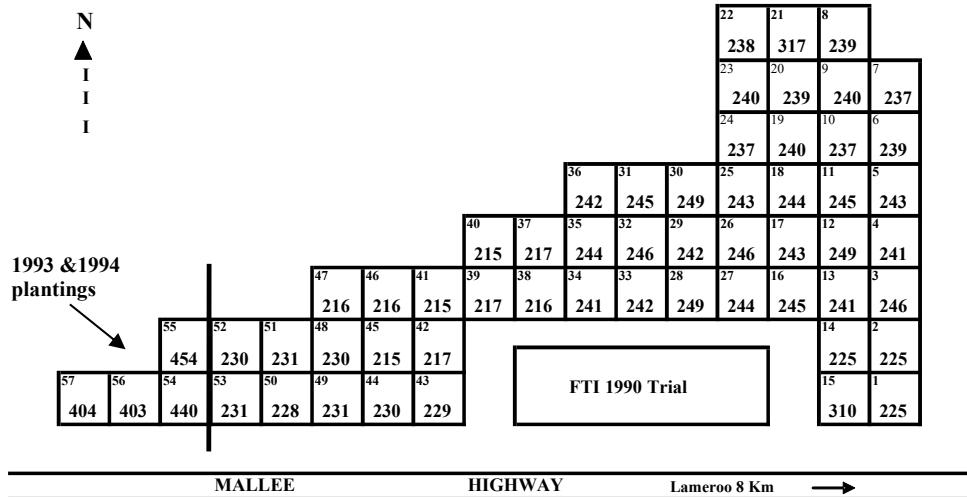
**Spacing:** 4m between trees, 5m between rows.

**Plot size:** Plots are 6m apart along the row and 8m apart across the rows

**Number of Plots:** Plots are of 8 trees each (two rows of four trees).

**Number of Plots:** 57

**Number of trees:** 456



Planted on 17 June 1992  
Plots 54 - 57 replanted 3 June 1993  
Plots 54 & 55 replanted 1 August 1994

Figure 21: Overview of FT009 Lameroo 1992 trial

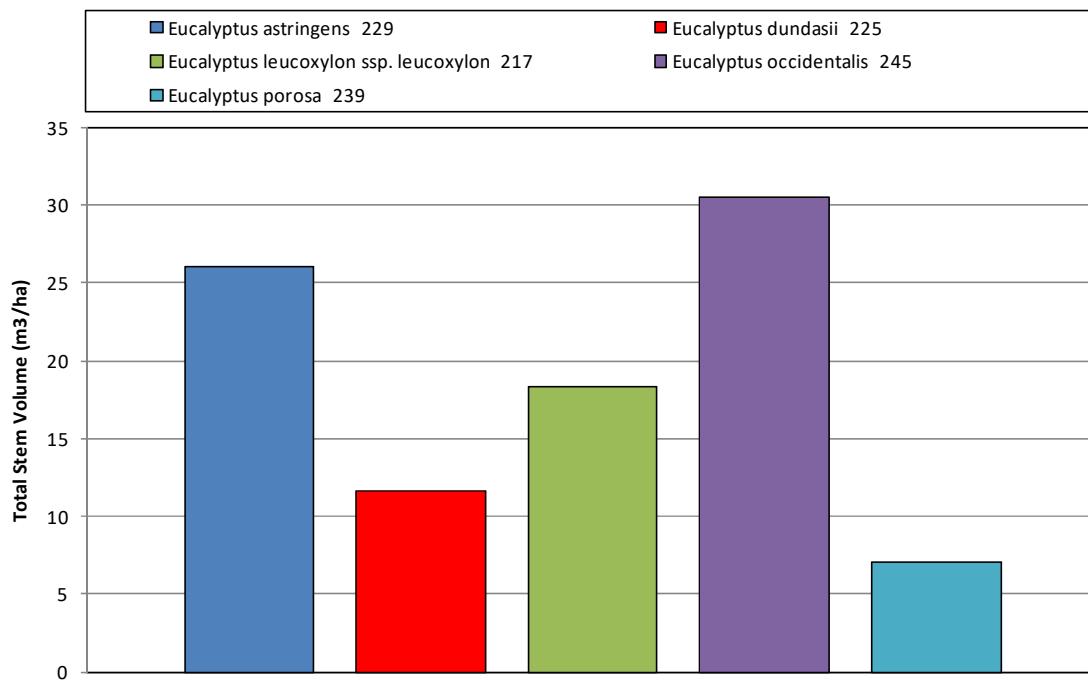
Table 19: Provenance No., Species and Collection details, FT009 Lameroo 1992

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	215	9608	Rushworth Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	13046	Kangaroo Island SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	16012	Wirrabara SA
<i>Eucalyptus dundasii</i>	225	12260	Norseman/Esperance WA
<i>Eucalyptus astringens</i>	228	12842	Dryandra SF WA
<i>Eucalyptus astringens</i>	229	17670	Boyagin Rock WA
<i>Eucalyptus astringens</i>	230	17685	Ravensthorpe WA
<i>Eucalyptus astringens</i>	231	17686	Kundip WA
<i>Eucalyptus porosa</i>	237	Turner	Dawson SA
<i>Eucalyptus porosa</i>	238	12219	Golgol NSW
<i>Eucalyptus porosa</i>	239	Fairlamb	Tailem Bend F.R. SA
<i>Eucalyptus porosa</i>	240	Bulman/ Fairlamb	Yatina/Pekina SA
<i>Eucalyptus occidentalis</i>	241	13633	Katanning WA
<i>Eucalyptus occidentalis</i>	242	13635	Rocky Gully WA
<i>Eucalyptus occidentalis</i>	243	13640	Bremer Bay WA
<i>Eucalyptus occidentalis</i>	244	13645	Esperance WA
<i>Eucalyptus occidentalis</i>	245	13647	Grass Patch WA
<i>Eucalyptus occidentalis</i>	246	15406	Pallerup Rock WA
<i>Eucalyptus occidentalis</i>	249	13642	Ravensthorpe Area WA
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	Blackwood Seeds	Flinders Range SA
<i>Melaleuca uncinata</i>	317	Clive Bowman	Lameroo SA
<i>Eucalyptus gracilis</i>	403	Greening Australia	Karoonda SA
<i>Eucalyptus leptophylla</i>	404	Greening Australia	Lameroo SA
<i>Eucalyptus longicornis</i>	440	CALM NS8438	Norseman WA
<i>Eucalyptus cladocalyx</i>	454	Neil Smith	Cleve Hills SA

**Table 20: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 3/11/2003 (age 9 -11), FT009 Lameroo 1992**

Species	Provenance	Age	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	11	3.7	0.4
<i>Eucalyptus astringens</i>	228	11	7.2	16.1
<i>Eucalyptus astringens</i>	229	11	7.6	26.1
<i>Eucalyptus astringens</i>	230	11	6.7	11.1
<i>Eucalyptus astringens</i>	231	11	6.1	9.2
<i>Eucalyptus cladocalyx</i>	454	9	0.0	0.0
<i>Eucalyptus dundasii</i>	225	11	8.2	11.7
<i>Eucalyptus gracilis</i>	403	10	3.1	0.5
<i>Eucalyptus leptophylla</i>	404	10	0.0	0.0
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	215	11	8.7	18.0
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	11	6.6	10.3
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	11	8.1	18.3
<i>Eucalyptus longicornis</i>	440	9	0.0	0.0
<i>Eucalyptus occidentalis</i>	241	11	9.0	21.6
<i>Eucalyptus occidentalis</i>	242	11	7.4	15.5
<i>Eucalyptus occidentalis</i>	243	11	8.4	21.5
<i>Eucalyptus occidentalis</i>	244	11	7.8	16.3
<i>Eucalyptus occidentalis</i>	245	11	9.8	30.5
<i>Eucalyptus occidentalis</i>	246	11	9.5	20.0
<i>Eucalyptus occidentalis</i>	249	11	9.4	24.5
<i>Eucalyptus porosa</i>	237	11	5.1	2.3
<i>Eucalyptus porosa</i>	238	11	5.6	4.2
<i>Eucalyptus porosa</i>	239	11	5.6	7.1
<i>Eucalyptus porosa</i>	240	11	5.2	4.1
<i>Melaleuca uncinata</i>	317	11	3.4	0.0

**Note:** Figure 22 below shows best performing provenance according to TSV (m<sup>3</sup>/ha). All dominant provenance results below 1m<sup>3</sup>/ha are not graphed. Provenances 310, 317, 403, 404, 440 and 454 have insufficient data recorded or poor survival.



**Figure 22: Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 11) for each dominant species, FT009 Lameroo**

## **Future Management of Lameroo ‘Bews’ 1992**

This trial is located adjacent to the Lameroo ‘Bews’ 1990 trial and has met the criteria of suitable trial design and sufficient replicates of key species. This mixed species trial consists of predominantly *E. leucoxylon*, *E. occidentalis*, *E. astringens* and *E. porosa* species.

The dominant species/provenance is *E. occidentalis* (Grass Patch) which displays the most vigorous growth and highest timber yield, closely followed by *E. occidentalis* provenance from Ravensthorpe area and are recommended for future plantings on this site type.

*E. astringens* (Boyagin Rock) and *E. leucoxylon* ssp. *leucoxylon* (Rushworth and Wirrabara) have excellent health, vigour and reliability and therefore will also be recommended taxa for this site type. All provenances of *E. porosa*, *C. pauper* ssp. *cristata* and *E. gracilis* fared poorly and are not recommended for future plantings at this site type.

*E. cladocalyx* (Cleve Hills), *E. leptophylla* (Lameroo) and *E. longicornis* (Norseman) all have poor survival and *M. uncinata* were too small for DBH measurement. These species/provenances are also not recommended on this site type.

**Recommendation:** Trial meets criteria, therefore consideration of continued measurement is recommended.

## 5.2.2 Murray Bridge

Location: The trial is located adjacent to PIRSA, Murray Bridge  
 Site type: Sandy loam over clay  
 Rainfall: Approximately 340mm annually.  
 Site History: Trees were planted into prepared bowls. The trees were watered in after planting and several times throughout the first summer. Plots were watered twice in the second summer. The trial was planted by PIRSA on October 9 1990.  
 Plot design: Single row plots with some replication.  
 Spacing: 4m between trees, 5m between rows.  
 Plot size: Plots are of 8 trees each (two rows of four trees).

479	479	479	479	479
219	219	219	219	219
477	477	477	477	477
478	478	478	478	478
217	217	217	217	217
250	250	250	250	250
457	457	457	457	457
220	220	220	220	220
481	481	481	481	481
246	246	246	246	246
458	458	458	458	458
480	480	480	480	480
246	246	246	246	246
250	250	250	250	250
446	446	446	446	446
250	250	250	250	250

246	246	246	246	246
478	478	478	478	478
250	250	250	250	250
479	479	479	479	479
219	219	219	219	219
477	477	477	477	477
217	217	217	217	217
446	446	446	446	446
458	458	458	458	458
480	480	480	480	480
220	220	220	220	220
457	457	457	457	457
458	458	458	458	458
481	481	481	481	481
478	478	478	478	478

Figure 23: Overview of FT005 Murray Bridge trial

Table 21: Provenance No., Species and Collection details, FT005 Murray Bridge

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217		Wirrabara SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219		Naracoorte SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220		Studley Park Vic
<i>Eucalyptus occidentalis</i>	246		Pallerup Rock WA
<i>Eucalyptus occidentalis</i>	250		Thomas River Area WA
<i>Eucalyptus astringens</i>	446	CALM 91038	Dryandra WA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457		Williamstown SA
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	458		Nelson/Glenelg River SA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	477		Brisbane Ranges NP Vic
<i>Eucalyptus occidentalis</i>	478		Gibson area WA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	479		Wail Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>pauperita</i>	480		Clare SA
<i>Casuarina cunninghamiana</i>	481		Cobargo NSW

Table 22: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 3/11/2003 (age 13), FT005 Murray Bridge

Species	Provenance No.	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Casuarina cunninghamiana</i>	481	0.9	0.0
<i>Eucalyptus astringens</i>	446	9.9	24.2
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	7.9	5.8
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	7.8	11.5
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	6.2	4.5
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	458	5.5	5.0
<i>Eucalyptus leucoxylon</i> ssp. <i>pauperita</i>	480	6.9	4.1
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	7.7	8.1
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	477	6.9	7.6
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	479	8.8	16.0
<i>Eucalyptus occidentalis</i>	246	11.0	25.0
<i>Eucalyptus occidentalis</i>	250	6.7	4.3
<i>Eucalyptus occidentalis</i>	478	8.2	13.3

**Note:** Figure 24 below shows best performing provenance according to TSV (m<sup>3</sup>/ha). All dominant provenance results below 1m<sup>3</sup>/ha are not graphed. Provenance 481 has poor survival.

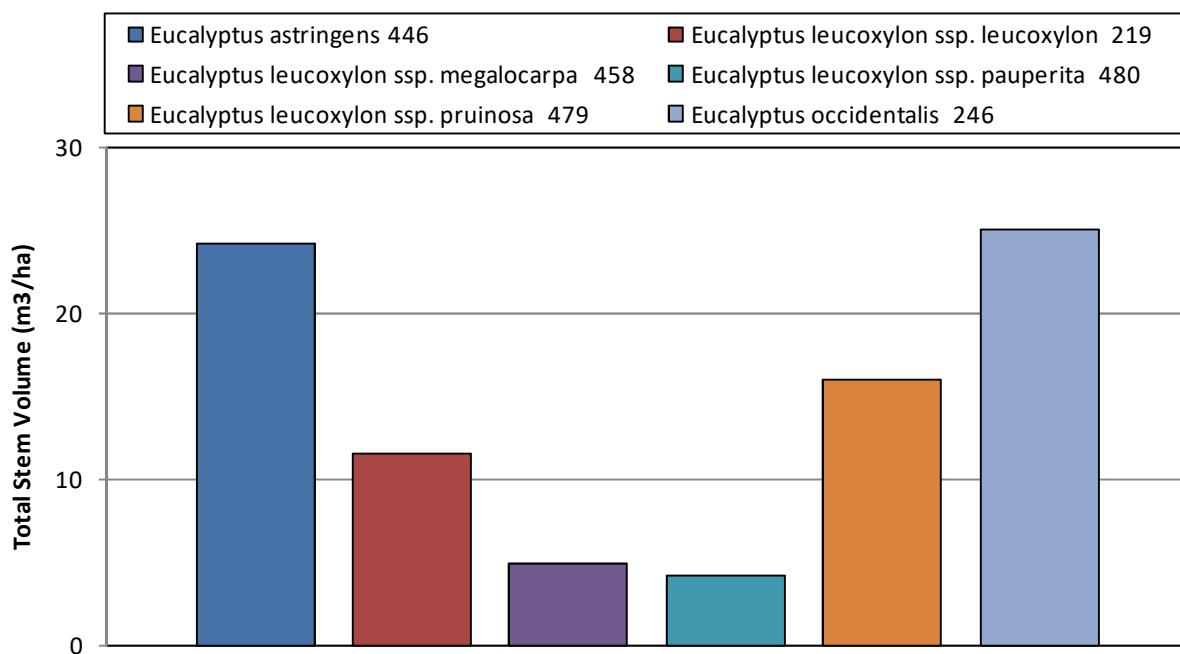


Figure 24: Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 13) for each dominant species, FT005 Murray Bridge

## Future Management of Murray Bridge

Located adjacent to the State Flora Nursery, this trial site is located on alkaline sandy loam soil with low rainfall (300-400mm). Species which performed well at this type of site, according to the previous measurement, were *E. occidentalis* (Pallerup Rock WA), *E. leucoxylon* ssp. *leucoxylon* (Naracoorte) and *E. astringens* (Dryandra State Forest). Each of these species/provenance still display desirable characteristics and are recommended for this site type. *E. leucoxylon* ssp. *pruinosa* (Wail) also performed well and is recommended.

*C. cunninghamiana* (Cobargo) is not recommended due to poor survival. *E. leucoxylon* ssp. *pauperita* (Clare), *E. occidentalis* (Thomas River Area), *E. leucoxylon* ssp. *megalocarpa* (Nelson/Glenelg River) and *E. leucoxylon* ssp. *leucoxylon* (Wirrabara and Studley Park) are not recommended due to poor growth performance.

**Recommendation:** Measurement ceased at this trial in 2003. This trial does not meet the required trial design criteria. Future measurement of this trial is not recommended

### 5.2.3 Paruna

Location: The trial is situated in the central area of the Paruna Land Management Project. The trial is adjacent to Brown's Well Area School which had an interest in helping to develop the site under guidance of the local Landcare group

Site type: Sandy loam site

Rainfall: Approximately 280mm annually.

Site History: The trial was planted by PIRSA staff, Brown's Well Area School Children and members of the local Landcare group on June 11 1992.

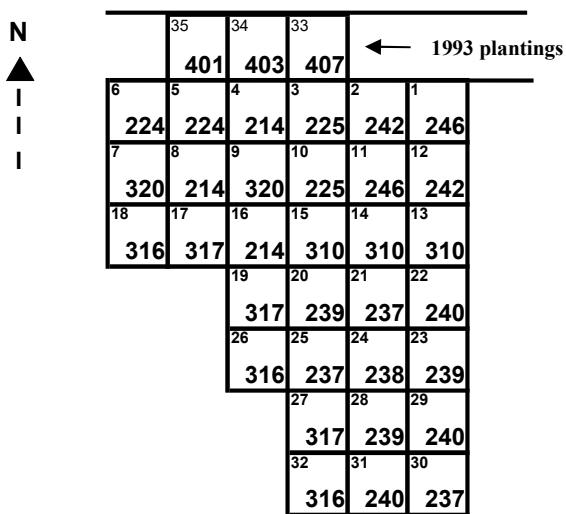
The trees were weeded and drip irrigation lines were laid out to provide water through the first summer.

Number of Plots: 35

Number of trees: 280

Spacing: 4m between trees, 4m between rows. Plots are 6m apart along the rows and 8m apart across the rows

Plot size: Plots are of 8 trees each (two rows of four trees).



Plots 33 - 35 planted 8/07/1993

Figure 25: Overview of FT007 Paruna trial

Table 23: Provenance No., Species and Collection details, FT007 Paruna

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Callitris columellaris</i>	214	Blackwood Seeds	Mambray Creek SA
<i>Grevillea striata</i>	224	17254	Alice Springs NT
<i>Eucalyptus dundasii</i>	225	12260	Norseman/Esperance WA
<i>Eucalyptus porosa</i>	237	Turner	Dawson SA
<i>Eucalyptus porosa</i>	238	12219	Golgol NSW
<i>Eucalyptus porosa</i>	239	Fairlamb	Tailem Bend F.R. SA
<i>Eucalyptus porosa</i>	240	Bulman/ Fairlamb	Yatina/Pekina SA
<i>Eucalyptus occidentalis</i>	242	13635	Rocky Gully WA
<i>Eucalyptus occidentalis</i>	246	15406	Pallerup Rock WA
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	Blackwood Seeds	Flinders Range SA
<i>Melaleuca uncinata</i>	316	Lyn Dohle	Kangaroo Island SA
<i>Melaleuca uncinata</i>	317	Clive Bowman	Lameroo SA
<i>Callitris columellaris</i>	320	Dowling	Wilpena/Hawker SA
<i>Eucalyptus incrassata</i>	401	Trees For Life	Swan Reach SA
<i>Eucalyptus gracilis</i>	403	Greening Australia	Karoonda SA
<i>Melaleuca uncinata</i>	407	Greening Australia	Murray Bridge SA

Table 24: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 4/11/2003 (age 10-11), FT007 Paruna

Species	Provenance No.	Age	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Callitris columellaris</i>	214	11	0.0	0.0
<i>Callitris columellaris</i>	320	11	4.7	1.7
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	11	4.1	0.6
<i>Eucalyptus dundasii</i>	225	11	7.5	10.6
<i>Eucalyptus gracilis</i>	403	10	3.3	0.6
<i>Eucalyptus incrassata</i>	401	10	3.3	0.2
<i>Eucalyptus occidentalis</i>	242	11	6.8	7.9
<i>Eucalyptus occidentalis</i>	246	11	8.0	10.0
<i>Eucalyptus porosa</i>	237	11	4.1	0.6
<i>Eucalyptus porosa</i>	238	11	5.0	2.9
<i>Eucalyptus porosa</i>	239	11	4.2	1.8
<i>Eucalyptus porosa</i>	240	11	3.1	0.5
<i>Grevillea striata</i>	224	11	0.0	0.0
<i>Melaleuca uncinata</i>	316	11	2.1	0.0
<i>Melaleuca uncinata</i>	317	11	2.5	0.0
<i>Melaleuca uncinata</i>	407	10	1.4	0.0

Note: Figure 26 below shows best performing provenance according to TSV (m<sup>3</sup>/ha). All dominant provenance results below 1m<sup>3</sup>/ha are not graphed. Provenances 214, 224, 237, 240, 310, 316, 317, 401, 403 and 407 have insufficient data recorded or poor survival.

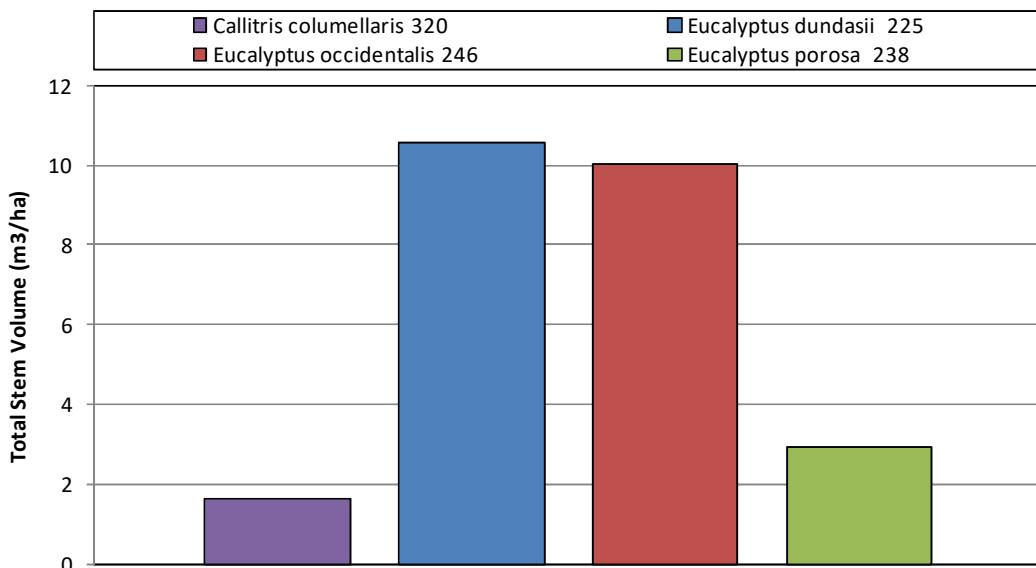


Figure 26: Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 11) for each dominant species, FT007 Paruna

## Future Management of Paruna

Located in well-draining alkaline sandy loam on a relatively dry site (200-300mm). Analysis derived from the most recent measurement shows *E. occidentalis* (Pallerup Rock and Rocky Gully WA) and *E. dundasii* (Norseman/Esperance WA) as being the most vigorous growing species/provenances. *E. porosa* (Golgol) displays the most promising results for this species. The remaining species/provenances coped poorly with the alkaline soil and low rainfall of this site and are not recommended for future planning on this site type.

Species which are recommended are *E. occidentalis* (Pallerup Rock, Rocky Gully) and *E. dundasii* (Norseman/Esperance WA).

**Recommendation:** Final measure of this trial was in 2003. All operations have since ceased due to lack of suitable species replication. The trial design does not meet the stated criteria due to insufficient replicates of key species. This site is not recommended for future measurement.

## 5.2.4 Peebinga

Location:	The trial is located on the northern boundary of the “Peebinga Pines Project”.
Site type:	Deep sand site
Rainfall:	Approximately 300mm annually.
Site History:	The area of the trial occupied was cleared by the Peebinga Pines Landcare Group (PPLG) and planted by PIRSA staff on May 27 1992. A few plants were watered in where considered necessary.
Number of Plots:	17
Number of trees:	136
Spacing:	4m between trees, 4m between rows. Plots are 6m apart along the rows and 8m apart across the rows
Plot size:	Plots are of 8 trees each (two rows of four trees).

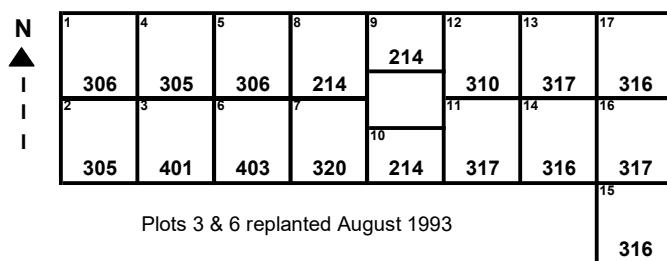


Figure 27: Overview of FT008 Peebinga trial

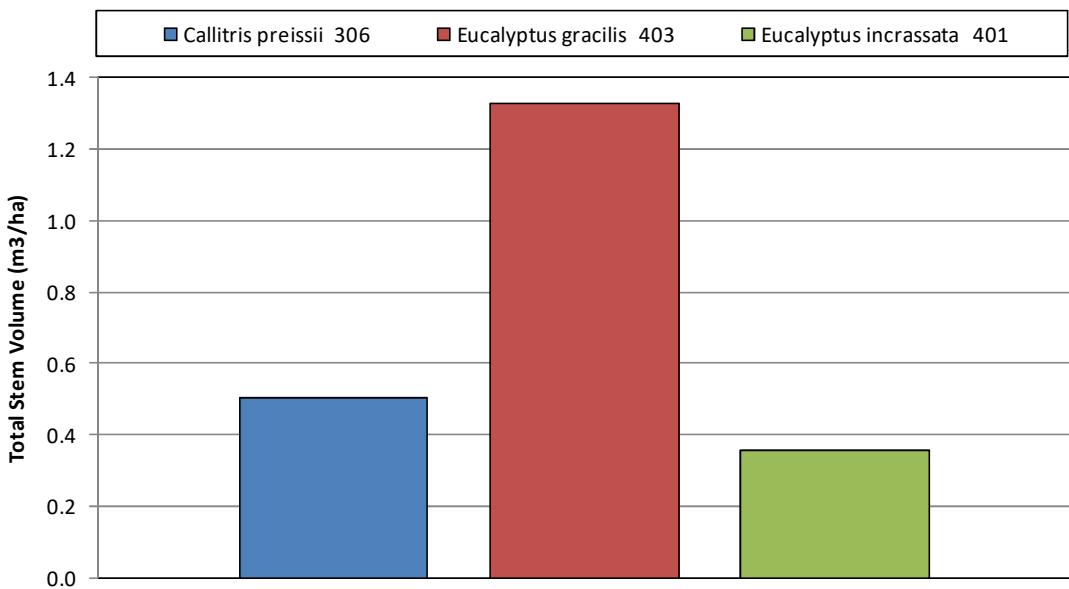
Table 25: Provenance No., Species and Collection details, FT008 Peebinga

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Callitris columellaris</i>	214	Blackwood Seeds	Mambray Creek SA
<i>Callitris preissii</i>	305	Dunsford	Red Hill SA
<i>Callitris preissii</i>	306	Unknown	Cape Jervis SA
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	Blackwood Seeds	Flinders Range SA
<i>Melaleuca uncinata</i>	316	Lyn Dohle	Kangaroo Island SA
<i>Melaleuca uncinata</i>	317	Clive Bowman	Lameroo SA
<i>Callitris columellaris</i>	320	Dowling	Wilpena/Hawker SA
<i>Eucalyptus incrassata</i>	401	Trees For Life	Swan Reach SA
<i>Eucalyptus gracilis</i>	403	Greening Australia	Karoonda SA

Table 26: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 4/11/2003 (age 11), FT008 Peebinga

Species	Provenance No.	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Callitris columellaris</i>	214	1.9	0.0
<i>Callitris columellaris</i>	320	0.0	0.0
<i>Callitris preissii</i>	305	2.5	0.0
<i>Callitris preissii</i>	306	3.4	0.5
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	0.0	0.0
<i>Eucalyptus gracilis</i>	403	4.4	1.3
<i>Eucalyptus incrassata</i>	401	3.8	0.4
<i>Melaleuca uncinata</i>	316	2.0	0.0
<i>Melaleuca uncinata</i>	317	1.4	0.0

**Note:** Figure 28 below shows best performing provenance according to TSV (m<sup>3</sup>/ha). All dominant provenance results of 0.0m<sup>3</sup>/ha are not graphed. Provenances 214, 305, 310, 316, 317 and 320 have insufficient data recorded or poor survival. Form assessment is recommended for provenances in this trial.



**Figure 28: Best performing provenance according to Total Stem Volume ( $m^3/ha$ ) (age 11) for each dominant species, FT008 Peebinga**

## Future Management of Peebinga

A trial planted in deep sand dunes and alkaline soils receiving 250-350mm of annual rainfall. Suitable taxa for this site type, according to the most previous measurement records is *Eucalyptus gracilis* (Karoonda).

*C. columellaris* (Wilpena/Hawker and Mambray Creek), *C. preissii* (Cape Jervis and Red Hill), *C pauper* ssp. *cristata* (Flinders Ranges) *E. incrassata* (Swan Reach) and *M. uncinata* (Lameroo and Kangaroo Island), displayed poor survival and are not recommended for future application on this site type.

**Recommendation:** Final measure of this trial was in 2003. All operations have since ceased due to lack of suitable species replication. This site is not recommended for future measurement.

## 5.2.5 Pinnaroo

Location: The trial is located two kilometres west of Pinnaroo adjacent to the Lameroo-Pinnaroo Road (Mallee Highway).

Site type: Sandy Loam

Rainfall: Approximately 340mm annually.

Site History: No preplant weed control. Trees were watered about 6 times in the first summer. Rows were marked with steel droppers and identified by stamped tags. The trial was planted by council employees on August 21 1990.

Plot design: Single row plots

Spacing: 4m between trees, 4m between rows.

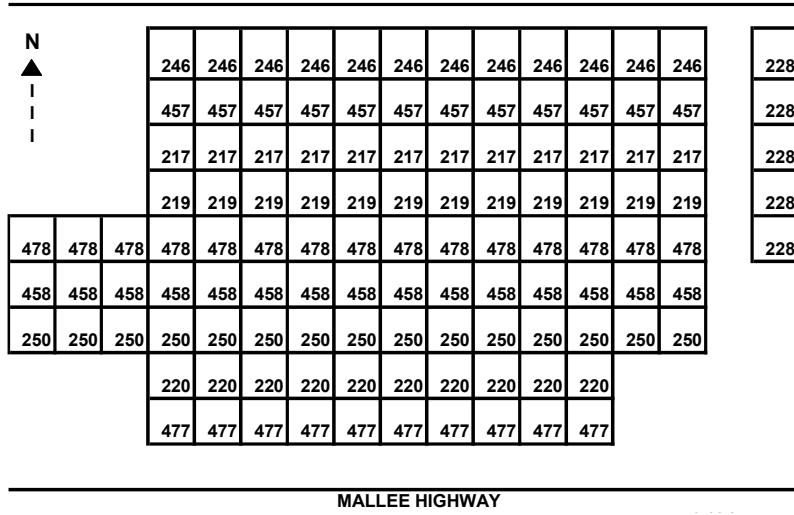


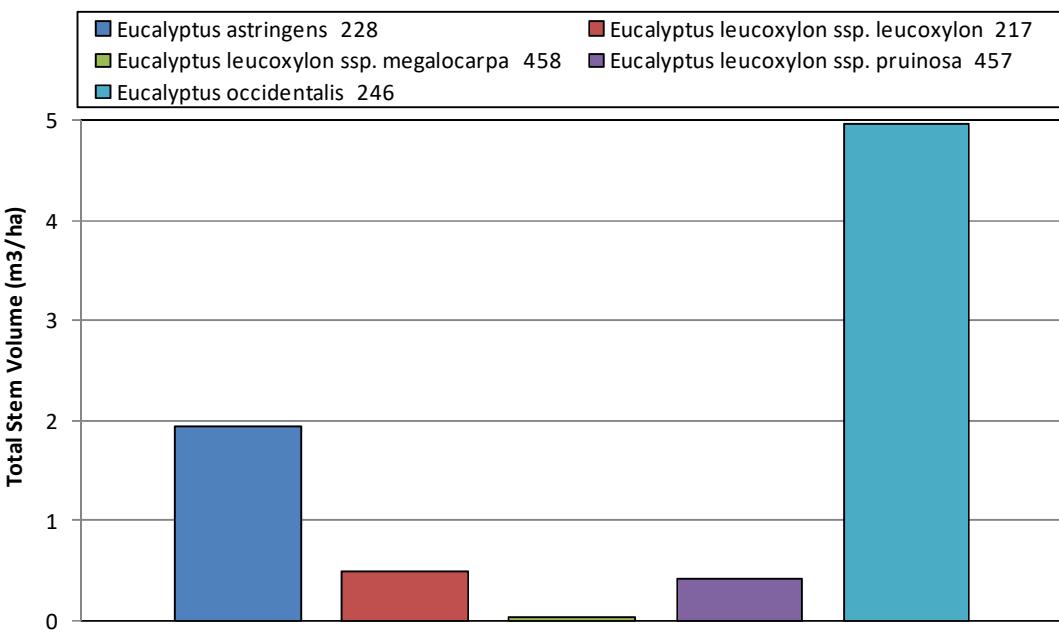
Table 27: Provenance No., Species and Collection details, FT001 Pinnaroo

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	16012	Wirrabara SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	17012	Studley Park Vic
<i>Eucalyptus astringens</i>	228	12842	Dryandra SF WA
<i>Eucalyptus occidentalis</i>	246	15406	Pallerup Rock WA
<i>Eucalyptus occidentalis</i>	250	13644	Thomas River Area WA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	16097	Williamstown SA
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	458	12456	Nelson/Glenelg R SA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	477	16518	Brisbane Ra NP Vic
<i>Eucalyptus occidentalis</i>	478	13646	Gibson Area WA

Table 28: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 5/12/1997 (age 7), FT0001 Pinnaroo

Species	Provenance No.	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Eucalyptus astringens</i>	228	4.3	1.9
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	4.0	0.5
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	4.1	0.3
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	1.5	0.0
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	458	2.2	0.0
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	4.3	0.4
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	477	2.7	0.0
<i>Eucalyptus occidentalis</i>	246	6.4	4.9
<i>Eucalyptus occidentalis</i>	250	3.9	0.4
<i>Eucalyptus occidentalis</i>	478	4.2	0.3

Note: Figure 30 below shows best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha). This trial ceased measurement in 1997.



**Figure 30: Best performing provenance according to Total Stem Volume ( $\text{m}^3/\text{ha}$ ) (age 7) for each dominant species, FT0001 Pinnaroo.**

## Future Management of Pinnaroo

This small trial is located just off the Mallee Highway at Pinnaroo on a well-draining sandy loam soil, annual rainfall 300-400mm. This trial was planted in single row plots and contains no quantifiable replication, therefore does not meet the stipulated criteria. Analysis of Total Stem volume ( $\text{m}^3/\text{ha}$ ) for this trial shows *E. occidentalis* (Gibson area) as the most vigorous grower of this site type resulting in this species being recommended as a taxa for future planting. *E. astringens* has also shown good height and volume growth and will also be recommended.

**Recommendation:** Final measurement at this trial was conducted in 1997. All operations have since ceased due to lack of suitable species replication.

## 5.2.6 Sherlock – Woidt's

Location: The trial is located approximately twenty-three kilometres from Tailem Bend on the Mallee Highway.  
 Site type: Shallow stony sandy loam over limestone.  
 Rainfall: Approximately 380mm annually.  
 Site History: The area was cropped by the property owners and has been constantly worked over the years, with exposed limestone rubble a feature of this site type. The site was fenced by the owners to protect it from sheep grazing. The trial was planted by PIRSA staff on June 30 1993.  
 Number of plots: 16  
 Number of trees: 128  
 Spacing: 4m between trees, 4m between rows. There is 1 blank row between plots across the rows and 6m between the plots along the rows.  
 Plot size: Plots are of 8 trees each (two rows of four trees).

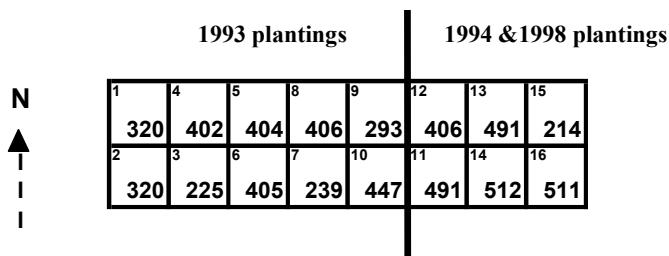


Figure 31: Overview of FT026 Sherlock trial

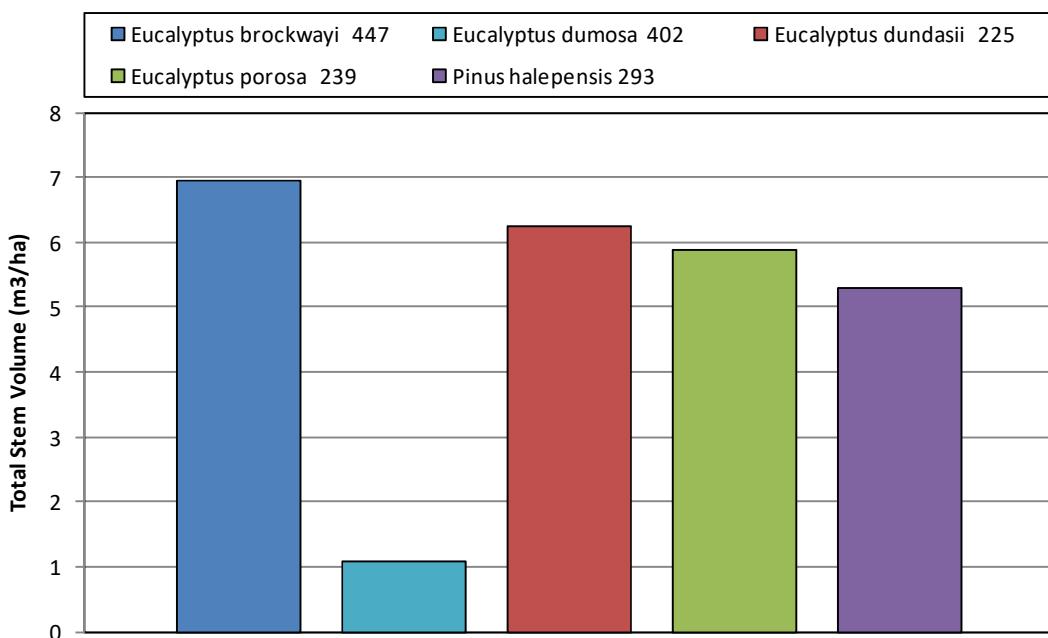
Table 29: Provenance No., Species and Collection details, FT026 Sherlock

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Callitris columellaris</i>	214	Blackwood Seeds	Mambray Creek SA
<i>Eucalyptus dundasii</i>	225	12260	Norseman/Esperance WA
<i>Eucalyptus porosa</i>	239	Fairlamb	Tailem Bend F.R. SA
<i>Pinus halepensis</i>	293	H18	Mellegue Romain Tunisia
<i>Callitris columellaris</i>	320	Dowling	Wilpena/Hawker SA
<i>Eucalyptus dumosa</i>	402	Greening Australia	Lameroo SA
<i>Eucalyptus leptophylla</i>	404	Greening Australia	Lameroo SA
<i>Eucalyptus leptophylla</i>	405	Trees For Life	Bakara CP SA
<i>Melaleuca uncinata</i>	406	Greening Australia	Karoonda SA
<i>Eucalyptus brockwayi</i>	447	CALM 9042	Kondinin WA
<i>Eucalyptus salmonophloia</i>	491	Unknown	Karonie Coonana WA
<i>Eucalyptus dundasii</i>	511	CALM 8532	5km E of Norsema WA
<i>Eucalyptus dundasii</i>	512	CALM 9081	8km NW of Davyhurst WA

**Table 30: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 3/11/2003 (age 5, 9 & 10), FT026 Sherlock.**

Species	Provenance No.	Age	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Callitris columellaris</i>	214	9	2.9	0.6
<i>Callitris columellaris</i>	320	10	2.7	0.4
<i>Eucalyptus brockwayi</i>	447	10	6.2	7.0
<i>Eucalyptus dumosa</i>	402	10	3.6	1.1
<i>Eucalyptus dundasii</i>	225	10	6.6	6.3
<i>Eucalyptus dundasii</i>	511	5	0.0	0.0
<i>Eucalyptus dundasii</i>	512	5	1.4	0.0
<i>Eucalyptus leptophylla</i>	404	10	3.5	0.5
<i>Eucalyptus leptophylla</i>	405	10	2.8	0.2
<i>Eucalyptus porosa</i>	239	10	5.8	5.9
<i>Eucalyptus salmonophloia</i>	491	5	1.5	0.0
<i>Melaleuca uncinata</i>	406	9 & 10	1.9	0.0
<i>Pinus halepensis</i>	293	10	5.8	5.3

**Note:** Figure 32 below shows best performing provenance according to TSV (m<sup>3</sup>/ha). Provenances with a TSV (m<sup>3</sup>/ha) below 1m<sup>3</sup>/ha are not graphed. Provenances 214, 320, 404, 405, 406, 491, 511 and 512 have insufficient data recorded (due to tree height <3.1m) or poor survival. Provenance 406 have two ages due to replants in 1993 and 1994.



**Figure 32: Best performing provenance according to Total Stem Volume (m<sup>3</sup>/ha) (age 10) for each dominant species, FT026 Sherlock.**

## Future Management of Sherlock – Woidt’s

This trial is planted on a shallow stony/calcareous site with sandy loam soil over limestone, annual rainfall is 300-400mm. This trial was designed with eight tree plots but only one or two replicates of key species. This trial is not recommended for future measure due to the lack of sufficient obtainable data for qualitative comparisons. Analysis conducted for the most recent series of measurements shows *E. brockwayi* (Kondinin) and *E. dundasii* (Norsemann/Esperance) as the most productive species/provenances at this site. *E. porosa* (Tailem Bend) and *P. halepensis* (Mellegue Romaine, Tunisia) have also displayed good height and volume results. These species/provenances are recommended for future plantings on this site type.

All other species/provenances planted in this trial have low TSV (m<sup>3</sup>/ha) values or low survival and are not recommended for future plantings on this site type.

**Recommendation:** Final measure of this trial was in 2003. All operations have since ceased due to lack of suitable species replication.

## 5.3 RESULTS FOR THE MOUNT LOFTY RANGES

FT003	Cudlee Creek*	planted 1990	Last measured 1997
FT010	Gumeracha Acacia (failed)	planted 1992	Last measured 1995
FT011	Gumeracha <i>Grevillea robusta</i>	planted 1992	Last measured 2006
FT012	Gumeracha <i>Eucalyptus cladocalyx</i>	planted 1992	Last measured 2006
FT013	Gumeracha <i>Robinia pseudoacacia</i>	planted 1992	Last measured 2006
FT014	Gumeracha Mixed Red Gum	planted 1992	Last measured 2006
FT015	Gumeracha Mixed Blue Gum	planted 1992	Last measured 2003
FT016	Gumeracha <i>Eucalyptus globulus</i>	planted 1992	Last measured 2006
FT038	Gumeracha Acacia (replant)	planted 1997	Last measured 1999
FT024	Montarra	planted 1993	Last measured 2003
FT039	Lenswood	planted 1998	Last measured 2003

\* Ceased measurement in 1997

### 5.3.1 Cudlee Creek

Location:	The trial is located at Coralinda, Cudlee Creek Forest Reserve.
Site type:	South Australian Blue Gum
Rainfall:	Approximately 900+mm annually.
Site History:	The site was sprayed with a mixture of Roundup® and Simazine at a rate of 3L/ha and 4L/ha respectively in September 1990. The rows are marked by pegs and the provenance identified by metal tags. An ashbed runs through the trial which may compromise the interpretation of measurements. The trial was planted by ForestrySA employees on 28 <sup>th</sup> September 1990.
Number of Plots:	7
Number of trees:	77
Spacing:	3m between trees, 2.5m between rows.
Plot design:	Single row plots, 6-15 trees per plot.

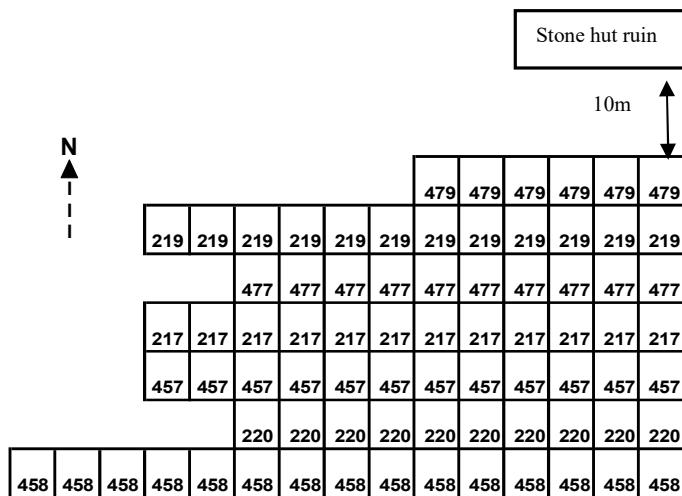


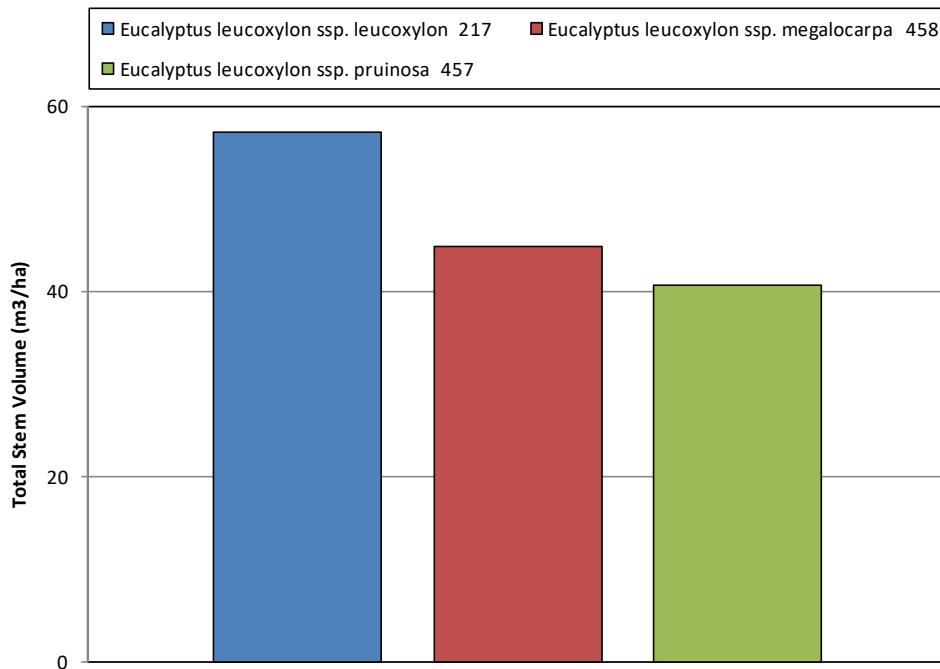
Figure 33: Overview of FT003 Cudlee Creek trial

**Table 31: Provenance No., Species and Collection details, FT003 Cudlee Creek**

Species	Provenance	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	16012	Wirrabara SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	17012	Studley Park Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	16097	Williamstown SA
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	458	12456	Nelson/Glenelg R SA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	477	16518	Brisbane Range NP Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	479	9599	Wail Vic

**Table 32 Predominant Height (m) and Total Stem Volume ( $\text{m}^3/\text{ha}$ ) comparison at 9/12/1997 (age 7), FT003 Cudlee Creek**

Species	Provenance	PDH (m)	TSV ( $\text{m}^3/\text{ha}$ )
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	11.0	57.2
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	8.5	33.7
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	6.4	11.4
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	458	8.5	44.8
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	9.0	40.6
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	477	7.6	20.7
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	479	6.2	13.7



**Figure 34: Best performing provenance according to Total Stem Volume ( $\text{m}^3/\text{ha}$ ) (age 7) for each dominant subspecies, FT003 Cudlee Creek**

## Future Management of Cudlee Creek

A small trial located in the Cudlee Creek Forest Reserve on a SA Blue Gum site with acidic clay-loam soil and high rainfall (850mm+ annually). Planted in single row plots with no replication means this trial does not meet the design or replication criteria and is not recommended for future measurement. Data gathered at the most recent measurement indicated strong performance by *E. leucoxylon* ssp. *leucoxylon* (Wirrabara), *E. leucoxylon* ssp. *megalocarpa* (Nelson/Glenelg River) and *E. leucoxylon* ssp. *pruinosa* (Williamstown) all of which are recommended for this site type. Interestingly, *E. leucoxylon* ssp. *leucoxylon* (Studley Park) and *E. leucoxylon* ssp. *pruinosa* (Wail) performed poorly and are not recommended.

**Recommendation:** Final measure of this trial was in 1997. All operations have since ceased due to lack of suitable species replication and unsuitable trial design.

### **5.3.2 Gumeracha Agroforestry Demonstration Area**

Location:	This is a group of seven trials which are located in the ForestrySA Agroforestry Demonstration Area (Bennetts) on the northern side of the Adelaide to Mannum road, in between Gumeracha and Chain of Ponds.
Site type:	Three Red Gum sites (trials 1, 2 and 3) and four Blue Gum sites (trials 4, 5, 6 and 7).
Rainfall:	Approximately 800mm annually.
Site History:	The Agroforestry Demonstration Area is on ForestrySA land. The trial sites were sprayed and ripped prior to planting. All trials were planted by PIRSA. Due to the large size of the trials, not all species could be planted adjacent to each other on the same site. The attached plan shows the location of the sites across the demonstration area (Figure 35). Ripping was done at 2.5m spacing and Roundup and Simazine were used for weed control. In October 1992 some kangaroo and hare damage was noticed across the trials. Some trees were blown over shortly after planting (mainly in Blue Gum sites no. 6 and 7) due to very heavy rains and high winds affecting the exposed sites.
Spacing:	All plots are spaced at 2.5m between the trees and 2.5m between the rows.
Plot size:	All plots are 8 tree plots (2 rows x 4 trees) except for the <i>Grevillea robusta</i> trial (site 5) which is planted to 12 tree plots (4 rows x 3 trees).
<b>Note:</b>	The Blue Gum trial site of mixed species (no. 7) was not planted on rip lines. The rip lines were 6m apart and too wide to use. Plots were established between the rips however, on the undisturbed area, using the rip lines as plot boundaries. All trials, apart from the one replant site, received a measure in 2006.

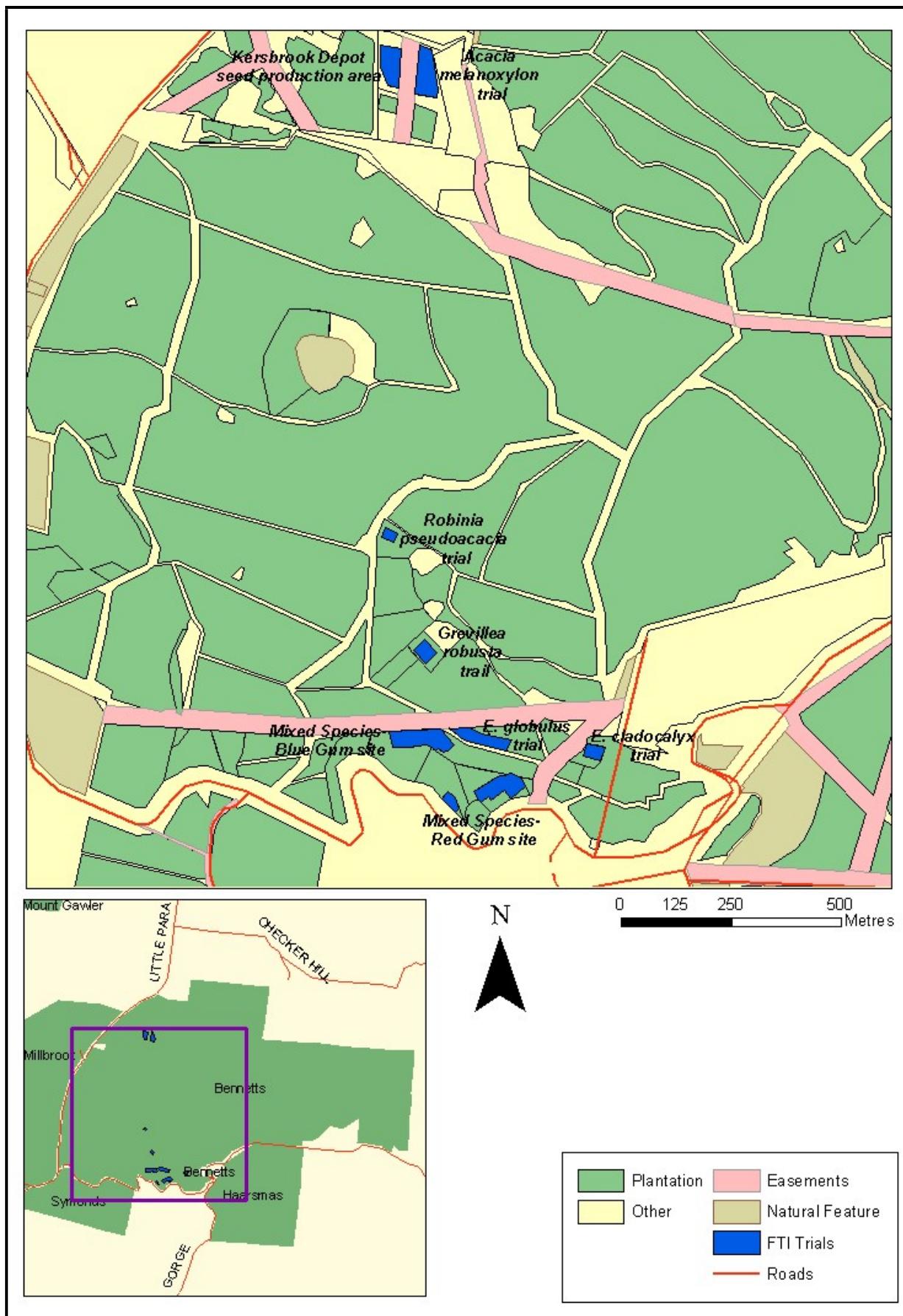


Figure 35: Farm Tree Improvement Trial locations, Agroforestry Demonstration Area, Gumeracha

### 5.3.2.1 Blackwood, *Acacia melanoxylon*

Site type: Red Gum site  
 Planting: The trial was planted on October 16 1992 by PIRSA  
 Number of Plots: 42  
 Number of trees: 336  
 Spacing: 2.5m between trees, 2.5m between rows.  
 Plot size: Plots are of 8 trees each (two rows of four trees).

**Note:** This trial (previously FT010) failed due to constant grazing by kangaroos and hares, it was replanted on the 5th August 1997 inside a vermin-proof fence with the following provenances and trial layout and renamed FT038.

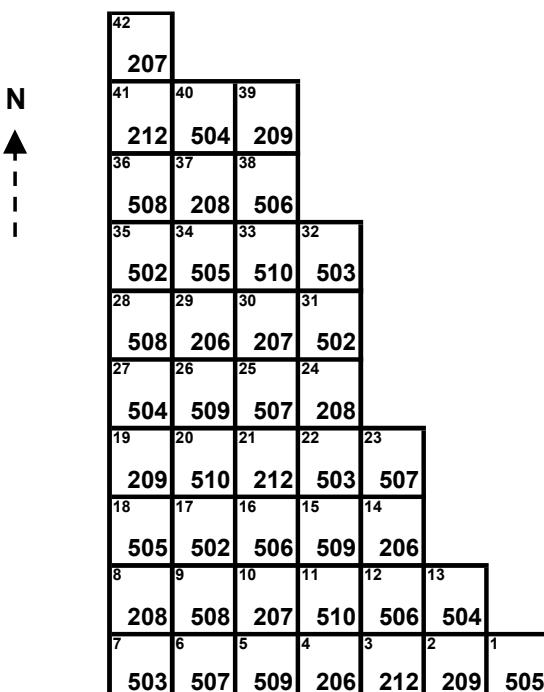


Figure 36: Overview of FT0038 Gumeracha *A. melanoxylon* trial

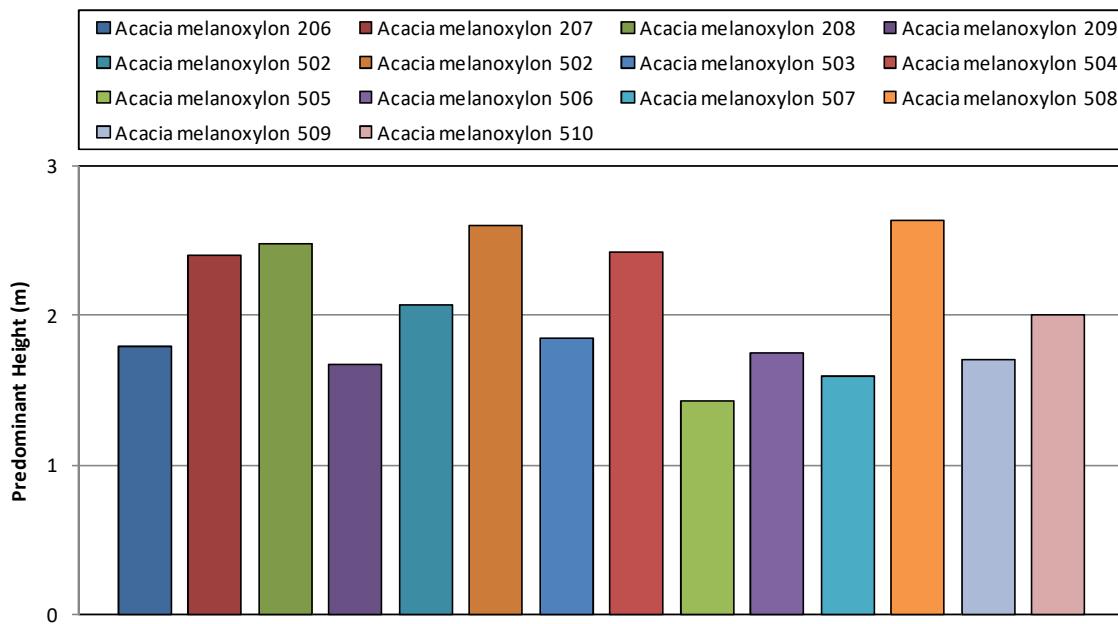
Table 33: Provenance No., Species and Collection details, FT0038 Gumeracha *A. melanoxylon* (replant)

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Acacia melanoxylon</i>	206	15614	Silver Creek Vic.
<i>Acacia melanoxylon</i>	207	15535	Burnie Tas.
<i>Acacia melanoxylon</i>	208	15863	Blackwood Park Tas.
<i>Acacia melanoxylon</i>	209	16526	Mt Gambier SA
<i>Acacia melanoxylon</i>	212	17958	Sassafras NSW
<i>Acacia melanoxylon</i>	502	Tas Forestry Comm.	"Fairfield" Near Cressy Tas
<i>Acacia melanoxylon</i>	503	16513	Welshpool Central Gippsland Vic
<i>Acacia melanoxylon</i>	504	18084	Red Creek Tas
<i>Acacia melanoxylon</i>	505	17229	Central Highlands Vic
<i>Acacia melanoxylon</i>	506	18021	Lancefield Vic
<i>Acacia melanoxylon</i>	507	Blackwood Seeds	Lenswood SA
<i>Acacia melanoxylon</i>	508	Tas Forestry Comm.	Fingal Tas
<i>Acacia melanoxylon</i>	509	Tas Forestry Comm.	Scottsdale Tas
<i>Acacia melanoxylon</i>	510	19350	Otways Vic

**Table 34: Predominant Height (m) and Total Stem Volume ( $m^3/ha$ ) comparison at 12/03/1999 (age 1.6), FT0038 Gumeracha *A. melanoxylon* (replant)**

Species	Provenance No.	PDH (m)	TSV ( $m^3/ha$ )
<i>Acacia melanoxylon</i>	206	1.8	0.1
<i>Acacia melanoxylon</i>	207	2.4	0.0
<i>Acacia melanoxylon</i>	208	2.5	0.1
<i>Acacia melanoxylon</i>	209	1.7	0.1
<i>Acacia melanoxylon</i>	212	2.1	0.0
<i>Acacia melanoxylon</i>	502	2.6	0.1
<i>Acacia melanoxylon</i>	503	1.8	0.1
<i>Acacia melanoxylon</i>	504	2.4	0.1
<i>Acacia melanoxylon</i>	505	1.4	0.0
<i>Acacia melanoxylon</i>	506	1.8	0.0
<i>Acacia melanoxylon</i>	507	1.6	0.0
<i>Acacia melanoxylon</i>	508	2.6	0.2
<i>Acacia melanoxylon</i>	509	1.7	0.1
<i>Acacia melanoxylon</i>	510	2.0	0.0

**Note:** Due to the age and nature of the *A. melanoxylon* replant trial, all TSV ( $m^3/ha$ ) results were below 1 $m^3/ha$  and subsequently not graphed. Figure 37 below displays PDH (m) results for all *A. melanoxylon* provenances.



**Figure 37: Seed source performance according to Predominant Height (m) (age 1.6), FT0038 Gumeracha *A. melanoxylon* (replant)**

### 5.3.2.2 Sugar Gum, *Eucalyptus cladocalyx*

Site type: Red Gum Site  
 Planting: The trial was planted on 22 July 1992 by PIRSA  
 Number of Plots: 15  
 Number of trees: 120  
 Spacing: 2.5m between trees, 2.5m between rows.  
 Plot size: Plots are of 8 trees each (two rows of four trees).

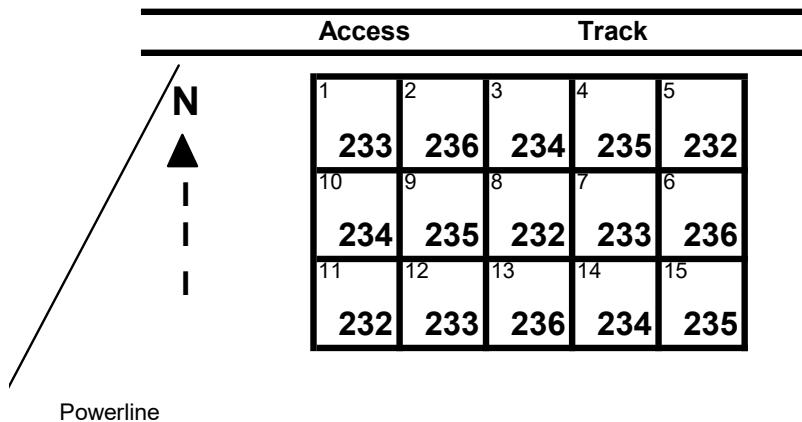


Figure 38: Overview of *E. cladocalyx* FT012 Gumeracha trial

Table 35: Provenance No., Species and Collection details, FT012 Gumeracha *E. cladocalyx*

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus cladocalyx</i>	232	15019	Wirrabara SA
<i>Eucalyptus cladocalyx</i>	233	15268	Wilmington SA
<i>Eucalyptus cladocalyx</i>	234	16018	Vanilla SA
<i>Eucalyptus cladocalyx</i>	235	16022	Flinders Chase Nat. Pk. KI SA
<i>Eucalyptus cladocalyx</i>	236	Thomas/Wood	Wirrabara F.R. SA

Table 36: Predominant Height (m), Total Stem Volume ( $m^3/ha$ ) and Mean Annual Increment ( $m^3/ha/yr$ ) comparison at 15/10/2006 (age 14), FT012 Gumeracha *E. cladocalyx*

Species	Provenance No.	PDH (m)	TSV ( $m^3/ha$ )	MAI ( $m^3/ha/yr$ )
<i>Eucalyptus cladocalyx</i>	232	20.3	296.4	21.2
<i>Eucalyptus cladocalyx</i>	233	19.2	257.3	18.4
<i>Eucalyptus cladocalyx</i>	234	12.6	195.9	14.0
<i>Eucalyptus cladocalyx</i>	235	20.3	386.1	27.6
<i>Eucalyptus cladocalyx</i>	236	19.2	304.8	21.8

Note: Figure 39 below shows best performing provenance according to MAI ( $m^3/ha/yr$ ).

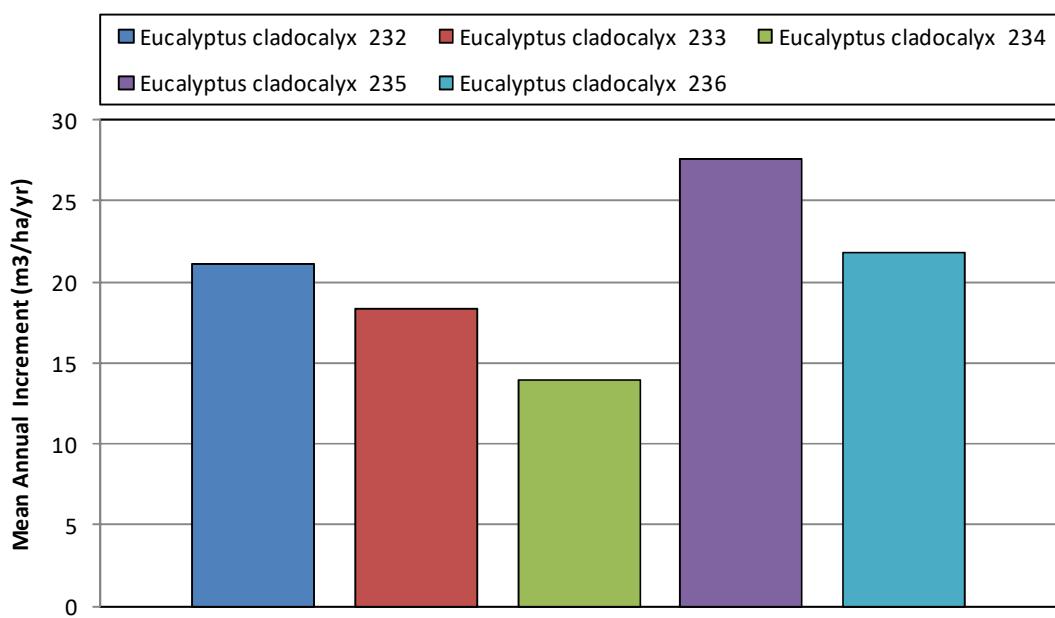


Figure 39: Seed source performance according to Mean Annual Increment ( $\text{m}^3/\text{ha}/\text{yr}$ ) (age 14), FT012 Gumeracha *E. cladocalyx*

### 5.3.2.3 Mixed Species, Red Gum Site

Site type: Red Gum site  
 Planting: The trial was planted on July 27 & 28 1992 by PIRSA  
 Number of Plots: 64  
 Number of trees: 512  
 Spacing: 2.5m between trees, 2.5m between rows.  
 Plot size: Plots are of 8 trees each (two rows of four trees).

Note: This trial is predominantly *E. camaldulensis* provenances

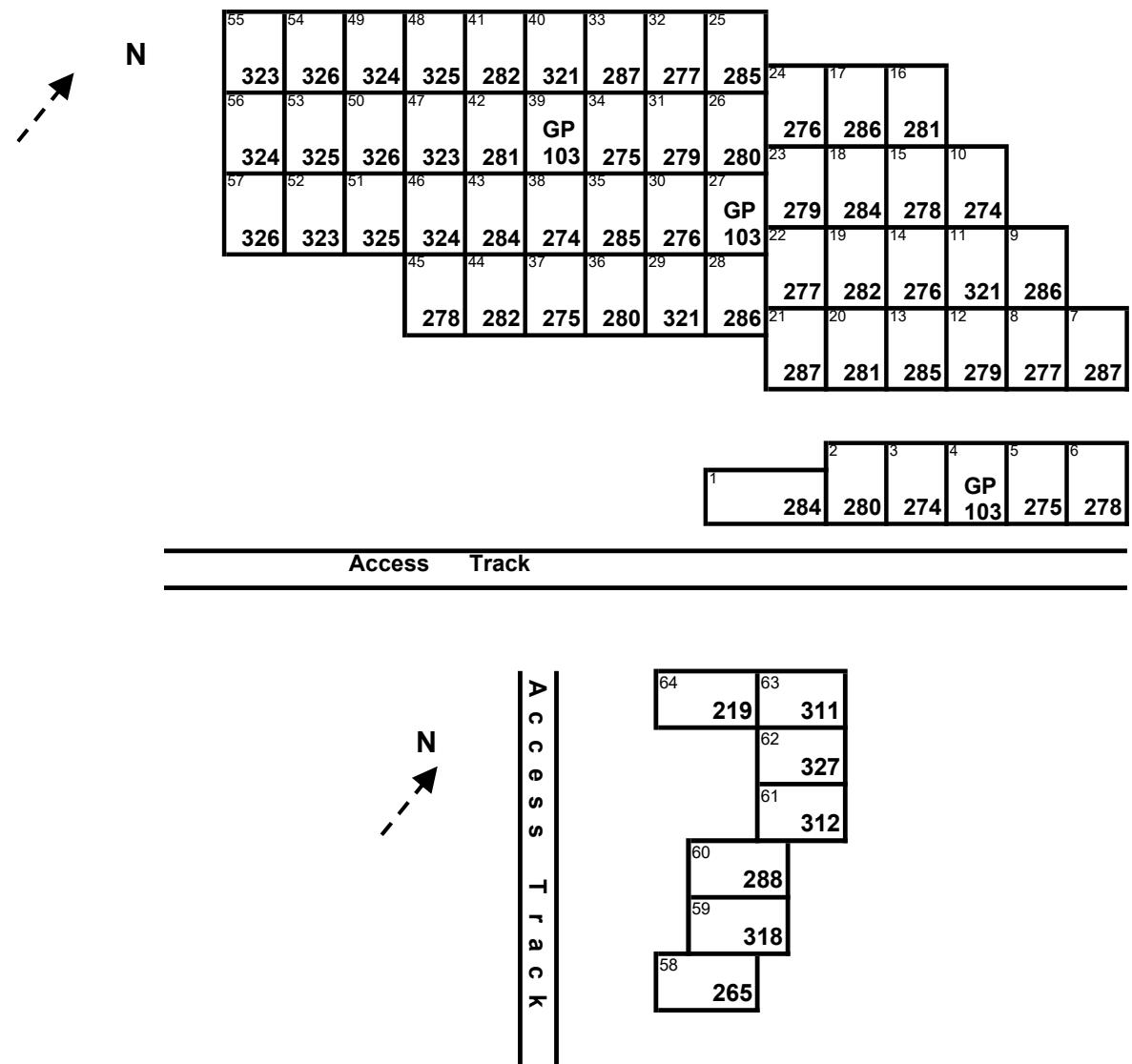


Figure 40: Overview of Mixed Species 1, FT014 Gumeracha Red Gum Site

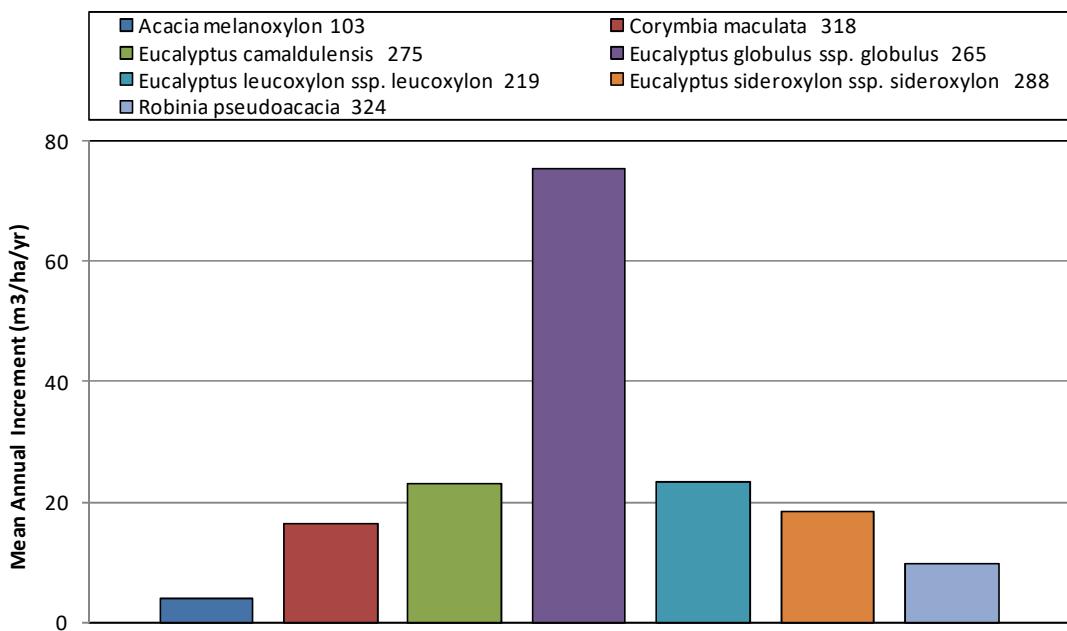
Table 37: Provenance No., Species and Collection details, FT014 Gumeracha Red Gum Site

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Acacia melanoxylon</i>	103	No details available	Mt Barker SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	265	16580	Huonville Tas.
<i>Eucalyptus camaldulensis</i>	274	13197	Pt Augusta SA
<i>Eucalyptus camaldulensis</i>	275	15022	Wimmera River Vic.
<i>Eucalyptus camaldulensis</i>	276	15799	Lake Indoona WA
<i>Eucalyptus camaldulensis</i>	277	18105	Petford Qld
<i>Eucalyptus camaldulensis</i>	278	15272	Silverton NSW
<i>Eucalyptus camaldulensis</i>	279	Blackwood Seeds	Murray Bridge SA
<i>Eucalyptus camaldulensis</i>	280	11340	Minlaton SA
<i>Eucalyptus camaldulensis</i>	281	Hunt	Kalangadoo SA
<i>Eucalyptus camaldulensis</i>	282	15029	Lake Albacutya N Vic
<i>Eucalyptus camaldulensis</i>	284	15024	Lake Hindmarsh SE Vic
<i>Eucalyptus camaldulensis</i>	285	15031	Lake Agnes Vic
<i>Eucalyptus camaldulensis</i>	286	15035	Lake Coorong Vic
<i>Eucalyptus camaldulensis</i>	287	15037	Lowan Valley - Saline Vic
<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	288	14443	Gilgandra NSW
<i>Allocasuarina torulosa</i>	311	10880	Woolgoolga NSW
<i>Allocasuarina luehmannii</i>	312	No details available	Murray Bridge NPS Seed Store
<i>Corymbia maculata</i>	318	13602	Batemans Bay NSW
<i>Eucalyptus camaldulensis</i> ssp. <i>obtusa</i>	321	Dowling	'Callana' Flinders Range SA
<i>Robinia pseudoacacia</i>	323	Parent 1	Nyirseg, Hungary
<i>Robinia pseudoacacia</i>	324	Parent 2	Nyirseg, Hungary
<i>Robinia pseudoacacia</i>	325	Parent 3	Nyirseg, Hungary
<i>Robinia pseudoacacia</i>	326	Parent 4	Nyirseg, Hungary
<i>Allocasuarina torulosa</i>	327	Royston Petrie Seeds	NE of Sydney NSW

**Table 38: Mixed species Predominant Height (m), Total Stem Volume (m<sup>3</sup>/ha) and Mean Annual Increment (m<sup>3</sup>/ha/yr) comparison at 15/10/2006 (age 14), FT0014 Gumeracha Red Gum Site.**

Species	Provenance No.	PDH (m)	TSV (m <sup>3</sup> /ha)	MAI (m <sup>3</sup> /ha/yr)
<i>Acacia melanoxylon</i>	103	10.8	57.6	4.1
<i>Allocasuarina luehmannii</i>	312	0.0	0.0	0.0
<i>Allocasuarina torulosa</i>	311	0.0	0.0	0.0
<i>Allocasuarina torulosa</i>	327	0.0	0.0	0.0
<i>Corymbia maculata</i>	318	16.8	228.8	16.3
<i>Eucalyptus camaldulensis</i>	274	10.4	72.1	5.2
<i>Eucalyptus camaldulensis</i>	275	17.8	322.3	23.0
<i>Eucalyptus camaldulensis</i>	276	0.0	0.0	0.0
<i>Eucalyptus camaldulensis</i>	277	0.0	0.0	0.0
<i>Eucalyptus camaldulensis</i>	278	11.5	78.9	5.6
<i>Eucalyptus camaldulensis</i>	279	13.2	151.0	10.8
<i>Eucalyptus camaldulensis</i>	280	7.6	26.3	1.9
<i>Eucalyptus camaldulensis</i>	281	13.3	135.1	9.7
<i>Eucalyptus camaldulensis</i>	282	16.4	262.2	18.7
<i>Eucalyptus camaldulensis</i>	284	16.1	206.2	14.7
<i>Eucalyptus camaldulensis</i>	285	14.8	211.8	15.1
<i>Eucalyptus camaldulensis</i>	286	15.4	224.3	16.0
<i>Eucalyptus camaldulensis</i>	287	18.9	298.7	21.3
<i>Eucalyptus camaldulensis</i> ssp. <i>obtusa</i>	321	2.5	4.0	0.3
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	265	26.1	1054.2	75.3
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	17.2	328.3	23.4
<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	288	15.4	259.9	18.6
<i>Robinia pseudoacacia</i>	323	13.5	97.2	6.9
<i>Robinia pseudoacacia</i>	324	14.3	135.7	9.7
<i>Robinia pseudoacacia</i>	325	15.0	102.3	7.3
<i>Robinia pseudoacacia</i>	326	13.3	78.2	5.6

**Note:** Figure 41 below shows best performing provenance according to MAI (m<sup>3</sup>/ha/yr). Provenances with a MAI (m<sup>3</sup>/ha/yr) below 1m<sup>3</sup>/ha/yr are not graphed. Provenances 276, 277, 311, 312, 321 and 327 are not graphed due to poor survival. Form assessment recommended for some of the species.



**Figure 41: Best performing seed source according to Mean Annual Increment (m<sup>3</sup>/ha/yr) (age 14) for each dominant species, FT0014 Gumeracha Red Gum Site.**

### 5.3.2.4 Black Locust, *Robinia pseudoacacia*

Site type: Blue Gum site  
 Planted: The trial was planted on August 15 1992  
 Number of Plots: 12  
 Number of trees: 96  
 Spacing: 2.5m between trees, 2.5m between rows.  
 Plot size: Plots are of 8 trees each (two rows of four trees).

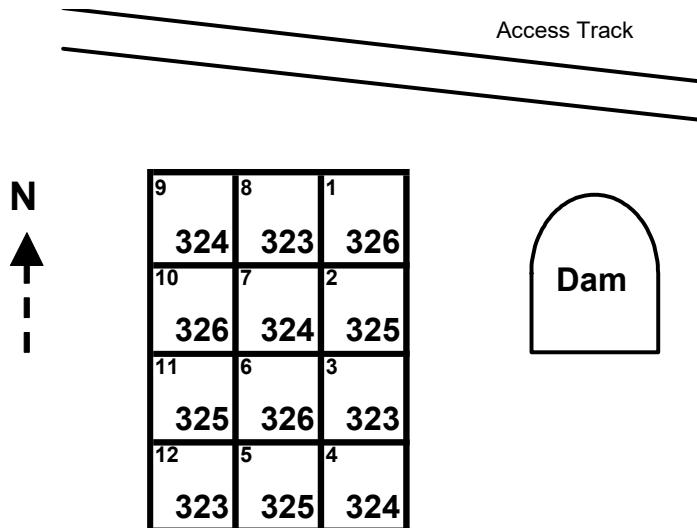


Figure 42: Overview of *R. pseudoacacia* FT013 Gumeracha trial

Table 39: Provenance No., Species and Collection details, FT013 Gumeracha *R. pseudoacacia*

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Robinia pseudoacacia</i>	323	Parent 1	Nyirseggi, Hungary
<i>Robinia pseudoacacia</i>	324	Parent 2	Nyirseggi, Hungary
<i>Robinia pseudoacacia</i>	325	Parent 3	Nyirseggi, Hungary
<i>Robinia pseudoacacia</i>	326	Parent 4	Nyirseggi, Hungary

Table 40: Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 15/09/2006 (age 14), FT0013 Gumeracha *R. pseudoacacia*

Species	Provenance No.	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Robinia pseudoacacia</i>	323	10.2	65.8
<i>Robinia pseudoacacia</i>	324	9.7	49.1
<i>Robinia pseudoacacia</i>	325	10.8	65.3
<i>Robinia pseudoacacia</i>	326	9.8	57.0

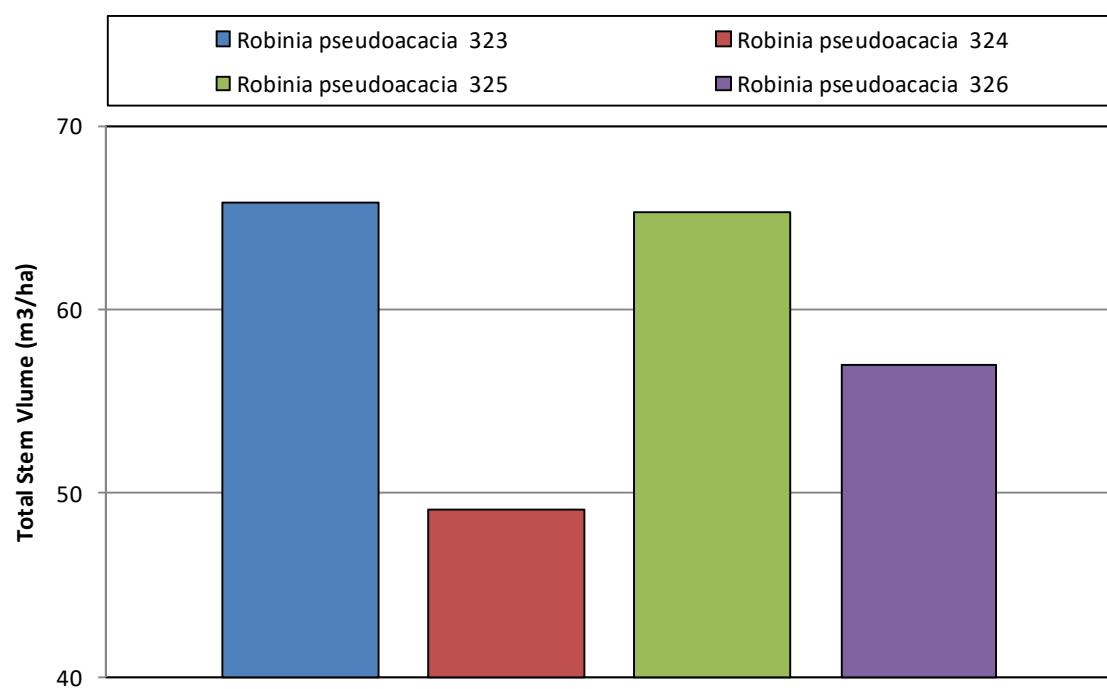


Figure 43: Seed source performance according to Total Stem volume (m<sup>3</sup>/ha) (age 14), FT0013 Gumeracha *R. Pseudoacacia*.

### 5.3.2.5 Silky Oak, *Grevillea robusta*

Site type: Blue Gum site  
 Planted: The trial was planted on July 21 1992  
 Number of Plots: 15  
 Number of trees: 180  
 Spacing: 3m between trees, 2.5m between rows.  
 Plot size: Plots are of 12 trees each (three rows of four trees).

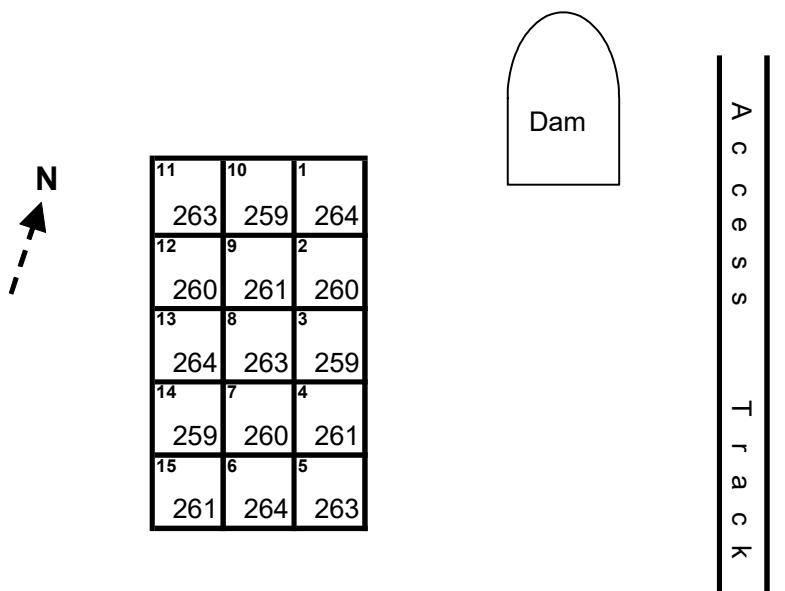


Figure 44: Overview of *G. robusta* FT011 Gumeracha trial

Table 41: Provenance No., Species and Collection details, FT011 Gumeracha *G. robusta*

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Grevillea robusta</i>	259	17620	Mann River NSW
<i>Grevillea robusta</i>	260	17622	Boyd River NSW
<i>Grevillea robusta</i>	261	17623	Guy Fawkes NSW
<i>Grevillea robusta</i>	263	17953	Samford Qld
<i>Grevillea robusta</i>	264	17612	Nimbin NSW

Table 42: Predominant Height (m) and Total Stem Volume ( $m^3/ha$ ) comparison at 15/09/2006 (age 14), FT0011 Gumeracha *G. robusta*

Species	Provenance No.	PDH (m)	TSV ( $m^3/ha$ )
<i>Grevillea robusta</i>	259	10.1	62.3
<i>Grevillea robusta</i>	260	10.4	60.9
<i>Grevillea robusta</i>	261	10.6	44.1
<i>Grevillea robusta</i>	263	10.6	50.4
<i>Grevillea robusta</i>	264	10.5	60.4

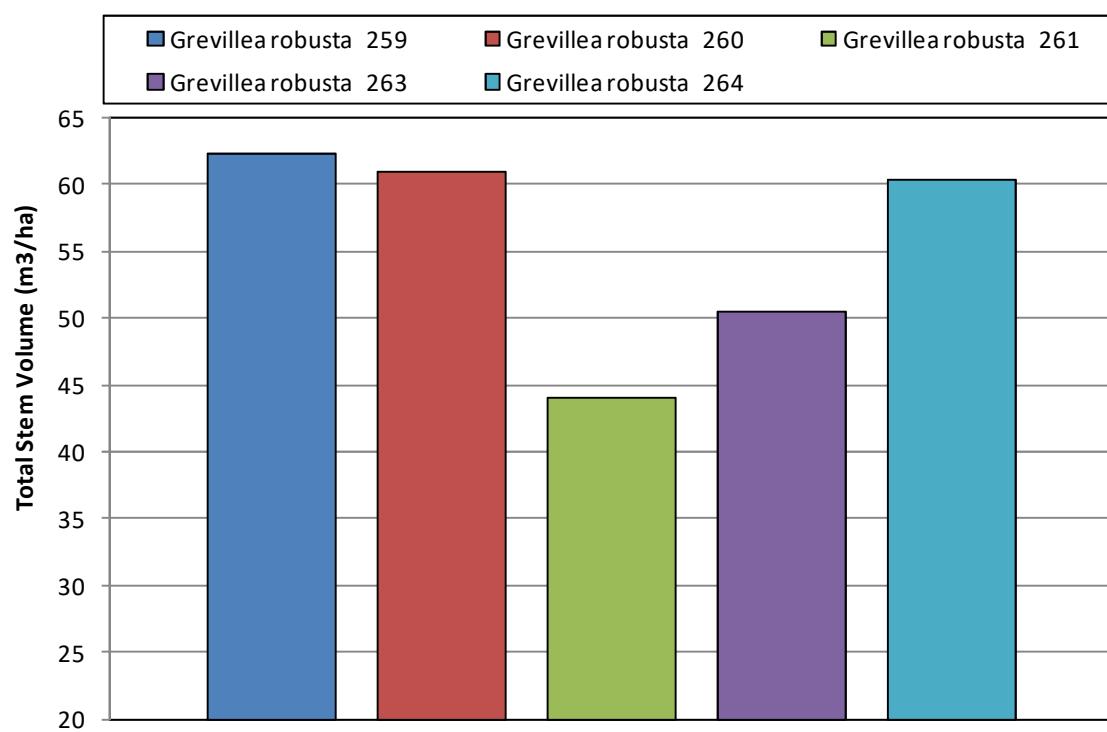


Figure 45: Seed source performance according to Total Stem Volume (m<sup>3</sup>/ha) (age 14), FT0011 Gumeracha *G. robusta*

### 5.3.2.6 Tasmanian Blue Gum, *Eucalyptus globulus*

Site type: Blue Gum site  
 Planted: The trial was planted on July 22 & 23 1992  
 Number of Plots: 27  
 Number of trees: 216  
 Spacing: 2.5m between trees, 2.5m between rows.  
 Plot size: Plots are of 8 trees each (two rows of four trees).

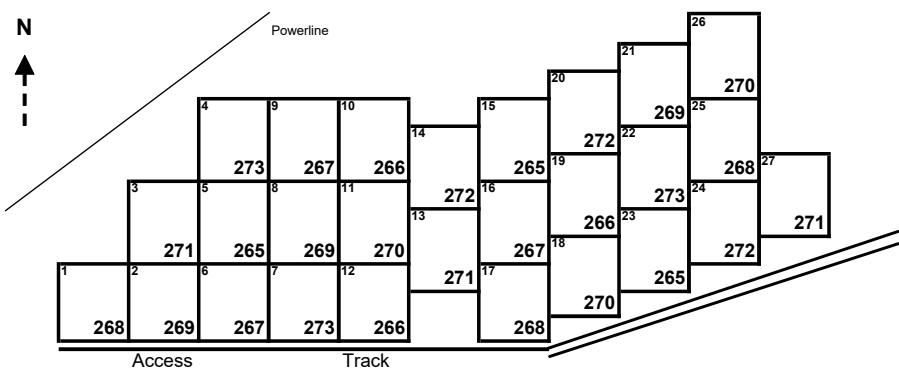


Figure 46: Overview of FT016 Gumeracha *E. globulus* trial

Table 43: Provenance No., Species and Collection details, FT016 Gumeracha *E. globulus*

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	265	16580	Huonville Tas.
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	266	16406	Lorne Vic
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	267	16471	Dover Tas.
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	268	18028	Lake Leake Tas.
<i>Eucalyptus globulus</i> ssp. <i>bicostata</i>	269	11742	Bruthen Vic
<i>Eucalyptus globulus</i> ssp. <i>bicostata</i>	270	13211	Rylstone NSW
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	271	13467	Police Point Tas.
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	272	12809	Denison Valley Tas.
<i>Eucalyptus globulus</i> ssp. <i>maidenii</i>	273	12321	Cann Valley Vic

Table 44: Predominant Height (m), Total Stem Volume (m<sup>3</sup>/ha) and Mean Annual Increment (m<sup>3</sup>/ha/yr) comparison at 15/10/2006 (age 14), FT0016 Gumeracha *E. globulus*

Species	Provenance No.	PDH (m)	TSV (m <sup>3</sup> /ha)	MAI (m <sup>3</sup> /ha/yr)
<i>Eucalyptus globulus</i> ssp. <i>bicostata</i>	269	22.3	366.3	26.2
<i>Eucalyptus globulus</i> ssp. <i>bicostata</i>	270	20.2	311.8	22.3
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	265	24.8	436.0	31.1
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	266	22.6	453.2	32.4
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	267	23.8	322.8	23.1
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	268	24.4	626.4	44.7
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	271	24.8	435.4	31.1
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	272	23.8	268.0	19.1
<i>Eucalyptus globulus</i> ssp. <i>maidenii</i>	273	21.4	381.5	27.2

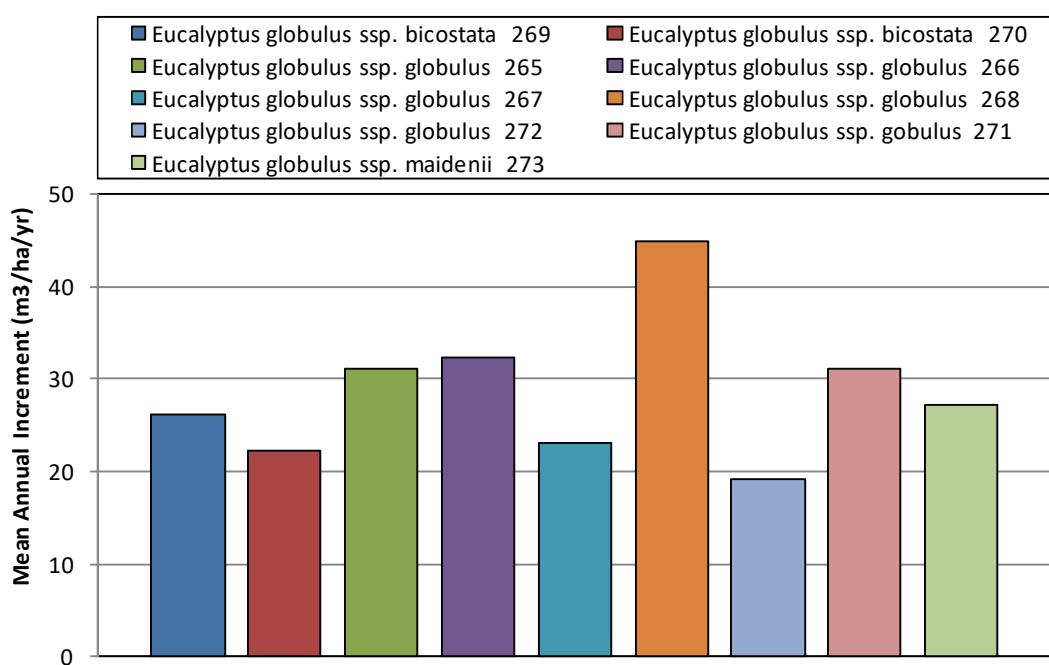


Figure 47: Seed source performance according to Mean Annual Increment (m<sup>3</sup>/ha/yr) (age 14), FT0016 Gumeracha *E. globulus*

### 5.3.2.7 Mixed Species, Blue Gum Site

Site type: Blue Gum site  
 Planting: The trial was planted on July 24 - 27 1992 by PIRSA  
 Number of Plots: 56  
 Number of trees: 448  
 Spacing: 2.5m between trees, 2.5m between rows.  
 Plot size: Plots are of 8 trees each (two rows of four trees).

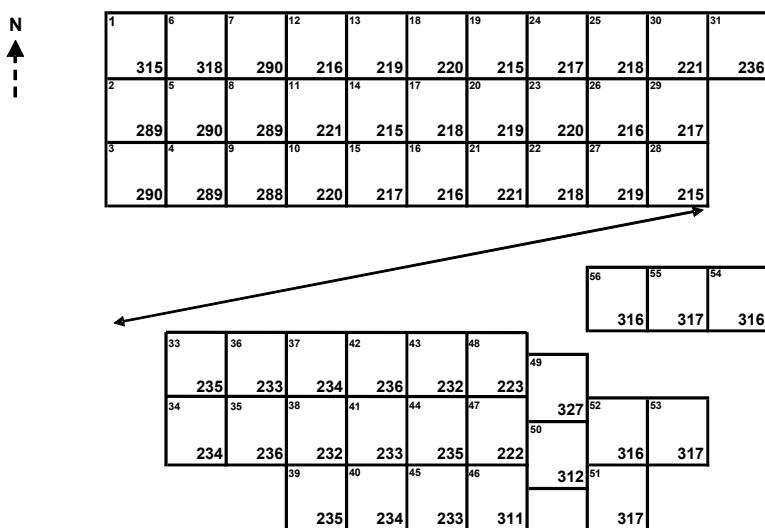


Figure 48: Overview of FT015 Mixed Species 2 Blue Gum Site Gumeracha trial

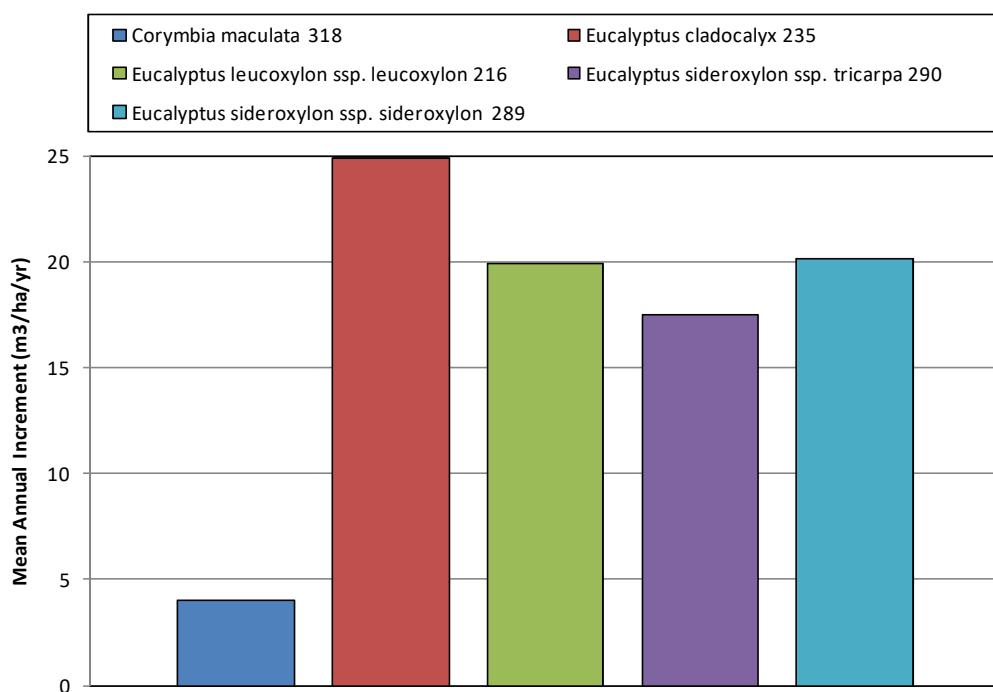
Table 45: Provenance No., Species and Collection details, FT015 Gumeracha Mixed Blue Gum

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	215	9608	Rushworth Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	13046	Kangaroo Island SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	16012	Wirrabara SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	218	16524	Digby Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	17012	Studley Park Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	221	17425	Merrimur Res. Vic
<i>Allocasuarina fraseriana</i>	222	17684	Norman Beach WA.
<i>Allocasuarina fraseriana</i>	223	13160	Darling Plateau WA.
<i>Eucalyptus cladocalyx</i>	232	15019	Wirrabara SA
<i>Eucalyptus cladocalyx</i>	233	15268	Wilmington SA
<i>Eucalyptus cladocalyx</i>	234	16018	Vanilla SA
<i>Eucalyptus cladocalyx</i>	235	16022	Flinders Chase Nat. Pk. KI SA
<i>Eucalyptus cladocalyx</i>	236	Thomas/Wood	Wirrabara F.R. SA
<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	288	14443	Gulgandra NSW
<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	289	15200	Wangaratta Vic
<i>Eucalyptus sideroxylon</i> ssp. <i>tricarpa</i>	290	13658	Bermagui NSW
<i>Allocasuarina torulosa</i>	311	10880	Woolgoolga NSW
<i>Allocasuarina luehmannii</i>	312	No details available	Murray Bridge NPS Seed Store
<i>Acacia salicina</i>	315	Pedlar	Near Yacca SA
<i>Melaleuca uncinata</i>	316	Lyn Dohle	Kangaroo Island SA
<i>Melaleuca uncinata</i>	317	Clive Bowman	Lameroo SA
<i>Corymbia maculata</i>	318	13602	Batemans Bay NSW
<i>Allocasuarina torulosa</i>	327	Royston Petrie Seeds	NE of Sydney NSW

**Table 46: Mixed species Predominant Height (m), Total Stem Volume (m<sup>3</sup>/ha) and Mean Annual Increment (m<sup>3</sup>/ha/yr) comparison at 15/10/2006 (age 14), FT0015 Gumeracha Mixed Blue Gum**

Species	Provenance No.	PDH (m)	TSV (m <sup>3</sup> /ha)	MAI m <sup>3</sup> /ha/yr
<i>Acacia salicina</i>	315	0.0	0.0	0.0
<i>Allocasuarina fraserana</i>	222	0.0	0.0	0.0
<i>Allocasuarina fraserana</i>	223	0.0	0.0	0.0
<i>Allocasuarina luehmannii</i>	312	0.0	0.0	0.0
<i>Allocasuarina torulosa</i>	311	0.0	0.0	0.0
<i>Allocasuarina torulosa</i>	327	0.0	0.0	0.0
<i>Corymbia maculata</i>	318	12.6	56.7	4.0
<i>Eucalyptus cladocalyx</i>	232	18.3	276.9	19.8
<i>Eucalyptus cladocalyx</i>	233	17.5	316.2	22.6
<i>Eucalyptus cladocalyx</i>	234	12.2	99.7	7.1
<i>Eucalyptus cladocalyx</i>	235	19.6	349.1	24.9
<i>Eucalyptus cladocalyx</i>	236	16.8	236.6	16.9
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	215	15.8	244.2	17.4
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	15.9	278.7	19.9
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	16.1	211.3	15.1
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	218	12.1	72.5	5.2
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	14.5	146.5	10.5
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	13.1	76.2	5.4
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	221	12.8	143.0	10.2
<i>Eucalyptus sideroxylon</i> ssp. <i>tricarpa</i>	290	14.4	244.9	17.5
<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	288	14.0	213.4	15.2
<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	289	15.4	282.3	20.2
<i>Melaleuca uncinata</i>	316	0.0	0.0	0.0
<i>Melaleuca uncinata</i>	317	0.0	0.0	0.0

**Note:** Figure 49 below shows best performing provenance according to MAI (m<sup>3</sup>/ha/yr). Provenances with a MAI below <1m<sup>3</sup>/ha/yr are not graphed. Provenances 222, 223, 311, 312, 315 and 327 all had poor survival, 316 and 317 have insufficient data recorded (no heights recorded due to trees being <3.0m).



**Figure 49: Best performing seed source according to MAI (m<sup>3</sup>/ha/yr) (age 14) for each dominant species, FT0015 Gumeracha Mixed Blue Gum**

## Future Management of Gumeracha Agroforestry Demonstration Area

Situated on both Red Gum and Blue gum sites these trials receive an average of 850mm of annual rainfall. These trials have been established according to the trial criteria. All trials have eight tree plots except for the *Grevillea robusta* trial which has twelve tree plots.

Surviving taxa and those recommended for future planting at the sites are trialled provenances of: *Acacia melanoxylon*, *Eucalyptus camaldulensis*, *Eucalyptus leucoxylon* ssp. *leucoxylon*, *Eucalyptus cladocalyx*, *Eucalyptus globulus* ssp *bicostata*, *Eucalyptus globulus* ssp *globulus*, *Eucalyptus globulus* ssp *maidenii*, *Eucalyptus sideroxylon* ssp *sideroxylon*, *Eucalyptus sideroxylon* ssp *tricarpa*, *Grevillea robusta*, *Corymbia maculata* and *Robinia pseudoacacia*.

Failed taxa and those species which are not recommended for future planting at this site are: *Melaleuca uncinata*, *Acacia salinica*, *Allocasuarina fraseriana*, *Allocasuarina huehmannii* and *Allocasuarina torulosa*.

**Recommendation:** Consider continued measurement program on all species listed above as recommended for these site types.

### 5.3.3 Lenswood

Location: The trial is located at the Lenswood Research Station, Lenswood  
 Site type: Tall stringybark <15m  
 Rainfall: Approximately 1040mm annually.  
 Site History: Apple orchards and woodlots. The trial was planted in July 1998.  
 Number of Plots: 42  
 Number of trees: 336  
 Spacing: 2.5m between trees, 2.5m between rows.  
 Plot design: Plots are 8 tree plots (2 rows x 4 trees).

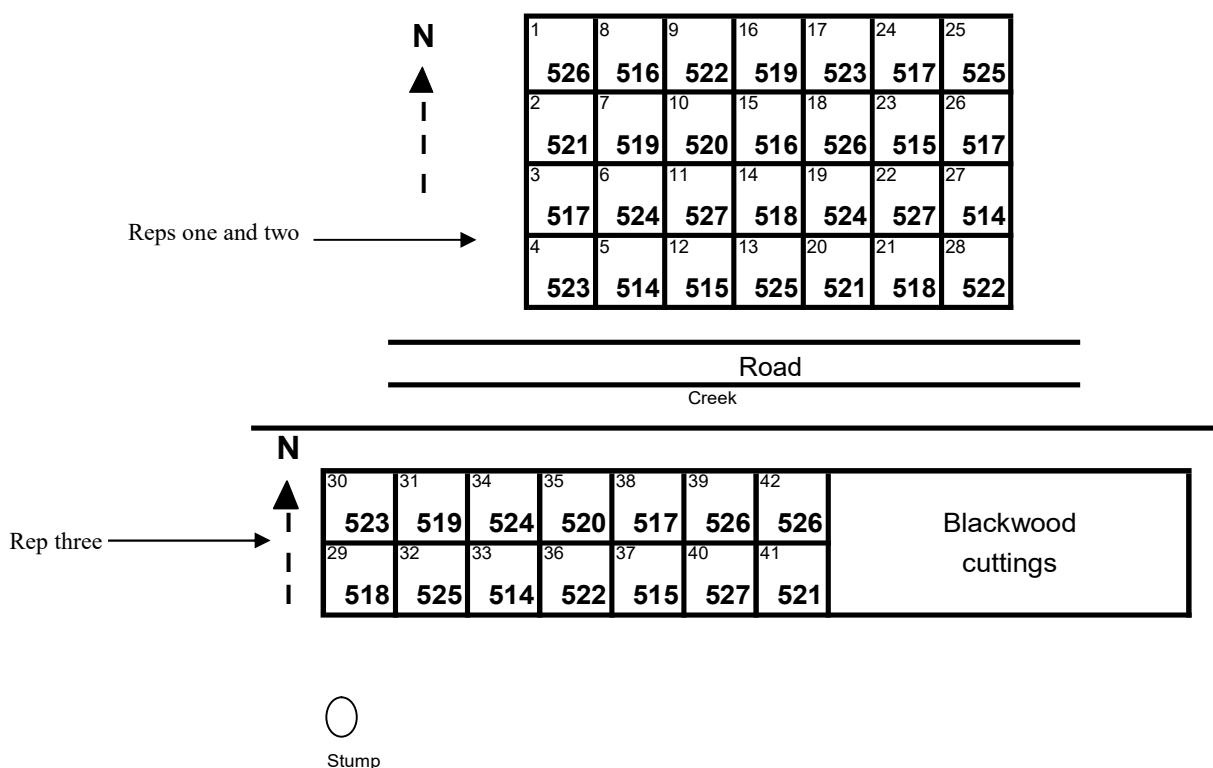


Figure 50: Overview of FT039 Lenswood trial

Table 47: Provenance No., Species and Collection details, FT039 Lenswood

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Acacia dealbata</i> ssp. <i>dealbata</i>	514	16271	Errinundra Plateau Vic
<i>Acacia dealbata</i> ssp. <i>dealbata</i>	515	16384	18.6km S Orford Tas
<i>Acacia dealbata</i> ssp. <i>dealbata</i>	516	18973	Kandos NSW
<i>Acacia decurrens</i>	517	15537	Picton NSW
<i>Acacia decurrens</i>	518	15484	Picton / Mittagong NSW
<i>Acacia decurrens</i>	519	19764	Tarago NSW
<i>Acacia filicifolia</i>	520	15841	19km SW of Singleton NSW
<i>Acacia filicifolia</i>	521	15859	7km W Kangaroo Valley NSW
<i>Acacia filicifolia</i>	522	17893	Yadboro Flat NSW
<i>Acacia mearnsii</i>	523	16625	6-7km W of Nelligen P NSW
<i>Acacia mearnsii</i>	524	17927	Tantanoola SA
<i>Acacia mearnsii</i>	525	18977	Mt. Gladstone NSW
<i>Acacia mearnsii</i>	526	18979	(R)B'Hill Res Kyneton Vic
<i>Acacia mearnsii</i>	527	Trees for Life	Wrattenbully SA

Table 48: Mixed species Predominant Height (m) and Total Stem Volume ( $m^3/ha$ ) comparison at 27/10/2003 (age 5), FT0039 Lenswood

Species	Provenance No.	PDH (m)	TSV ( $m^3/ha$ )
<i>Acacia dealbata</i> ssp. <i>dealbata</i>	514	10.2	35.8
<i>Acacia dealbata</i> ssp. <i>dealbata</i>	515	11.7	81.0
<i>Acacia dealbata</i> ssp. <i>dealbata</i>	516	9.6	22.2
<i>Acacia decurrens</i>	517	11.7	57.2
<i>Acacia decurrens</i>	518	11.6	39.2
<i>Acacia decurrens</i>	519	10.9	45.4
<i>Acacia filicifolia</i>	520	11.6	36.8
<i>Acacia filicifolia</i>	521	9.8	33.2
<i>Acacia filicifolia</i>	522	12.4	85.1
<i>Acacia mearnsii</i>	523	11.7	84.4
<i>Acacia mearnsii</i>	524	11.9	75.2
<i>Acacia mearnsii</i>	525	11.2	63.6
<i>Acacia mearnsii</i>	526	11.7	91.1
<i>Acacia mearnsii</i>	527	10.8	54.5

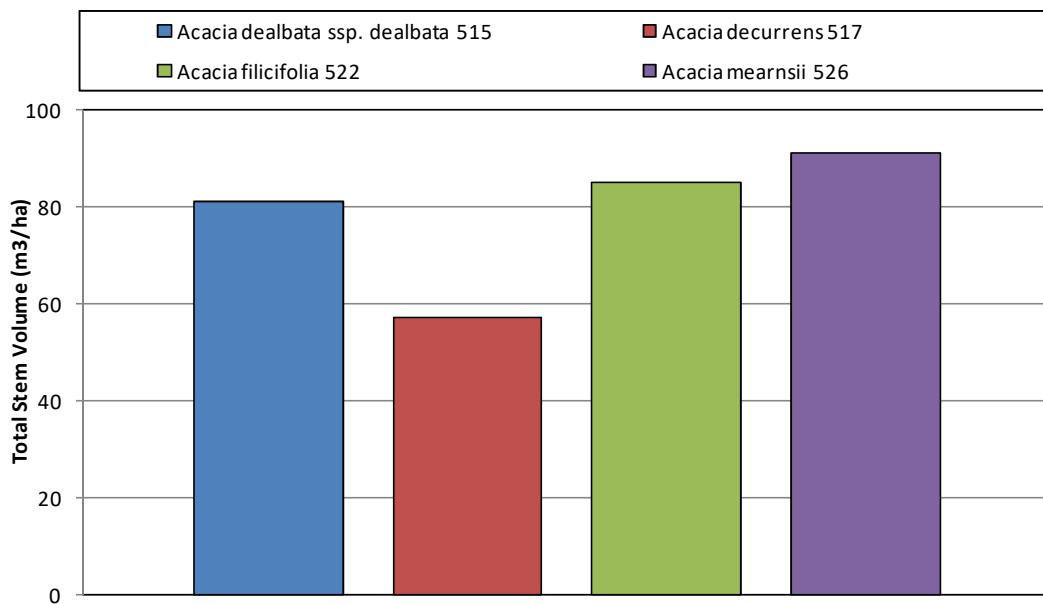


Figure 51: Best performing seed source according to Total Stem Volume ( $m^3/ha$ ) (age 5) for each dominant species, FT0039 Lenswood

## Future Management of Lenswood

This was one of the final trials to be established, this trial is adjacent to the apple orchard at Primary Industries SA Lenswood Research Centre. The purpose of this particular trial was to test the performance of fourteen *Acacia* taxa for woodlotting. At the time of the previous report this trial was only five years old and was already displaying exceptional growth and survival for all species trialled.

All *Acacia* taxa trialled at this site have shown strong results for volume production. All of these species are recommended for future planting use at this site type, but with an emphasis on product for woodlotting, *Acacia mearnsii* (all provenances) is the recommended species for this purpose as it is producing the highest yield for these taxa. *Acacia dealbata* ssp. *dealbata* (Kandos) was the poorest performing taxa at this site but has still produced good volume results and is to be recommended for future plantings on this site type.

**Recommendation:** Consider continued measurement program.

### 5.3.4 Montarra – Burgan's

Location: The trial is located near Hope Forest, between Meadows and Willunga.  
 Site type: Stringybark  
 Rainfall: Approximately 820mm annually.  
 Site History: Planting lines were ripped and sprayed to 1m width. The area was grazing land prior to planting. The trial was planted by PIRSA staff on September 3, 6 & 7 1993. The trial has been fenced to cattle fence standard.  
 Number of Plots: 70  
 Number of trees: 560  
 Spacing: 2.5m between trees, 2.5m between rows. There is 1 blank row between plots.  
 Plot size: Plots are of 8 trees each (two rows of four trees).

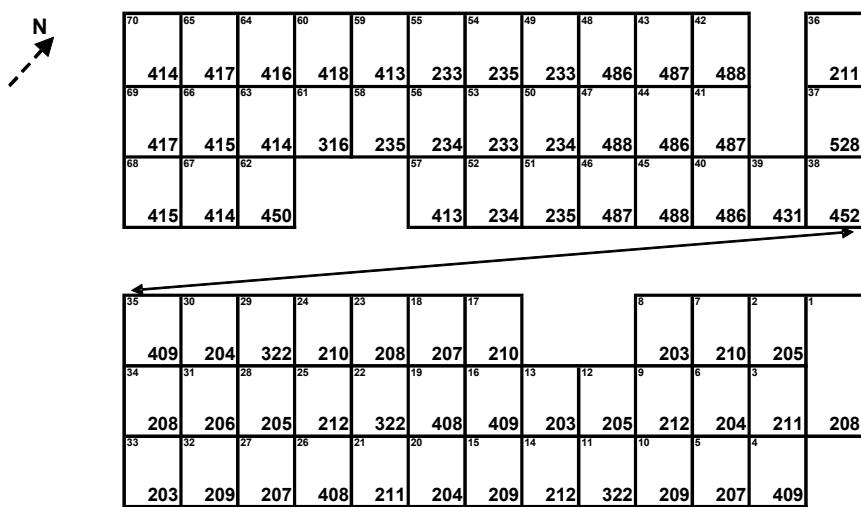


Figure 52: Overview of FT024 Montarra trial

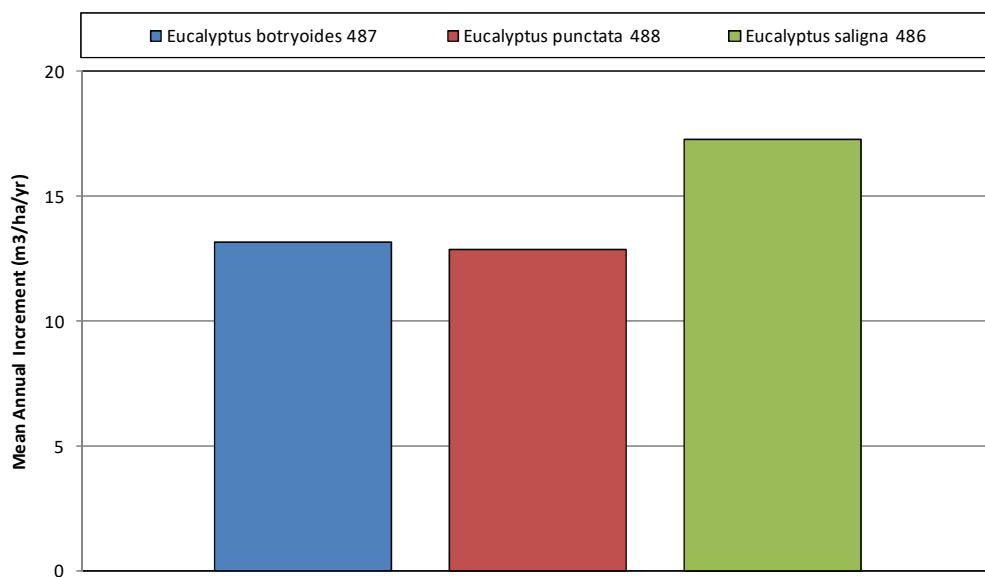
**Table 49: Provenance No., Species and Collection details, FT024 Montarra**

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Acacia melanoxylon</i>	203	13157	Smithton Tas.
<i>Acacia melanoxylon</i>	204	14428	Tallaganda SF NSW
<i>Acacia melanoxylon</i>	205	Tas For Comm	'Bush Run' Tas.
<i>Acacia melanoxylon</i>	206	15614	Silver Creek Vic.
<i>Acacia melanoxylon</i>	207	15535	Burnie Tas.
<i>Acacia melanoxylon</i>	208	15863	Blackwood Park Tas.
<i>Acacia melanoxylon</i>	209	16526	Mt Gambier SA
<i>Acacia melanoxylon</i>	210	16873	Yarrangobilly NSW
<i>Acacia melanoxylon</i>	211	17263	Mt. Mee Qld.
<i>Acacia melanoxylon</i>	212	17958	Sassafras NSW
<i>Eucalyptus cladocalyx</i>	233	15268	Wilmington SA
<i>Eucalyptus cladocalyx</i>	234	16018	Vanilla SA
<i>Eucalyptus cladocalyx</i>	235	16022	Flinders Chase Nat. Pk. KI SA
<i>Melaleuca uncinata</i>	316	Lyn Dohle	Kangaroo Island SA
<i>Acacia melanoxylon</i>	322	Tas. For.Comm.	Fingal Tas.
<i>Acacia melanoxylon</i>	408	Tas For Comm	Scottsdale TAS
<i>Acacia melanoxylon</i>	409	Trees For Life	Furner SA
<i>Eucalyptus cladocalyx</i>	413	Trees For Life	Kangaroo Island SA
<i>Eucalyptus fasciculosa</i>	414	Unknown	Keith/Brumbago Rd SA
<i>Eucalyptus fasciculosa</i>	415	Trees For Life	Kuitpo FR SA
<i>Eucalyptus fasciculosa</i>	416	Trees For Life	N of Lucindale SA
<i>Eucalyptus fasciculosa</i>	417	Blackwood Seeds	Meningie SA
<i>Robinia pseudoacacia</i>	418	F Ugody	#1 Nyirseg, Hungary
<i>Corymbia maculata</i>	431	13608	Orbost VIC
<i>Pawlonia tomentosa</i>	450	Cuttings	State Flora MB SA
<i>Eucalyptus globulus</i>	452	AE O'Connor	Otways VIC
<i>Eucalyptus saligna</i>	486	Unknown	Mt. Boss SF NSW
<i>Eucalyptus botryoides</i>	487	Unknown	Orbost Vic
<i>Eucalyptus punctata</i>	488	Unknown	N Raymond Terrace NSW
<i>Eucalyptus globulus</i>	528	Unknown	Pelverata Tas

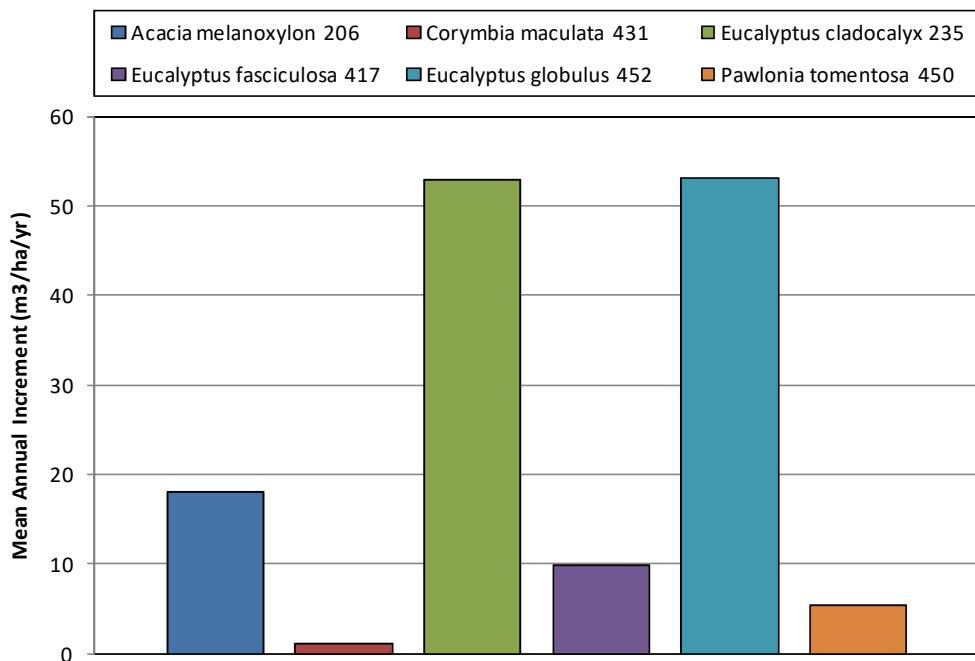
**Table 50: Mixed species Predominant Height (m), Total Stem Volume (m<sup>3</sup>/ha) and Mean Annual Increment (m<sup>3</sup>/ha/yr) comparison at 22/10/2003 (ages 8 & 10), FT024 Montarra**

Species	Provenance No.	Age	PDH (m)	TSV (m <sup>3</sup> /ha)	MAI (m <sup>3</sup> /ha/yr)
<i>Acacia melanoxylon</i>	203	10	9.0	79.6	8.0
<i>Acacia melanoxylon</i>	204	10	7.2	38.4	3.8
<i>Acacia melanoxylon</i>	205	10	8.4	62.0	6.2
<i>Acacia melanoxylon</i>	206	10	12.3	180.7	18.1
<i>Acacia melanoxylon</i>	207	10	8.1	61.8	6.2
<i>Acacia melanoxylon</i>	208	10	12.3	71.3	7.1
<i>Acacia melanoxylon</i>	209	10	9.2	83.7	8.4
<i>Acacia melanoxylon</i>	210	10	6.7	47.2	4.7
<i>Acacia melanoxylon</i>	211	10	9.1	62.1	6.2
<i>Acacia melanoxylon</i>	212	10	7.5	48.7	4.9
<i>Acacia melanoxylon</i>	322	10	9.6	85.9	8.6
<i>Acacia melanoxylon</i>	408	10	8.7	109.4	10.9
<i>Acacia melanoxylon</i>	409	10	8.6	66.8	6.7
<i>Corymbia maculata</i>	431	10	7.6	10.7	1.1
<i>Eucalyptus botryoides</i>	487	8	12.6	131.4	13.1
<i>Eucalyptus cladocalyx</i>	233	10	15.2	198.3	19.8
<i>Eucalyptus cladocalyx</i>	234	10	11.3	169.8	17.0
<i>Eucalyptus cladocalyx</i>	235	10	18.2	529.4	52.9
<i>Eucalyptus cladocalyx</i>	413	10	14.8	268.1	26.8
<i>Eucalyptus fasciculosa</i>	414	10	8.1	52.6	5.3
<i>Eucalyptus fasciculosa</i>	415	10	9.3	66.8	6.7
<i>Eucalyptus fasciculosa</i>	416	10	5.8	7.8	0.8
<i>Eucalyptus fasciculosa</i>	417	10	8.8	99.2	9.9
<i>Eucalyptus globulus</i>	528	10	9.5	16.4	1.6
<i>Eucalyptus globulus</i>	452	10	20.5	531.1	53.1
<i>Eucalyptus punctata</i>	488	8	12.0	128.7	12.9
<i>Eucalyptus saligna</i>	486	8	14.3	172.9	17.3
<i>Melaleuca uncinata</i>	316	10	2.5	0.0	0.0
<i>Pawlonia tomentosa</i>	450	10	8.3	54.7	5.5
<i>Robinia pseudoacacia</i>	418	10	3.6	0.2	0.0

**Note:** Figures 53 and 54 below show best performing provenance according to MAI (m<sup>3</sup>/ha/yr). Provenances with a MAI below <1m<sup>3</sup>/ha/yr are not graphed. Provenances 416 and 418 all had poor survival and 316 had insufficient data recorded (no heights recorded due to trees being <3.0m).



**Figure 53: Best performing seed source according to MAI (m<sup>3</sup>/ha/yr) (age 8) for each dominant species, FT0024 Montarra**



**Figure 54: Best performing seed source according to MAI (m<sup>3</sup>/ha/yr) (age 10) for each dominant species, FT0024 Montarra**

## Future Management of Montarra

Situated on acidic clay loam soils, this stringybark site receives an annual rainfall of approximately 820mm. This trial warrants future measurement as it meets the design criteria and has high species survival.

All *E. cladocalyx* provenances (Flinders Chase NP, Kangaroo Island, Wilmington and Vanilla) and *E. globulus* (Otway Ranges) dominated the measurement parameters in this trial displaying excellent MAI (m<sup>3</sup>/ha/yr) values and are recommended for future plantings. *A. melanoxylon* (Silver Creek and Scottsdale), *E. saligna* (Mt Boss SF), *E. botryoides* (Orbost) and *E. punctata* (N of Raymond Terrace) have also displayed good MAI (m<sup>3</sup>/ha/yr) results and are recommended for future plantings on this site.

*C. maculata* (Orbost), *E. fasciculosa* (N of Lucindale), *M. uncinata* (Kangaroo Island) and *R. pseudoacacia* (Nyirseg, Hungary) have shown poor volume growth or survival and are not recommended on this site type.

**Recommendation:** Consider continued measurement program.

## 5.4 RESULTS FOR THE SOUTH-EAST REGION

FT036	Coombe - Brookman's*	planted 1994	Last measured 1996
FT020	Kalangadoo - <i>A. melanoxylon</i>	planted 1993	Last measured 2003
FT033	Kalangadoo - Mixed Species^	planted 1993	Last measured 2003
FT021	Penola - Murray's^	planted 1993	Last measured 2003
FT022	Struan (failed)	planted 1992	Last measured 1994
FT037	Struan (replant)^	planted 1995	Last measured 2003
FT035	Willalooka - Jackson's	planted 1994	Last measured 2003
FT023	Woolumbool - Del Fabbro's	planted 1993	Last measured 2003

\* Ceased measurement in 1996

^ Ceased measurement in 2003

### 5.4.1 Coombe - Brookman's

Location:	The trial is located approximately eight kilometres north of Keith on the Keith - Tintinara Road.
Site type:	Deep Sand
Rainfall:	Approximately 470mm annually.
Site History:	The trial is planted on the top of a large sand dune previously direct sown. The direct seeding was unsuccessful and the site was offered for the trial. Planting lines were sprayed before planting.
Number of Plots:	18
Number of trees:	144
Spacing:	4m between trees, 4m between rows. Plots are separated by a blank row
Plot size:	Plots are of 8 trees each (two rows of four trees).

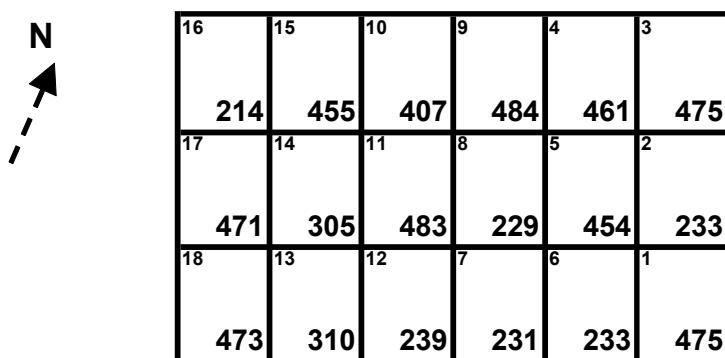


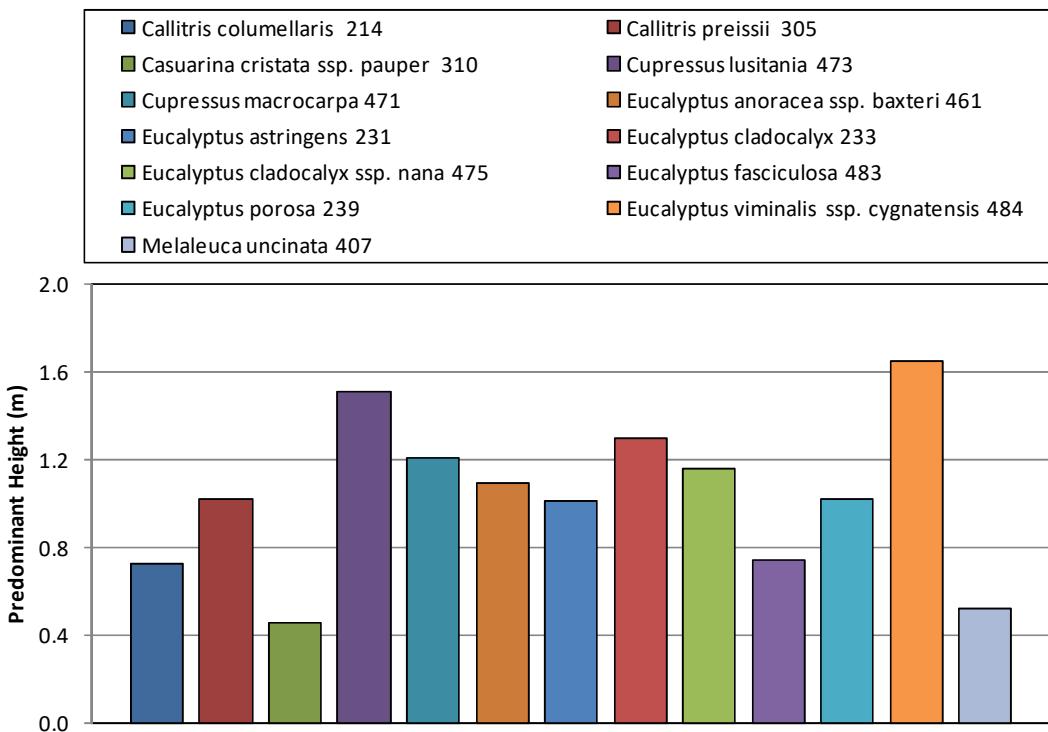
Figure 55: Overview of FT036, Coombe - Brookman's trial.

**Table 51: Provenance No., Species and Collection details, FDT036 Coombe - Brookman's**

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Callitris columellaris</i>	214	Blackwood Seeds	Mambray Creek SA
<i>Eucalyptus astringens</i>	229	17670	Boyagin Rock WA
<i>Eucalyptus astringens</i>	231	17686	Kundip WA
<i>Eucalyptus cladocalyx</i>	233	15268	Wilmington SA
<i>Eucalyptus porosa</i>	239	Fairlamb	Tailem Bend F.R. SA
<i>Callitris preissii</i>	305	Dunsford	Red Hill SA
<i>Casuarina pauper</i> ssp. <i>cristata</i>	310	Blackwood Seeds	Flinders Range SA
<i>Melaleuca uncinata</i>	407	Greening Australia	Murray Bridge SA
<i>Eucalyptus cladocalyx</i>	454	N. Smith	Cleve SA
<i>Callitris preissii</i>	455	P Kerley	Peebinga SA
<i>Eucalyptus anoracea</i> ssp. <i>baxteri</i>	461	Quarry Industries	Adelaide Hills SA
<i>Cupressus macrocarpa</i>	471	Proseed	Longwoods S.S NZ
<i>Cupressus lusitania</i>	473	Proseed	Lismore Seed Stand NZ
<i>Eucalyptus cladocalyx</i> ssp. <i>nana</i>	475	Blackwood Seeds	Murray Bridge - Tailem Bend Rd SA
<i>Eucalyptus fasciculosa</i>	483	Jackson	Reed Paddock Willalooka SA
<i>Eucalyptus viminalis</i> ssp. <i>cygnatensis</i>	484	Jackson	Kyara Willalooka SA

**Table 52: Mixed species Predominant Height (m) comparison at 9/12/1996 (age 2.5), FT036 Coombe Bookman's.**

Species	Provenance No.	PDH (m)
<i>Callitris columellaris</i>	214	0.7
<i>Callitris preissii</i>	305	1.0
<i>Callitris preissii</i>	455	0.8
<i>Casuarina cristata</i> ssp. <i>pauper</i>	310	0.5
<i>Cupressus lusitania</i>	473	1.5
<i>Cupressus macrocarpa</i>	471	1.2
<i>Eucalyptus anoracea</i> ssp. <i>baxteri</i>	461	1.1
<i>Eucalyptus astringens</i>	229	0.8
<i>Eucalyptus astringens</i>	231	1.0
<i>Eucalyptus cladocalyx</i>	233	1.3
<i>Eucalyptus cladocalyx</i>	454	1.0
<i>Eucalyptus cladocalyx</i> ssp. <i>nana</i>	475	1.2
<i>Eucalyptus fasciculosa</i>	483	0.7
<i>Eucalyptus porosa</i>	239	1.0
<i>Eucalyptus viminalis</i> ssp. <i>cygnatensis</i>	484	1.7
<i>Melaleuca uncinata</i>	407	0.5



**Figure 56: Best performing seed source according to Predominant Height (m) (age 2.5) for each dominant species, FT036 Coombe – Brookman's.**

## Future Management of Coombe – Brookman's

This small trial was planted on the crest of a sand-dune just north of Keith on a site previously directly seeded with native vegetation with little success (annual rainfall 400-500mm). This trial does not meet the design criteria, failing to provide sufficient replication amongst its key species. No quantifiable results can be extracted from this site.

Data gathered from this trial at age 2.5 shows *E. viminalis* (Kyara Willalooka) as the better performing provenance, closely followed by *C. lusitanica* (Lismore Seed Stand) and *E. cladocalyx* (Wilmington).

*C. columellaris* (Mambray Creek), *C. preissii* (Peebinga), *C. cristata* ssp. *pauper* (Flinders Ranges), *E. astringens* (Boyagin Rock), *E. fasciculosa* (Reed Paddock Willalooka) and *M. uncinata* (Murray Bridge) were among the poorer performing provenances. However, due to only height values being calculated at this trial, these species were the lesser performers due to the nature of their growth.

**Recommendation:** Final measure of this trial was in 1996. All operations have since ceased due to lack of suitable species replication.

## 5.4.2 Kalangadoo - Hunt's

Location:

The trial is located approximately five kilometres northwest of Kalangadoo on Tri-Hi Road. Due to the numbers of plants and requirements of the landowner, the trial was split into two separate blocks, the Blackwoods being planted apart from the main trial in a nearby paddock.

Site type:

Both parts of the trial are on Red Gum Site types.

Rainfall:

Approximately 760mm annually.

Site History:

This site was pasture prior to trial establishment. Planting rows were mounded and sprayed with Roundup at a rate of 1.5L/ha before planting. The trial was planted by PIRSA with much help from the land owner and the Kalangadoo Primary School on June 23 1993. A follow-up spray of Roundup and Synatrol oil at a rate of 4L/ha and 2L/ha respectively to control vigorous dock growth was applied prior to measurement. Some hare damage was noticed soon after planting mainly to the Blackwoods. Control has been effected by shooting.

Number of Plots:

(A) Main trial= 97

(B) Blackwood trial= 39

There were seven additional plots in the main trial which were not measured. These plots are adjacent to or under the canopy of existing trees growing in the neighbour's property

Number of trees:

(A) Main trial= 776

(B) Blackwood trial= 312

Total= 1088

Spacing:

(A) Main trial- 2.5m between trees, 2.5m between rows, plots are 2.5m apart

(B) Blackwood trial- 2.5m between trees, 2.5m between rows, plots are 4m apart across the rows, 2.5m along the rows

Plot size:

All plots are of 8 trees each (two rows of four trees).

### Main Trial

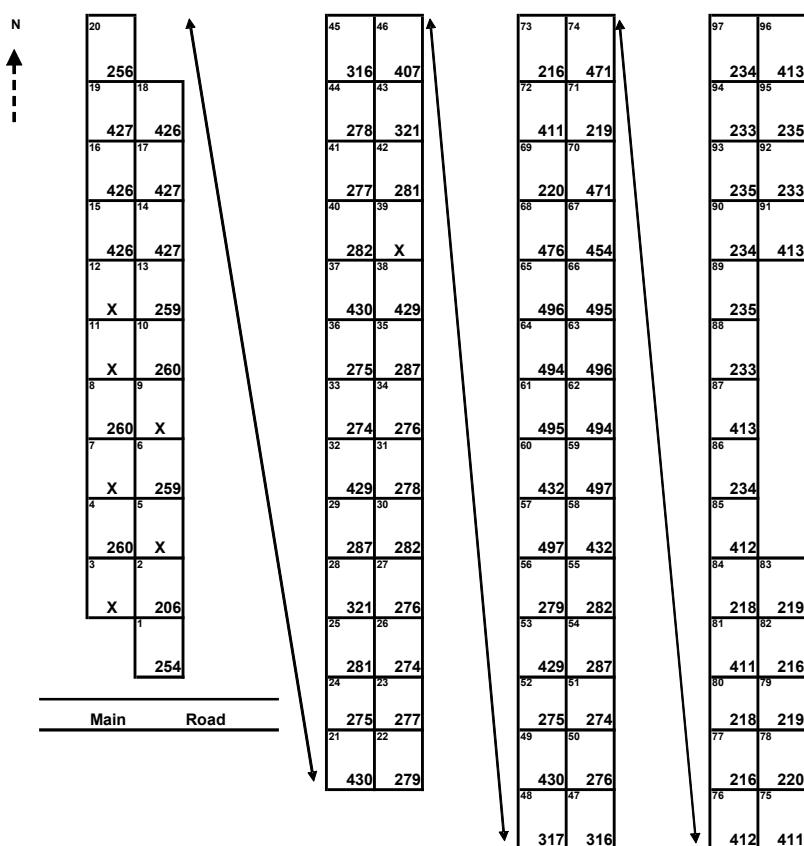


Figure 57: Overview of FT033 Kalangadoo Mixed Species trial

Table 53: Provenance No., Species and Collection details, FT033 Kalangadoo Mixed Species

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Acacia melanoxylon</i>	206	15614	Silver Creek Vic.
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	13046	Kangaroo Island SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	218	16524	Digby Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	17012	Studley Park Vic
<i>Eucalyptus cladocalyx</i>	233	15268	Wilmington SA
<i>Eucalyptus cladocalyx</i>	234	16018	Vanilla SA
<i>Eucalyptus cladocalyx</i>	235	16022	Flinders Chase Nat. Pk. KI SA
<i>Casuarina glauca</i>	254	16363	Hawkesbury River NSW
<i>Casuarina glauca</i>	256	13128	Singleton NSW
<i>Eucalyptus camaldulensis</i>	274	13197	Pt Augusta SA
<i>Eucalyptus camaldulensis</i>	275	15022	Wimmera River Vic.
<i>Eucalyptus camaldulensis</i>	276	15799	Lake Indoona WA
<i>Eucalyptus camaldulensis</i>	277	18105	Petford Qld
<i>Eucalyptus camaldulensis</i>	278	15272	Silverton NSW
<i>Eucalyptus camaldulensis</i>	279	Blackwood Seeds	Murray Bridge SA
<i>Eucalyptus camaldulensis</i>	281	Nick Hunt	Kalangadoo SA
<i>Eucalyptus camaldulensis</i>	282	15029	Lake Albacutya N Vic
<i>Eucalyptus camaldulensis</i>	287	15037	Lowan Valley - Saline Vic
<i>Melaleuca uncinata</i>	316	Lyn Dohle	Kangaroo Island SA
<i>Melaleuca uncinata</i>	317	Clive Bowman	Lameroo SA
<i>Eucalyptus camaldulensis</i> ssp. <i>obtusa</i>	321	Dowling	'Callana' Flinders Range SA
<i>Melaleuca uncinata</i>	407	Greening Australia	Murray Bridge SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	411	Greening Australia	Monarto Sth SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	412	Trees For Life	Anstey Hill SA
<i>Eucalyptus cladocalyx</i>	413	Trees For Life	Kangaroo Island SA
<i>Casuarina cunninghamiana</i>	426	13127	Hunter River NSW
<i>Casuarina cunninghamiana</i>	427	14919	Uriarra Crossing NSW
<i>Eucalyptus camaldulensis</i>	429	Trees for Life	Laura SA
<i>Eucalyptus camaldulensis</i>	430	M. Gunn	Cherrypool Vic
<i>Eucalyptus ovata</i>	432	Blackwood Seeds	Yundi SA
<i>Eucalyptus cladocalyx</i>	454	Neil Smith	Cleve SA
<i>Cupressus macrocarpa</i>	471	Proseed	Lismore Seed Stand NZ
<i>Eucalyptus tereticornis</i>	476	13302	Lochsport Vic
<i>Eucalyptus botryoides</i>	494	12134	Termeil SF NSW
<i>Eucalyptus saligna</i>	495	13015	Relligen NSW
<i>Eucalyptus grandis</i>	496	13020	Coffs Harbour NSW
<i>Eucalyptus camaldulensis</i>	497	T. Dunsford	Crystal Brook SA

**Table 54: Mixed Species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) and Mean Annual Increment (m<sup>3</sup>/ha/yr) comparison at 26/11/2003 (age 7, 9 & 10), FT033 Kalangadoo Mixed Species**

Species	Provenance No.	Age	PDH (m)	TSV (m <sup>3</sup> /ha)	MAI (m <sup>3</sup> /ha/yr)
<i>Acacia melanoxylon</i>	206	7	6.4	19.3	2.6
<i>Casuarina cunninghamiana</i>	426	10	8.0	44.6	4.3
<i>Casuarina cunninghamiana</i>	427	10	8.4	40.2	3.9
<i>Casuarina glauca</i>	254	10	8.2	44.5	4.3
<i>Casuarina glauca</i>	256	10	8.7	52.3	5.0
<i>Cupressus macrocarpa</i>	471	9	8.5	46.8	5.0
<i>Eucalyptus botryoides</i>	494	7	11.1	121.0	16.3
<i>Eucalyptus camaldulensis</i>	274	10	3.6	6.3	0.6
<i>Eucalyptus camaldulensis</i>	275	10	8.3	100.6	9.7
<i>Eucalyptus camaldulensis</i>	276	10	4.9	8.2	0.8
<i>Eucalyptus camaldulensis</i>	277	10	3.7	2.6	0.2
<i>Eucalyptus camaldulensis</i>	278	10	6.9	40.5	3.9
<i>Eucalyptus camaldulensis</i>	279	10	8.2	58.9	5.7
<i>Eucalyptus camaldulensis</i>	281	10	7.7	99.8	9.6
<i>Eucalyptus camaldulensis</i>	282	10	7.5	62.0	6.0
<i>Eucalyptus camaldulensis</i>	287	10	8.1	65.8	6.3
<i>Eucalyptus camaldulensis</i>	429	10	6.6	42.8	4.1
<i>Eucalyptus camaldulensis</i>	430	10	8.5	95.0	9.1
<i>Eucalyptus camaldulensis</i>	497	7	5.7	9.0	1.2
<i>Eucalyptus camaldulensis</i> ssp. <i>obtusa</i>	321	10	0.0	0.0	0.0
<i>Eucalyptus cladocalyx</i>	233	10	14.2	123.5	11.9
<i>Eucalyptus cladocalyx</i>	234	10	10.5	102.1	9.8
<i>Eucalyptus cladocalyx</i>	235	10	14.9	325.9	31.3
<i>Eucalyptus cladocalyx</i>	413	10	15.4	337.3	32.4
<i>Eucalyptus cladocalyx</i>	454	9	6.4	53.0	5.7
<i>Eucalyptus grandis</i>	496	7	9.3	60.1	8.1
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	10	13.4	344.4	33.1
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	218	10	10.1	66.6	6.4
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	10	11.6	115.6	11.1
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	10	9.3	75.3	7.2
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	411	10	9.3	51.7	5.0
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	412	10	11.6	163.4	15.7
<i>Eucalyptus ovata</i>	432	7	8.1	51.1	6.9
<i>Eucalyptus saligna</i>	495	7	10.1	72.1	9.7
<i>Eucalyptus tereticornis</i>	476	9	6.6	20.1	2.2
<i>Melaleuca uncinata</i>	316	10	2.1	0.0	0.0
<i>Melaleuca uncinata</i>	317	10	1.7	0.0	0.0
<i>Melaleuca uncinata</i>	407	10	1.6	0.0	0.0

**Note:** Figures 58 - 60 below show best performing provenance according to MAI (m<sup>3</sup>/ha/yr) graphed by age. Provenances with a MAI <1m<sup>3</sup>/ha/yr are not graphed. Provenances 316, 317, 321 and 407 all have poor survival, plots 6-13 & 39 within this trial were replanted by the land owner in 1993 (presumably), and last measured in 1995 where they have since not survived. There is insufficient data recorded for these plots (no provenance numbers).

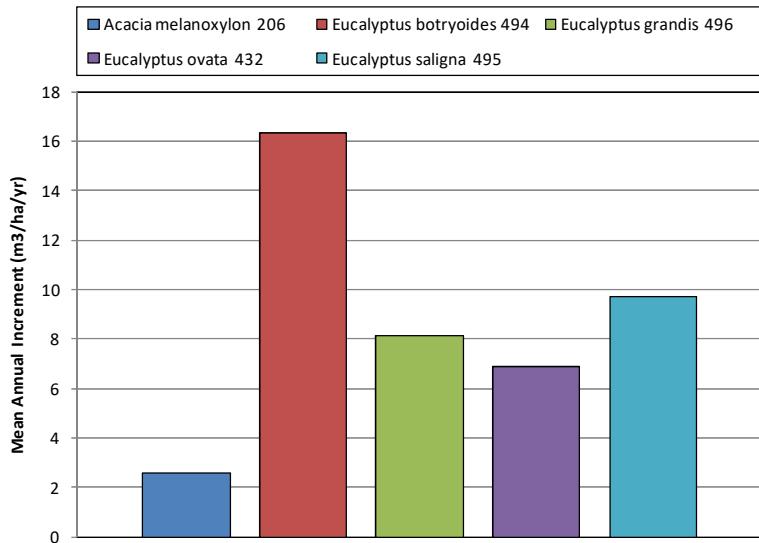


Figure 58: Best performing seed source according to MAI ( $m^3/ha/yr$ ) (age 7) for each dominant species, FT033 Kalangadoo Mixed Species

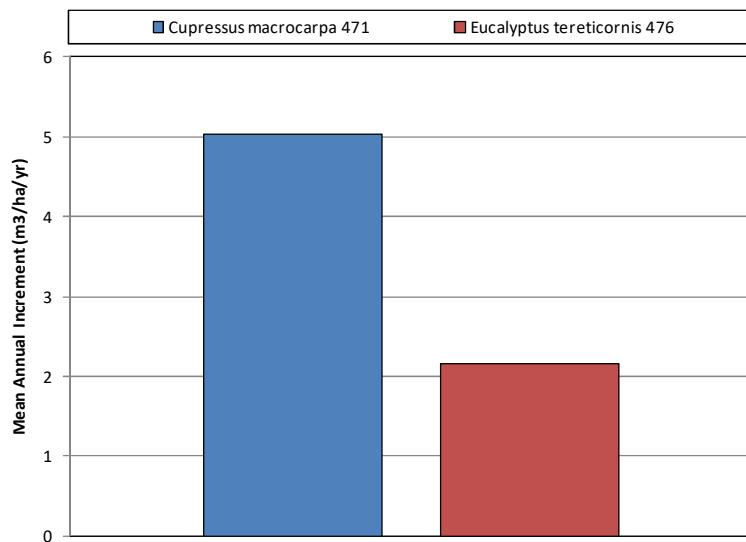


Figure 59: Best performing seed source according to MAI ( $m^3/ha/yr$ ) (age 9) for each dominant species, FT033 Kalangadoo Mixed Species

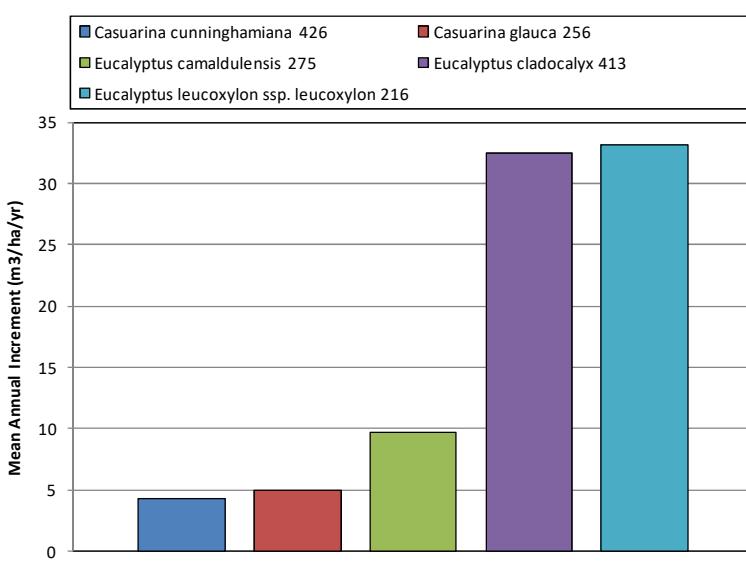


Figure 60: Best performing seed source according to MAI ( $m^3/ha/yr$ ) (age 10) for each dominant species, FT033 Kalangadoo Mixed Species

## Future Management of Kalangadoo – Hunt’s Mixed species trial

Insufficient replication of key species in this trial results in this trial not being recommended for future measurement programs. An assessment from the most recent measurement shows *E. leucoxylon* ssp. *leucoxylon* and *E. cladocalyx* provenances collected from Kangaroo Island as the most productive provenances (age 10). Species of *E. cladocalyx* (Flinders Chase NP) and *E. leucoxylon* ssp. *leucoxylon* (Anstey Hill) displayed good height and volume results (age 10). Strong results displayed from *E. botryoides* (Termeil SF) proved promising value at this site type (age 7). All species/provenances mention above are recommended for future plantings at this site type.

*A. melanoxylon* (Silver Creek), *E. camaldulensis* (Crystal Brook, Pt Augusta, Lake Indoona and Petford), *E. camaldulensis* ssp. *obtusa* ('Callana' Flinders Range), *M. uncinata* (Kangaroo Island, Lameroo and Murray Bridge), and have displayed poor survival and are not recommended on this site type.

*C. cunninghamiana* (Hunter River and Uriarra Crossing) and *C. glauca* (Hawkesbury River and Singleton), *C. macrocarpa* (Lismore Seed Stand), *E. grandis* (Coffs Harbour), *E. tereticornis* (Loch Sport), *E. ovata* (Yundi) and *E. saligna* (Relligen) all show promising PDH (m) and MAI ( $m^3/ha/yr$ ) results.

**Recommendation:** Final measure of this trial was in 2003. All operations have since ceased due to lack of suitable species replication.

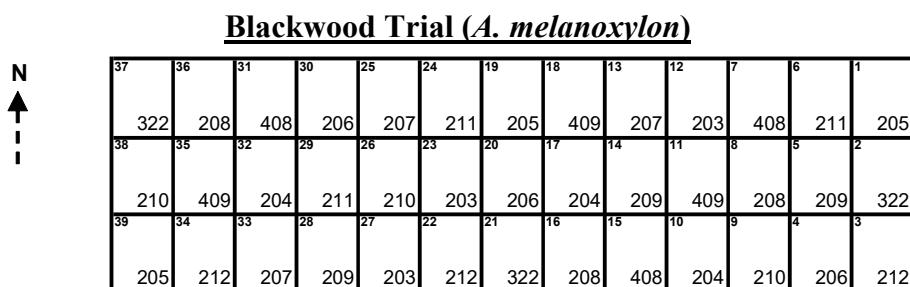


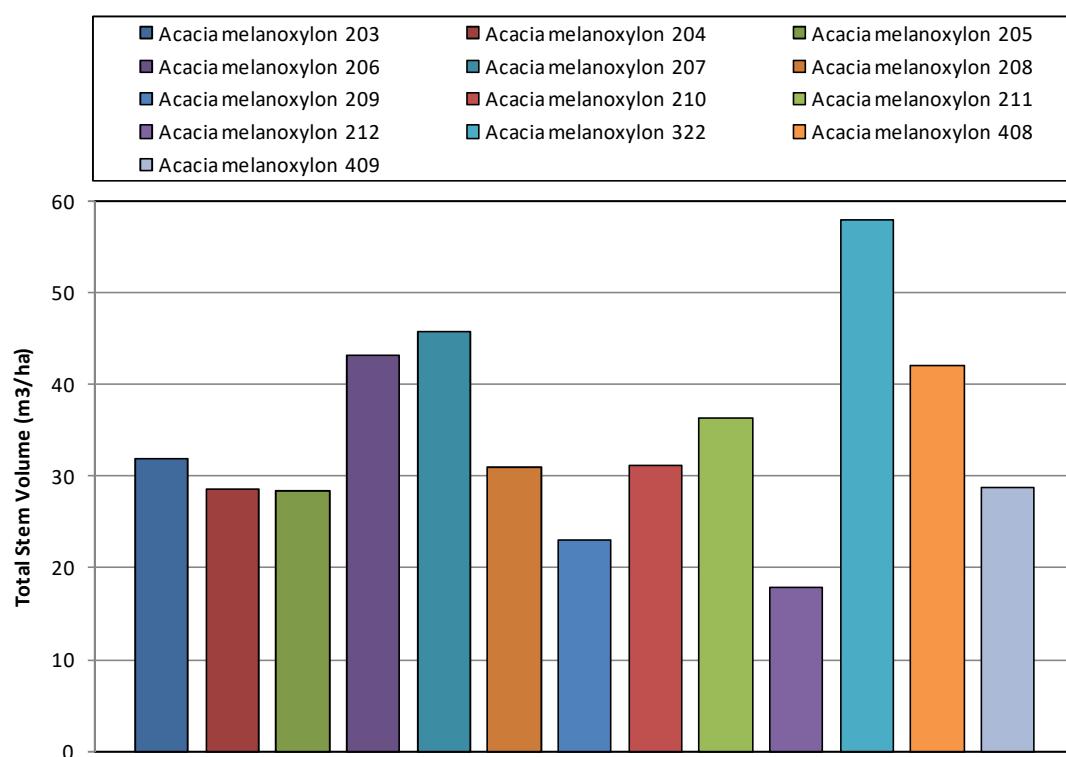
Figure 61: Overview of FT020 Kalangadoo *A. melanoxylon* trial

Table 55: Provenance No., Species and Collection details, FT020 Kalangadoo *A. melanoxylon*

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Acacia melanoxylon</i>	203	13157	Smithton Tas.
<i>Acacia melanoxylon</i>	204	14428	Tallaganda SF NSW
<i>Acacia melanoxylon</i>	205	Tas For Comm	'Bush Run' Tas.
<i>Acacia melanoxylon</i>	206	15614	Silver Creek Vic.
<i>Acacia melanoxylon</i>	207	15535	Burnie Tas.
<i>Acacia melanoxylon</i>	208	15863	Blackwood Park Tas.
<i>Acacia melanoxylon</i>	209	16526	Mt Gambier SA
<i>Acacia melanoxylon</i>	210	16873	Yarrangobilly NSW
<i>Acacia melanoxylon</i>	211	17263	Mt. Mee Qld.
<i>Acacia melanoxylon</i>	212	17958	Sassafras NSW
<i>Acacia melanoxylon</i>	322	Tas. For. Comm.	Fingal Tas.
<i>Acacia melanoxylon</i>	408	Tas For Comm	Scottsdale TAS
<i>Acacia melanoxylon</i>	409	Trees for Life	Furner SA

**Table 56: Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 3/11/2003 (age 10), FT020 Kalangadoo *A. melanoxylon***

Species	Provenance No.	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Acacia melanoxylon</i>	203	8.3	31.8
<i>Acacia melanoxylon</i>	204	7.1	28.6
<i>Acacia melanoxylon</i>	205	5.5	28.4
<i>Acacia melanoxylon</i>	206	8.5	43.2
<i>Acacia melanoxylon</i>	207	7.0	45.8
<i>Acacia melanoxylon</i>	208	8.4	31.1
<i>Acacia melanoxylon</i>	209	7.8	23.1
<i>Acacia melanoxylon</i>	210	5.9	31.1
<i>Acacia melanoxylon</i>	211	7.4	36.3
<i>Acacia melanoxylon</i>	212	5.8	17.9
<i>Acacia melanoxylon</i>	322	9.2	57.9
<i>Acacia melanoxylon</i>	408	8.4	42.0
<i>Acacia melanoxylon</i>	409	7.9	28.7



**Figure 62: Seed source performance according to Total Stem Volume (m<sup>3</sup>/ha) (age 10), FT020 Kalangadoo *A. melanoxylon*.**

### Future Management of Kalangadoo – Hunt’s - Blackwood (*A. melanoxylon*) provenance trial

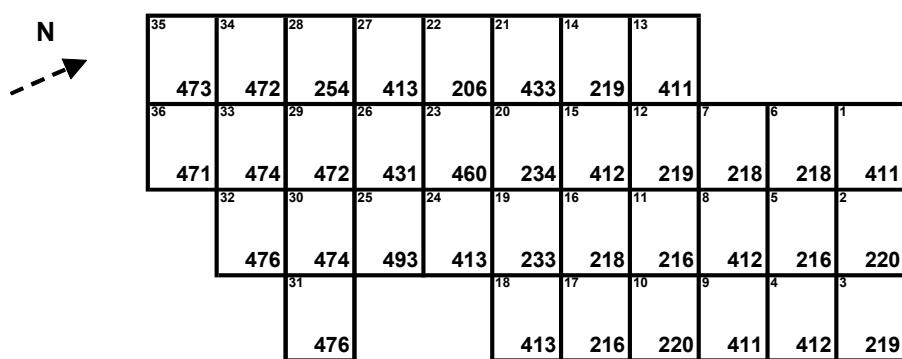
These trials are planted on a Red Gum site which receives approximately 760mm of annual rainfall. Two trials were established at this locality one a Blackwood (*Acacia melanoxylon*) trial and the other a mixed species trial.

All provenances of *A. melanoxylon* performed well at this site type, particularly provenances from Fingal, Burnie, Silver Creek and Scottsdale. Some of the lesser performing provenances were sourced from Sassafras and Mt Gambier but would still be suitable for future application at this site type.

**Recommendation:** All of the above provenances are suitable for this site. Consider continuing with the current measurement program.

### 5.4.3 Penola – Murray's

Location: Near Coonawarra, North and West of Penola.  
 Site type: Stringybark  
 Rainfall: Approximately 650mm annually.  
 Site History: Prior to planting the trial site was pasture with bracken. The area was fenced and the trees planted into a weed free chipped area 50cm x 50cm. The weeds in between the trees were sprayed after planting with Roundup and Pulse at 5L/ha and 200ml/ha respectively. The trial was planted by PIRSA staff on July 20 1993  
 Number of Plots: 36  
 Number of trees: 288  
 Spacing: 2.5m between trees, 2.5m between rows. Plots are 4m apart along the rows and 5m apart across the rows  
 Plot size: Plots are of 8 trees each (two rows of four trees).



Plots 1-32 planted July 1993

Plots 29-32 replanted + plots 33-36 established in July 1994

Plots 21-23, 25 & 28 replanted July 1996

Figure 63: Overview of FT021 Penola – Murray's trial

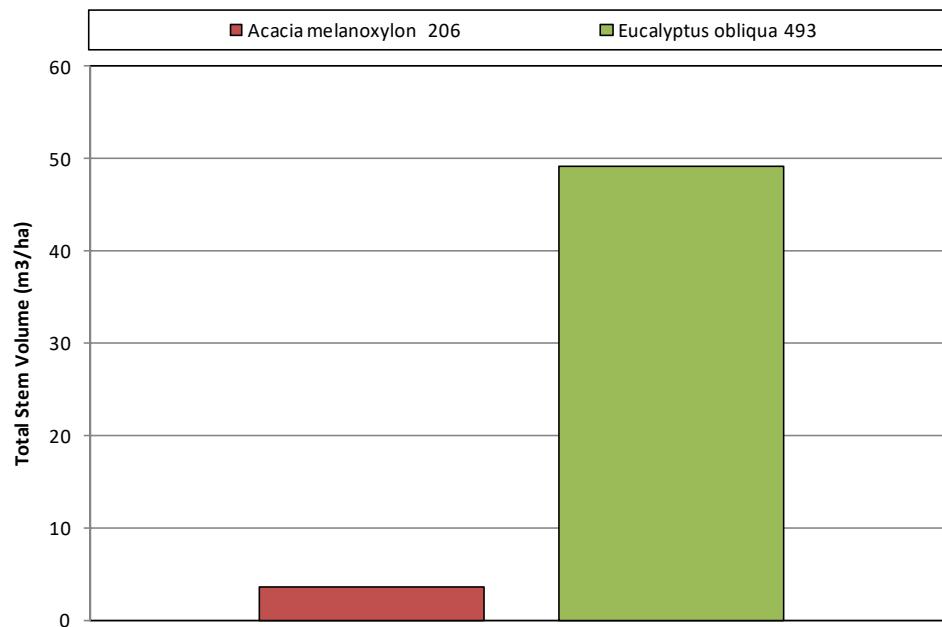
Table 57: Provenance No., Species and Collection details, FT021 Penola – Murray's

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Acacia melanoxylon</i>	206	15614	Silver Creek Vic.
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	13046	Kangaroo Island SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	218	16524	Digby Vic
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	17012	Studley Park Vic
<i>Eucalyptus cladocalyx</i>	233	15268	Wilmington SA
<i>Eucalyptus cladocalyx</i>	234	16018	Wanilla SA
<i>Casuarina glauca</i>	254	16363	Hawkesbury River NSW
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	411	Greening Australia	Monarto Sth SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	412	Trees For Life	Anstey Hill SA
<i>Eucalyptus cladocalyx</i>	413	Trees For Life	Kangaroo Island SA
<i>Corymbia maculata</i>	431	13608	Orbost VIC
<i>Corymbia maculata</i>	433	15361	Batemans Bay NSW
<i>Eucalyptus largiflorens</i>	460	16528	Renmark SA
<i>Cupressus macrocarpa</i>	471	Proseed	Lismore Seed Stand NZ
<i>Eucalyptus tereticornis</i>	472	17768	Yurrammie SF NSW
<i>Cupressus lusitanica</i>	473	Proseed	Lismore Seed Stand NZ
<i>Eucalyptus tereticornis</i>	474	13311	Oakdale NSW
<i>Eucalyptus tereticornis</i>	476	13302	Lochsport Vic
<i>Eucalyptus obliqua</i>	493	13156	Smithton Tas

**Table 58: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 25/11/2003 (ages 7, 9 & 10), FT021 Penola - Murray's**

Species	Provenance No.	Age	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Acacia melanoxylon</i>	206	7	5.9	3.6
<i>Casuarina glauca</i>	254	7	0.0	0.0
<i>Corymbia maculata</i>	431	10	11.8	87.7
<i>Corymbia maculata</i>	433	7	0.0	0.0
<i>Cupressus lusitania</i>	473	9	11.9	86.9
<i>Cupressus macrocarpa</i>	471	9	11.1	81.8
<i>Eucalyptus cladocalyx</i>	233	10	11.9	30.9
<i>Eucalyptus cladocalyx</i>	234	10	7.3	17.6
<i>Eucalyptus cladocalyx</i>	413	10	11.0	47.1
<i>Eucalyptus largiflorens</i>	460	7	3.4	0.8
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	10	11.7	108.6
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	218	10	7.9	24.8
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	10	12.2	105.9
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	10	9.1	57.7
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	411	10	7.9	23.9
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	412	10	9.4	74.9
<i>Eucalyptus obliqua</i>	493	7	8.0	49.1
<i>Eucalyptus tereticornis</i>	472	9	11.9	97.8
<i>Eucalyptus tereticornis</i>	474	9	12.1	87.9
<i>Eucalyptus tereticornis</i>	476	9	13.3	102.5

**Note:** Figures 64 - 66 below show best performing provenance according to TSV (m<sup>3</sup>/ha) graphed by age. Provenances with a TSV <1m<sup>3</sup>/ha are not graphed. Provenances 254, 433 and 460 all have poor survival.



**Figure 64: Best performing seed source according to Total Stem Volume (m<sup>3</sup>/ha) (age 7) for each dominant species, FT021 Penola – Murray's.**

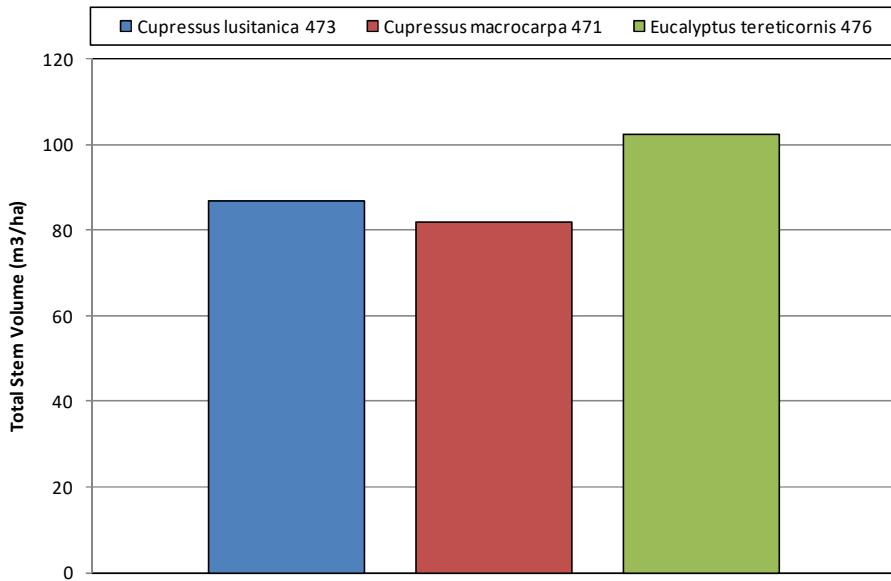


Figure 65: Best performing seed source according to Total Stem Volume ( $\text{m}^3/\text{ha}$ ) (age 9) for each dominant species, FT021 Penola – Murray's.

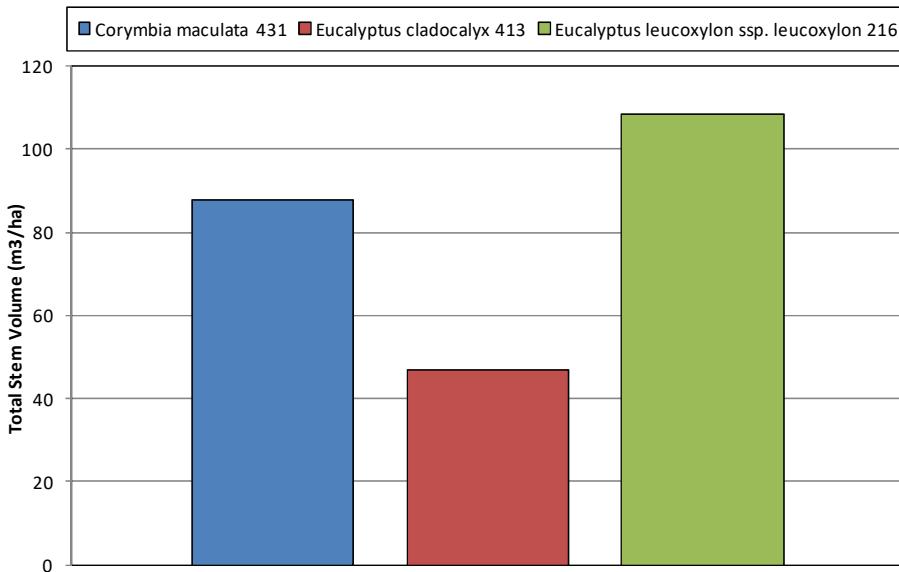


Figure 66: Best performing seed source according to Total Stem Volume ( $\text{m}^3/\text{ha}$ ) (age 10) for each dominant species, FT021 Penola – Murray's.

## Future Management of Penola – Murray's

Planted on a stringybark site which receives approximately 650mm of mean annual rainfall, this trial does not meet the design criteria. From the most recent measurements *E. leucoxylon* ssp. *leucoxylon* (Naracoorte and Kangaroo Island - age 10) and all provenances of *E. tereticornis* (age 9) have shown excellent results for both PDH (m) and TSV ( $\text{m}^3/\text{ha}$ ), and are recommended for this site type. *C. maculata* (Orbost), *C. lusitanica* (Lismore Seed Stand), *C. macrocarpa* (Lismore Seed Stand) and *E. obliqua* (Smithton) have also performed well at this site and are recommended as suitable taxa for this site type.

*Casuarina glauca* (Hawkesbury River), *C. maculata* (Batemans Bay), *E. largiflorens* (Renmark) and *A. melanoxylon* (Silver Creek) have shown poor survival and are not recommended on this site type.

**Recommendation:** Final measure of this trial was in 2003. All operations have since ceased due to lack of suitable species replication.

## 5.4.4 Struan

Location:

The site is located on Primary Industries SA land adjacent to the Bool Lagoon stockyards. It is planted to act as an extension of an existing windbreak.

Site type:

“Treeless” plains.

Rainfall:

Approximately 580mm annually.

Site History:

The area was originally pastured. Before planting in 1992 the site had been ploughed twice and sprayed with Roundup at a rate of 2L/ha. The site was fenced against cattle. Hares destroyed 90% of trees resulting in re-establishment and re-planting in 1995. Replants on 16<sup>th</sup> July 1996 were completed by PIRSA staff.

Number of plots:

81

Number of trees:

648

Spacing:

3m between trees, 2.5m between rows. Plots are 4m across and along the rows.

Plot size:

Plots are of 8 trees each (two rows of four trees).

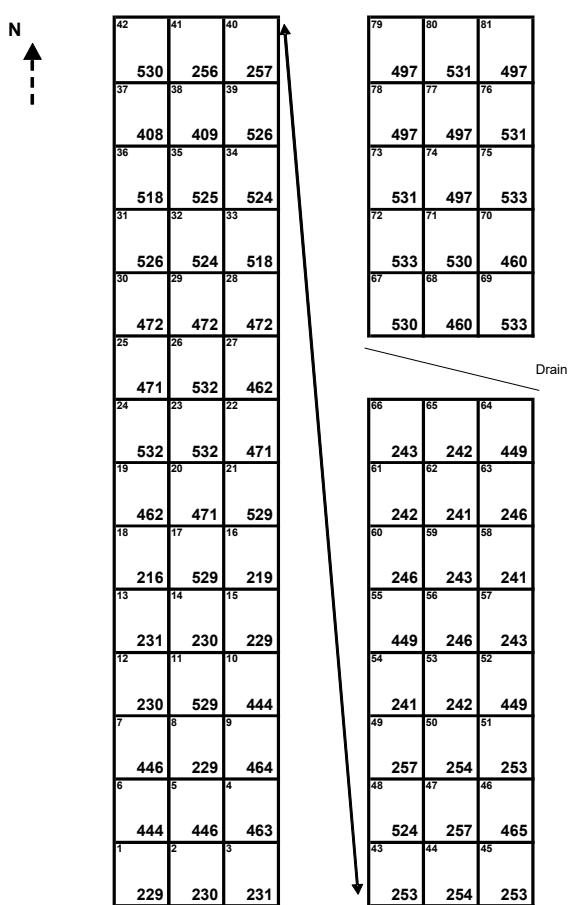


Figure 67: Overview of FT022 & FT037 Struan trial

### FT022

Trial established in 1992 plots 1 – 66

Plots 53 – 66 replanted in 1994 but all plots failed - trial was re-established in 1995 and extended to 81 plots

### FT0037

Plots 1-81 planted July 1995

Plots 68, 70, 74 & 78 replanted in July 1996

Plots 11, 17, 21, 23-24, 26, 28-36, 42, 46, 67, 69, 71-73, 75-77 & 79-81 replanted in August 1999

Table 59: Provenance No., Species and Collection details, FT022 &amp; FT037 Struan

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>Leucoxylon</i>	216	13046	Kangaroo Island SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus astringens</i>	229	17670	Boyagin Rock WA
<i>Eucalyptus astringens</i>	230	17685	Ravensthorpe WA
<i>Eucalyptus astringens</i>	231	17686	Kundip WA
<i>Eucalyptus occidentalis</i>	241	13633	Katanning WA
<i>Eucalyptus occidentalis</i>	242	13635	Rocky Gully WA
<i>Eucalyptus occidentalis</i>	243	13640	Bremer Bay WA
<i>Eucalyptus occidentalis</i>	246	15406	Pallerup Rock WA
<i>Casuarina glauca</i>	253	15934	Myall Lakes NSW
<i>Casuarina glauca</i>	254	16363	Hawkesbury River NSW
<i>Casuarina glauca</i>	256	13128	Singleton NSW
<i>Casuarina glauca</i>	257	13987	Coffs Harbour NSW
<i>Acacia melanoxylon</i>	408	Tas For Comm	Scottsdale TAS
<i>Acacia melanoxylon</i>	409	Trees For Life	Furner SA
<i>Eucalyptus astringens</i>	444	CALM D921	Cuballing WA
<i>Eucalyptus astringens</i>	446	CALM 91038	Dryandra WA
<i>Eucalyptus occidentalis</i>	449	CALM A92122	Jerramungup WA
<i>Eucalyptus largiflorens</i>	460	16528	Renmark SA>
<i>Eucalyptus cnoerifolia</i>	462	16023	Kingscote KI SA.
<i>Eucalyptus gomphocephala</i>	463	12308	Ludlow SF Perth WA.
<i>Eucalyptus cornuta</i>	464	11256	Albany WA
<i>Eucalyptus kondininensis</i>	465	15380	Lake Joy WA
<i>Cupressus macrocarpa</i>	471	Proseed	Longwoods Seed Stand NZ.
<i>Eucalyptus tereticornis</i>	472	17768	Yurramie NSW.
<i>Eucalyptus camaldulensis</i>	497	T. Dunsford	Crystal Brook SA.
<i>Acacia decurrens</i>	518	154847	Picton/ Mittagong NSW
<i>Acacia mearnsii</i>	524	17927	Tantanoola SA
<i>Acacia mearnsii</i>	526	18979	Kyneton Vic
<i>Casuarina glauca</i>	529	Unknown	Unknown
<i>Eucalyptus ovata</i>	530	Unknown	Unknown
<i>Eucalyptus camaldulensis</i>	531	Unknown	Unknown
<i>Eucalyptus kondininensis</i>	532	Unknown	Unknown
<i>Eucalyptus cornuta</i>	533	Unknown	Unknown

**Table 60: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 27/11/03 (ages 4, 7 & 8), FT022 & FT037 Struan**

Species	Provenance No.	Age	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Acacia decurrens</i>	518	4	0.0	0.0
<i>Acacia mearnsii</i>	524	4 & 8	2.2	6.5
<i>Acacia mearnsii</i>	526	4 & 8	1.6	0.2
<i>Acacia melanoxylon</i>	408	8	0.0	0.0
<i>Acacia melanoxylon</i>	409	8	4.6	4.3
<i>Casuarina glauca</i>	253	8	7.3	20.8
<i>Casuarina glauca</i>	254	8	7.8	17.8
<i>Casuarina glauca</i>	256	8	5.8	11.2
<i>Casuarina glauca</i>	257	8	6.7	27.2
<i>Casuarina glauca</i>	529	4	0.0	0.0
<i>Cupressus macrocarpa</i>	471	8	5.2	9.4
<i>Eucalyptus astringens</i>	229	8	5.6	30.8
<i>Eucalyptus astringens</i>	230	8	7.7	27.1
<i>Eucalyptus astringens</i>	231	8	3.7	19.1
<i>Eucalyptus astringens</i>	444	8	8.8	58.6
<i>Eucalyptus astringens</i>	446	8	8.8	48.5
<i>Eucalyptus camaldulensis</i>	497	4 & 7	3.9	3.0
<i>Eucalyptus camaldulensis</i>	531	4	0.0	0.0
<i>Eucalyptus cnoerifolia</i>	462	8	3.9	1.4
<i>Eucalyptus cornuta</i>	464	8	0.0	0.0
<i>Eucalyptus cornuta</i>	533	4	0.0	0.0
<i>Eucalyptus gomphocephala</i>	463	8	9.7	89.1
<i>Eucalyptus kondininensis</i>	465	4	0.0	0.0
<i>Eucalyptus kondininensis</i>	532	4	0.0	0.0
<i>Eucalyptus largiflorens</i>	460	7	3.2	0.6
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	8	7.7	60.3
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	8	6.8	13.3
<i>Eucalyptus occidentalis</i>	241	8	12.2	85.6
<i>Eucalyptus occidentalis</i>	242	8	10.2	88.3
<i>Eucalyptus occidentalis</i>	243	8	11.8	124.4
<i>Eucalyptus occidentalis</i>	246	8	12.8	104.4
<i>Eucalyptus occidentalis</i>	449	8	12.2	95.1
<i>Eucalyptus ovata</i>	530	4	1.0	0.1
<i>Eucalyptus tereticornis</i>	472	4	2.9	0.2

**Note:** Figures 68 and 69 below show best performing provenance according to TSV (m<sup>3</sup>/ha). Provenances with a TSV <1m<sup>3</sup>/ha are not graphed. Provenances 408, 460, 464, 465, 472, 518, 526, 529, 530, 531, 532 and 533 all have poor survival or insufficient data recorded. Provenances 497, 524 and 526 have mixed ages (4- 7&8yrs) within plots due to replants. Plots with provenance 497 were replanted in 1996 and 1999. Plots with provenances 524 and 526 were replanted in 1995 and 1999. Form assessment is recommended for some species in this trial.

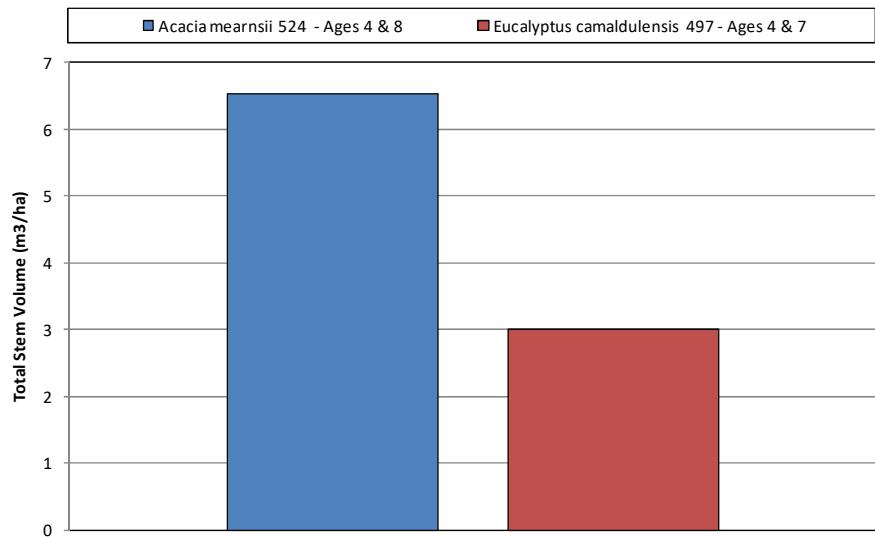


Figure 68: Best performing seed source according to Total Stem Volume ( $m^3/ha$ ) (mixed ages) for each dominant species, FT022 & FT037 Struan

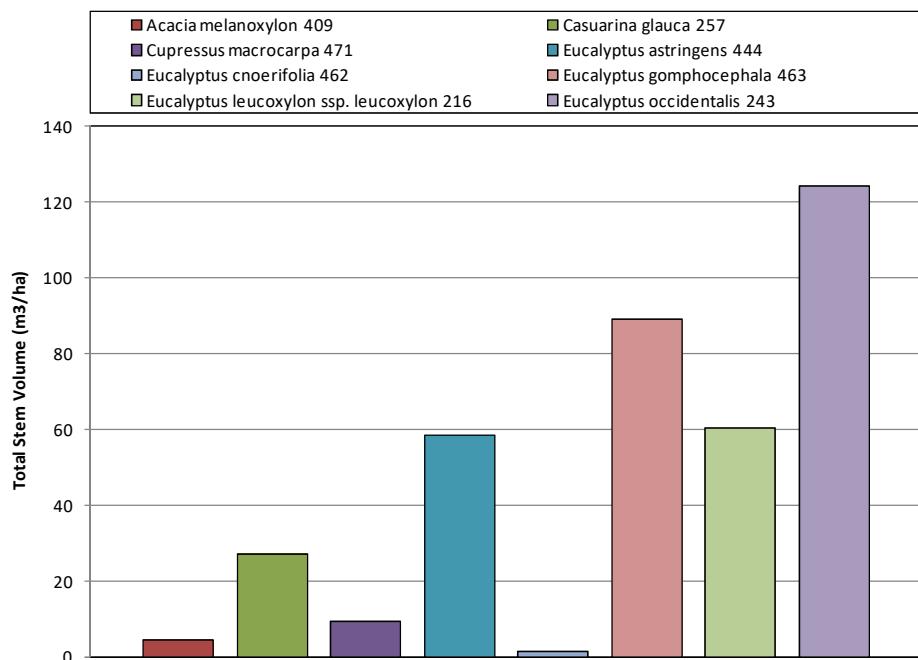


Figure 69: Best performing seed source according to Total Stem Volume ( $m^3/ha$ ) (age 8) for each dominant species, FT022 & FT037 Struan

## Future Management of Struan

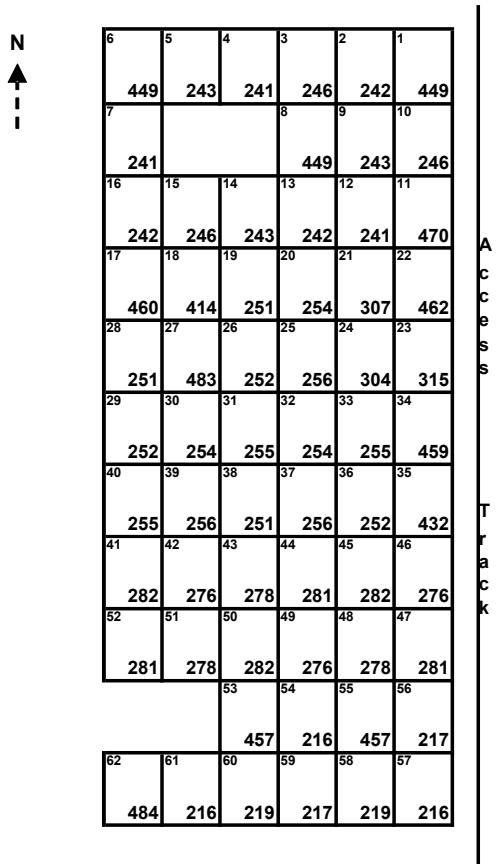
This trial was established on a black cracking clay site and receives approximately 580mm of annual rainfall. The trial design includes eight tree plots with some single plots and two or three replicates per taxa. Due to poor survival from some taxa, wind thrown trees and stock damage, this site was previously not recommended for future measurement programs. Analysis of PDH (m) and TSV ( $m^3/ha$ ) parameters from recent measures show strong results from *E. occidentalis* (Bremer Bay, Katanning, Rocky Gully, Jerramungup and Pallerup Rock) and *E. gomphocephala* (Ludlow SF Perth). Both are recommended for future plantings on this site type.

*E. leucoxylon* ssp. *leucoxylon* (Kangaroo Island) and *E. astringens* (Cuballing, Dryandra, Boyagin Rock and Ravensthorpe) are showing some promising results and are recommended for this site type. All other species/provenances have poor growth or survival and are not recommended for future plantings on this site type.

**Recommendation:** Final measure of this trial was in 2003. All operations have since ceased due to lack of suitable species replication.

## 5.4.5 Willalooka – Jackson's

Location: The trial is located approximately one kilometre north of the Willalooka store on the Keith-Naracoorte road.  
 Site type: Pink Gum.  
 Rainfall: Approximately 475mm annually.  
 Site History: The site was originally pastured with scattered pink gums. The gums were showing signs of distress, possible due to a rising water table and increasing salinity. The site was sprayed prior to the trial being planted on July 26 1994.  
 Number of plots: 62  
 Number of trees: 496.  
 Spacing: 3m between trees, 3m between rows. Plots are separated by a blank row.  
 Plot size: Plots are of 8 trees each (two rows of four trees).



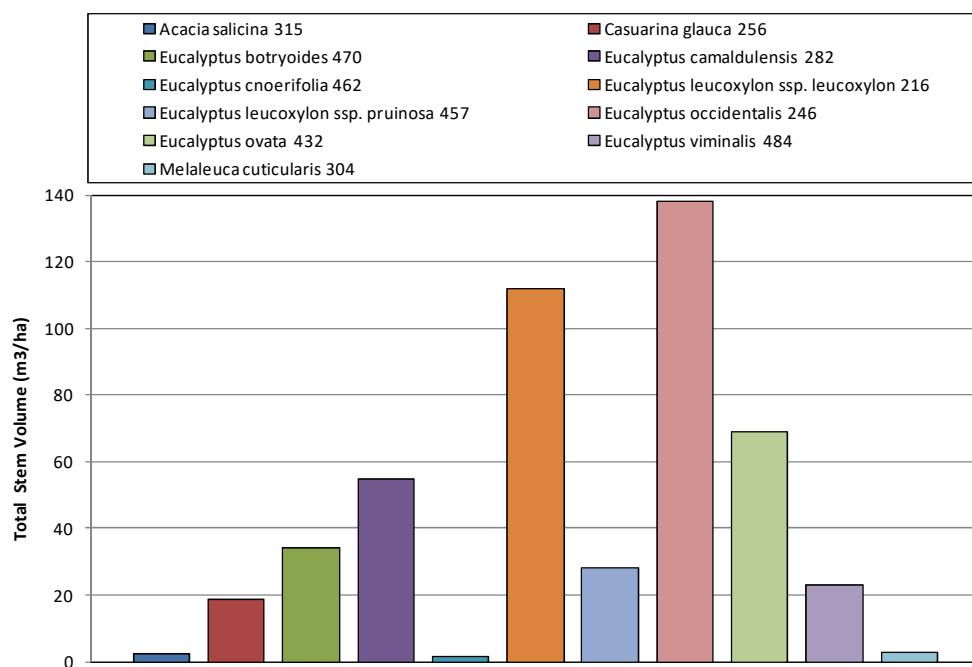
**Table 61: Provenance No., Species and Collection details, FT035 Willalooka – Jackson's**

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	13046	Kangaroo Island SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	16012	Wirrabara SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus occidentalis</i>	241	13633	Katanning WA
<i>Eucalyptus occidentalis</i>	242	13635	Rocky Gully WA
<i>Eucalyptus occidentalis</i>	243	13640	Bremer Bay WA
<i>Eucalyptus occidentalis</i>	246	15406	Pallerup Rock WA
<i>Casuarina glauca</i>	251	13146	Tuross Lake NSW
<i>Casuarina glauca</i>	252	13143	Mangrove Creek NSW
<i>Casuarina glauca</i>	254	16363	Hawkesbury River NSW
<i>Casuarina glauca</i>	255	13141	Coffs Harbour (22km S) NSW
<i>Casuarina glauca</i>	256	13128	Singleton NSW
<i>Eucalyptus camaldulensis</i>	276	15799	Lake Indoon WA
<i>Eucalyptus camaldulensis</i>	278	15272	Silvertown NSW
<i>Eucalyptus camaldulensis</i>	281	Hunt	Kalangadoo SA
<i>Eucalyptus camaldulensis</i>	282	15029	Lake Albacutya N Vic
<i>Melaleuca cuticularis</i>	304	CALM No. P9088	Stirling Range Nat. Park WA
<i>Acacia stenophylla</i>	307	Walladge	'Riverland' SA
<i>Acacia salicina</i>	315	Pedlar	Near Yacca SA
<i>Eucalyptus fasciculosa</i>	414	unknown	Keith/Brumbago Rd SA
<i>Eucalyptus ovata</i>	432	Blackwood Seeds	Yundi SA
<i>Eucalyptus occidentalis</i>	449	CALM A92122	Jerramungup WA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	16097	Williamstown SA
<i>Melaleuca uncinata</i>	459	State Flora	Keith Saltpans SA
<i>Eucalyptus largiflorens</i>	460	16528	Renmark SA
<i>Eucalyptus cnoerifolia</i>	462	16023	Kingscote KI SA.
<i>Eucalyptus botryoides</i>	470	15529	S Narooma NSW
<i>Eucalyptus faciculosa</i>	483	Jackson	Reed Paddock Wilalka SA.
<i>Eucalyptus viminalis</i>	484	Jackson	Kyara/ Tintinara SA.

**Table 62: Mixed species Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 24/11/03 (age 9), FT035 Willalooka-Jackson's**

Species	Provenance No.	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Acacia salicina</i>	315	4.7	2.3
<i>Acacia stenophylla</i>	307	0.0	0.0
<i>Casuarina glauca</i>	251	7.5	4.4
<i>Casuarina glauca</i>	252	7.5	13.9
<i>Casuarina glauca</i>	254	7.6	5.9
<i>Casuarina glauca</i>	255	6.7	13.0
<i>Casuarina glauca</i>	256	7.7	18.9
<i>Eucalyptus botryoides</i>	470	10.1	34.2
<i>Eucalyptus camaldulensis</i>	276	6.6	17.2
<i>Eucalyptus camaldulensis</i>	278	7.5	11.7
<i>Eucalyptus camaldulensis</i>	281	9.4	39.1
<i>Eucalyptus camaldulensis</i>	282	10.8	54.7
<i>Eucalyptus cnoerifolia</i>	462	4.5	1.5
<i>Eucalyptus faciculosa</i>	483	1.5	0.0
<i>Eucalyptus fasciculosa</i>	414	0.0	0.0
<i>Eucalyptus largiflorens</i>	460	0.0	0.0
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	216	12.4	112.0
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	11.6	66.0
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	11.7	99.7
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	8.9	28.3
<i>Eucalyptus occidentalis</i>	241	14.4	100.3
<i>Eucalyptus occidentalis</i>	242	12.2	86.1
<i>Eucalyptus occidentalis</i>	243	12.2	111.6
<i>Eucalyptus occidentalis</i>	246	14.7	138.2
<i>Eucalyptus occidentalis</i>	449	13.9	127.9
<i>Eucalyptus ovata</i>	432	10.2	68.9
<i>Eucalyptus viminalis</i>	484	8.6	23.2
<i>Melaleuca cuticularis</i>	304	3.7	3.0
<i>Melaleuca uncinata</i>	459	1.5	0.0

**Note:** Figure 71 below shows best performing provenance according to TSV (m<sup>3</sup>/ha). Provenances with a TSV <1m<sup>3</sup>/ha are not graphed. Provenances 307, 414, 483, 459 and 460 all have poor survival or insufficient data recorded.



**Figure 71: Best performing seed source according to TSV (m<sup>3</sup>/ha) (age 9) for each dominant species, FT035 Willalooka– Jackson's**

## **Future Management of Willalooka**

This trial was established on a Pink Gum site type on sandy plains over limestone in a 475mm annual rainfall zone. The trial contains mostly three replicates of eight tree plots with some single or two replicate plots. *E. occidentalis* (Katanning, Bremer Bay, Jerramungup, Pallerup Rock and Rocky Gully) and *E. leucoxylon* ssp. *leucoxylon* (Kangaroo Island, Wirrabara and Naracoorte) are the dominant species/provenances at this site type. *E. ovata* (Yundi), *E. camaldulensis* (Kalangadoo SA and Lake Albacutya N) and *E. botryoides* (S Narooma) all have reasonable growth and are recommended for future plantings on this site type.

*A. salicina* (Yacka), *A. stenophylla* (Berri), *E. cneorifolia* (Kingscote), *E. largiflorens* (Renmark), *M. cuticularis* (Stirling Ranges) and *M. uncinata* (Keith) had poor survival and are not recommended on this site type. Interestingly, *E. fasciculosa* (Pink Gum) provenances from Reed Paddock Wilalka and Keith/Brumbago Rd did not perform well even though the site was originally occupied by this species.

**Recommendation:** Consider continued measurement program.

## 5.4.6 Woolumbool - Del Fabbro's

Location: The trial is located on Alaman Road approximately nine kilometres south of the junction of the Woolumbool - Kingston road.

Site type: Saline.

Rainfall: Approximately 500mm annually.

Site History: The area was originally pastured. Before planting the trial site was sprayed with Roundup at a rate of 1.5L/ha. A post planting spray of Fusilade™ was carried out at 2L/ha. The trial was planted on 28<sup>th</sup> July 1993.

Number of plots: 52

Number of trees: 416.

Spacing: 3m between trees, 3m between rows. The plots are 4m apart along the rows and 6m apart across the rows.

Plot size: Plots are of 8 trees each (two rows of four trees).

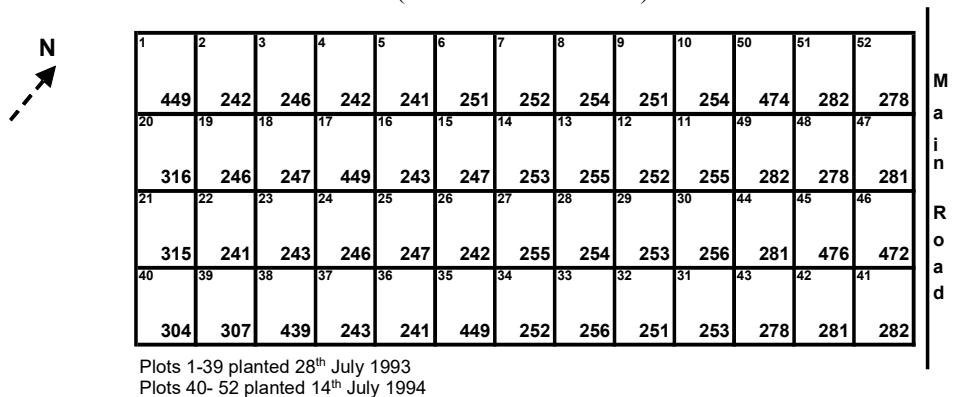


Figure 72: Overview of FT023 Woolumbool trial

Table 63: Provenance No., Species and Collection details, FT023 Woolumbool

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus occidentalis</i>	241	13633	Katanning WA
<i>Eucalyptus occidentalis</i>	242	13635	Rocky Gully WA
<i>Eucalyptus occidentalis</i>	243	13640	Bremer Bay WA
<i>Eucalyptus occidentalis</i>	246	15406	Pallerup Rock WA
<i>Eucalyptus occidentalis</i>	247	13634	Broomehill Area WA
<i>Casuarina glauca</i>	251	13146	Tuross Lake NSW
<i>Casuarina glauca</i>	252	13143	Mangrove Creek NSW
<i>Casuarina glauca</i>	253	15934	Myall Lakes NSW
<i>Casuarina glauca</i>	254	16363	Hawkesbury River NSW
<i>Casuarina glauca</i>	255	13141	Coffs Harbour (22km S) NSW
<i>Casuarina glauca</i>	256	13128	Singleton NSW
<i>Eucalyptus camaldulensis</i>	278	15272	Silverton NSW
<i>Eucalyptus camaldulensis</i>	281	Hunt	Kalangadoo SA
<i>Eucalyptus camaldulensis</i>	282	15029	Lake Albacutya N Vic
<i>Melaleuca cuticularis</i>	304	CALM No. P9088	Stirling Range Nat. Park WA
<i>Acacia stenophylla</i>	307	Walladge	'Riverland' SA
<i>Acacia salicina</i>	315	Pedlar	Near Yacca SA
<i>Melaleuca uncinata</i>	316	Lyn Dohle	Kangaroo Island SA
<i>Eucalyptus famelica</i>	439	*NS 3871	Ravensthorpe WA
<i>Eucalyptus occidentalis</i>	449	CALM A92122	Jerramungup WA
<i>Eucalyptus tereticornis</i>	472	17768	Yurramie NSW.
<i>Eucalyptus tereticornis</i>	474	13311	Oakdale NSW
<i>Eucalyptus tereticornis</i>	476	13302	Loch Sport Vic.

Table 64: Predominant Height (m) and Total Stem Volume (m<sup>3</sup>/ha) comparison at 25/11/03 (age 9&10), FT023 Wolumbool

Species	Provenance No.	Age	PDH (m)	TSV (m <sup>3</sup> /ha)
<i>Acacia salicina</i>	315	10	0.0	0.0
<i>Acacia stenophylla</i>	307	10	0.0	0.0
<i>Casuarina glauca</i>	251	10	7.5	21.9
<i>Casuarina glauca</i>	252	10	9.2	46.8
<i>Casuarina glauca</i>	253	10	8.7	34.6
<i>Casuarina glauca</i>	254	10	6.9	10.9
<i>Casuarina glauca</i>	255	10	7.6	24.3
<i>Casuarina glauca</i>	256	10	7.9	33.0
<i>Eucalyptus camaldulensis</i>	278	9	10.8	82.2
<i>Eucalyptus camaldulensis</i>	281	9	12.8	114.7
<i>Eucalyptus camaldulensis</i>	282	9	13.8	188.3
<i>Eucalyptus famelica</i>	439	10	2.4	0.1
<i>Eucalyptus occidentalis</i>	241	10	13.7	125.3
<i>Eucalyptus occidentalis</i>	242	10	10.2	62.7
<i>Eucalyptus occidentalis</i>	243	10	10.9	46.7
<i>Eucalyptus occidentalis</i>	246	10	11.1	70.9
<i>Eucalyptus occidentalis</i>	247	10	12.8	103.2
<i>Eucalyptus occidentalis</i>	449	10	12.2	84.6
<i>Eucalyptus tereticornis</i>	472	9	14.0	141.6
<i>Eucalyptus tereticornis</i>	474	9	8.2	14.1
<i>Eucalyptus tereticornis</i>	476	9	12.1	74.1
<i>Melaleuca cuticularis</i>	304	9	1.8	0.1
<i>Melaleuca uncinata</i>	316	10	1.8	0.0

Note: Figures 73 & 74 below show best performing provenance according to TSV (m<sup>3</sup>/ha). Provenances with a TSV <1m<sup>3</sup>/ha are not graphed. Provenances 304, 307, 315, 316 and 439 all have poor survival or insufficient data recorded.

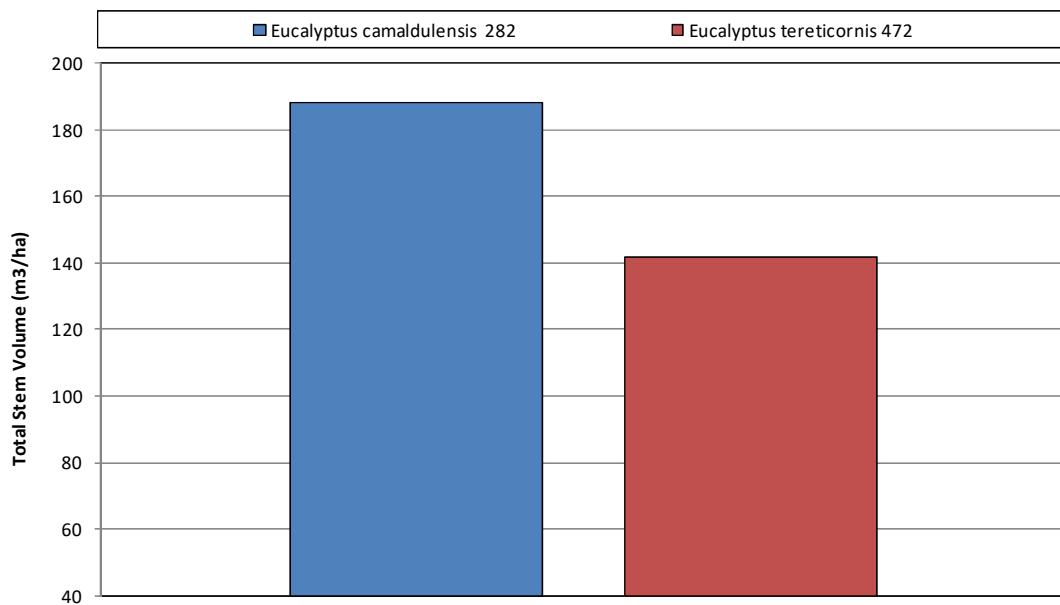


Figure 73: Best performing Seed source according to Total Stem Volume (m<sup>3</sup>/ha) (age 9) for each dominant species, FT023 Wolumbool

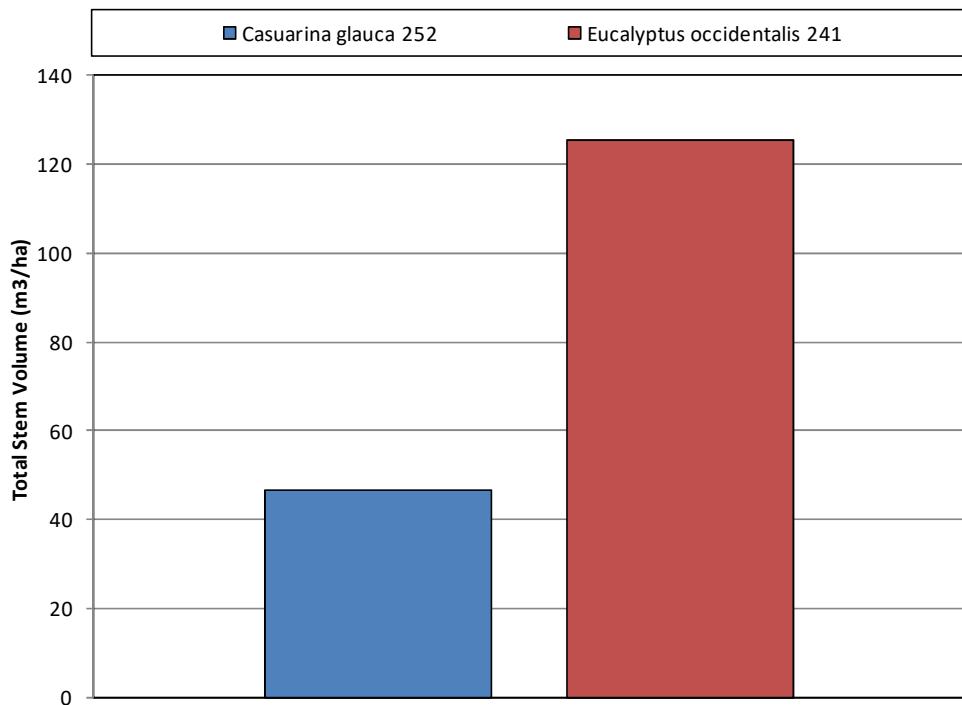


Figure 74: Best performing Seed source according to Total Stem Volume (m<sup>3</sup>/ha) (age 10) for each dominant species, FT023 Woomoolooloo

## Future Management of Woomoolooloo

This trial is planted on a SA Blue Gum site which receives 400mm of annual rainfall. This trial meets the design criteria. *E. camaldulensis* (Lake Albacutya) is the most dominant species/provenance at this site type. Followed by *E. tereticornis* (Yurramie) and *E. occidentalis* (Katanning). *C. glauca* (Mangrove Creek) has shown very good survival with some promising growth results and will be recommended for future plantings on this site type.

*A. salicina* (Yacka), *A. stenophylla* (Riverland), *E. famelica* (Ravensthorpe), *M. cuticularis* (Stirling Ranges), *E. tereticornis* (Oakdale), *M. Cuticularis* (Stirling Range Nat. Park) and *M. uncinata* (Kangaroo Island) all had poor growth or survival and are not recommended for future planting on this site type.

**Recommendation:** Consider continued measurement program.

## 5.5 RESULTS FOR THE EYRE PENINSULA REGION

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### 5.5.1 Minnipa

Location: Minnipa Research Centre, Eyre Peninsula  
 Site type: Casuarina cristata/ mallee.  
 Rainfall: 350mm.  
 Site History: Rows were ripped and trees were watered at planting. Trial was planted in Oct/Nov 1990  
 Spacing: Unknown  
 Plot size: Single tree plots, 4-13 reps  
 Note: This trial was omitted due to single tree plot design.

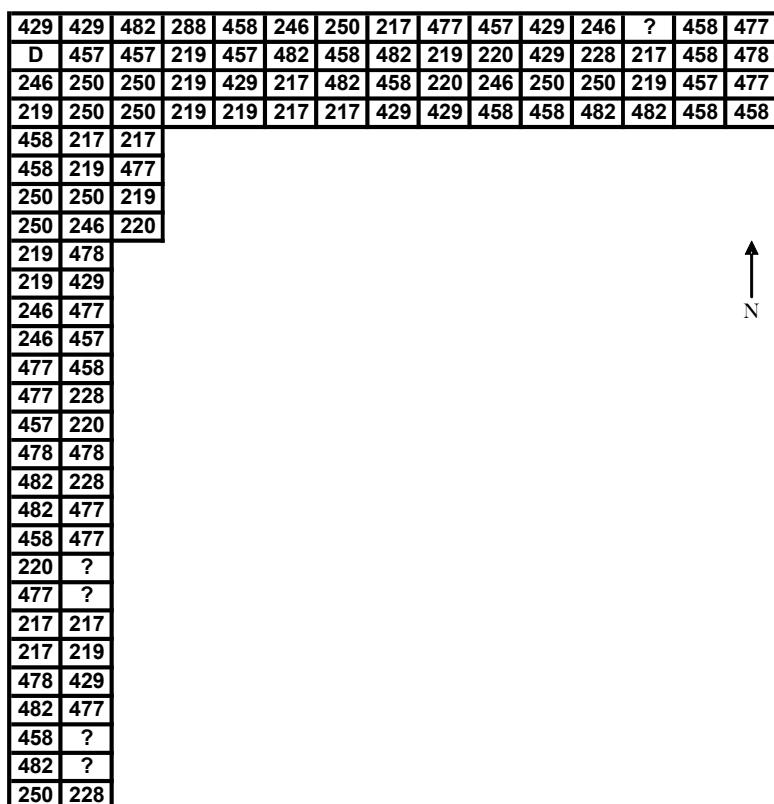


Figure 75: Overview of Minnipa Farm Tree trial

Table 65: Provenance No., Species and Collection details, Minnipa Farm Tree trial

Species	Provenance No.	Collector or CSIRO No.	Provenance Details
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	217	16012	Wirrabara SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	219	16527	Naracoorte SA
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	220	17012	Studley Park Vic
<i>Eucalyptus astringens</i>	228	12842	Dryandra SF WA
<i>Eucalyptus occidentalis</i>	246	15406	Pallerup Rock WA
<i>Eucalyptus occidentalis</i>	250	13644	Thomas River Area WA
<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	288	14443	Gilgandra NSW
<i>Eucalyptus camaldulensis</i>	429	Trees For Life	Laura SA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	457	16097	Williamstown SA
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	458	12456	Nelson/Glenelg R SA
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	477	16518	Brisbane Range NP Vic
<i>Eucalyptus occidentalis</i>	478	13646	Gibson area WA
<i>Eucalyptus leucoxylon</i> ssp. <i>petiolaris</i>	482	12072	Cowell SA

Note: No measurement data exists for this trial

## 6.0 SEED PRODUCTION AREAS

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Seed production areas were established at Bundaleer HQ, Redhill, Kersbrook Depot and Murray Bridge.

Redhill has a seed production area of *Eucalyptus occidentalis*, in proximity to the FT017 trial on a salt affected paddock. The other *E. occidentalis* seed production area is at Bundaleer Forest Reserve Headquarters.

*Eucalyptus cladocalyx* seed production areas were planted at Murray Bridge State Flora Complex on a relatively dry site (325mm annually) and at Gumeracha Agroforestry Demonstration Area adjacent to the *Acacia melanoxylon* trial, in a wet site that receives 850mm annually. The difference in rainfall each site receives will indicate which provenances are more productive in different rainfall zones. Murray Bridge also has an orchard of *Pinus halepensis* on a site suitable for this species.

All seed production areas are monitored regularly. Assessments of form, vigour and branching are undertaken to remove poorer specimens and retain the ‘select’ trees for seed production.

**Note:** No two similar provenances in the seed production areas have been placed in adjacent plantings to reduce the occurrence of self-pollination.

### 6.1 Redhill

Location:	Redhill
Species:	<i>Eucalyptus occidentalis</i>
Spacing:	3m x 3m
Site preparation:	Ripping and spraying
Number of provenances:	10
Number of replications:	Variable- from 19 to 85, but generally about 70
Total No. of trees:	714
Design:	Open pollinated (no restriction or control on source of pollination) planted as a block of 21 rows of 34 trees
Plant Date:	September 9, 1992

**Table 66: Overview of Redhill seed production area planting details**

Provenance No.	Collector or CSIRO No.	Provenance Details	No. of trees
241	13633	Katanning WA	79
242	13635	Rocky Gully WA	85
243	13640	Bremer Bay WA	79
244	13645	Esperance WA	85
245	13647	Grass Patch WA	78
246	15406	Pallerup Rock WA	79
247	13634	Broomehill Area WA	79
248	13638	Jerramungup Area WA	44
249	13642	Ravensthorpe Area WA	79
250	13644	Thomas River Area WA	19

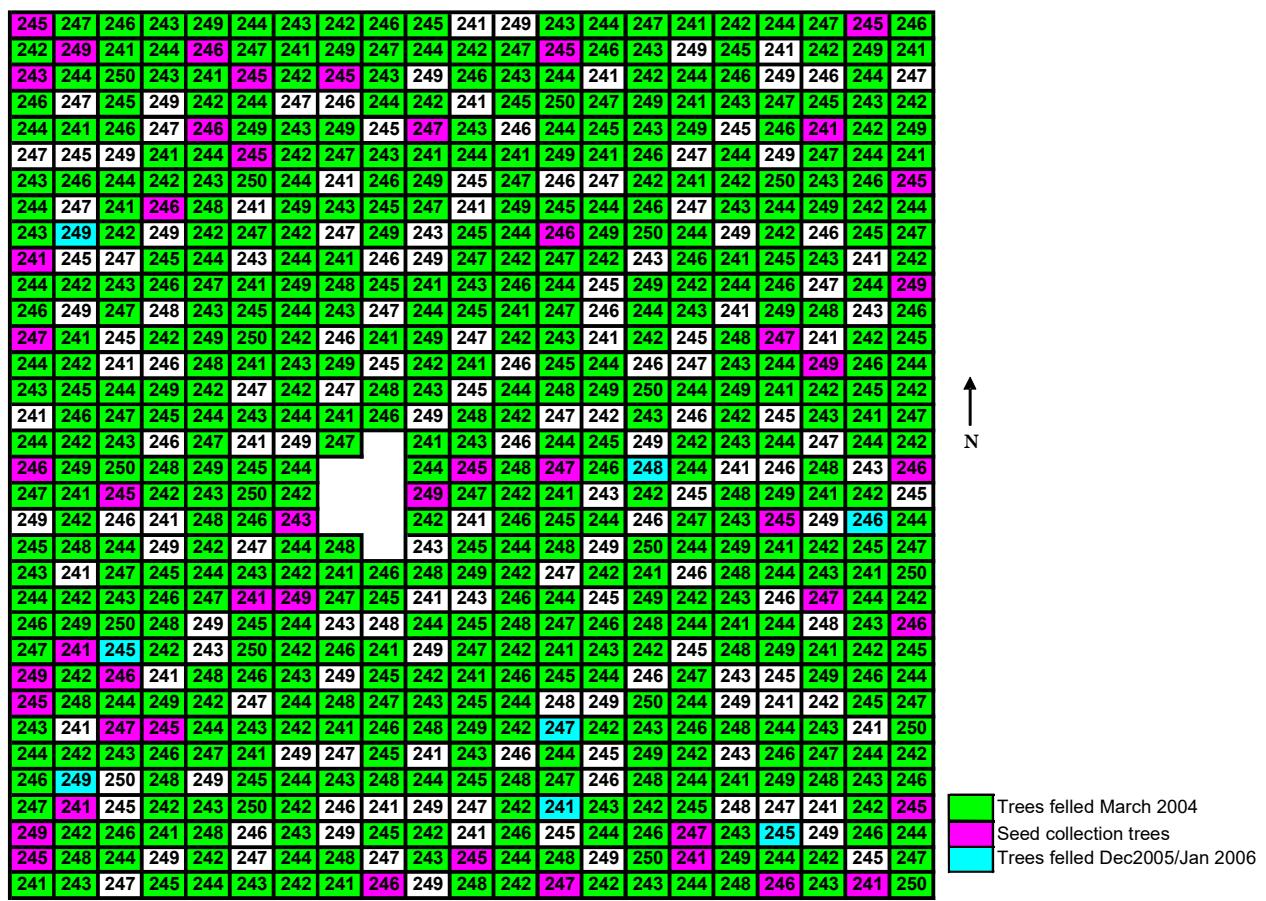


Figure 76: Overview of Redhill seed production area layout

## 6.2 Bundaleer Forest Reserve

Species: *Eucalyptus occidentalis*

Spacing: 3m x 3m

Site preparation: Nil.

Due to the nature of the site and the very wet spring prior to planting, this site could not be ripped or sprayed before establishment. Weed control was conducted after planting using tube shelters and hand-held spray wands.

Number of provenances: 8

Number of replications: 80

Total No. of trees: 640

Design: Open pollinated planted as a block of 20 rows of 32 trees

Plant Date: October 17, 1992

Table 67: Overview of Bundaleer seed production area planting details

Provenance No.	Collector or CSIRO No.	Provenance Details	No. of trees
241	13633	Katanning WA	79
242	13635	Rocky Gully WA	85
243	13640	Bremer Bay WA	79
244	13645	Esperance WA	85
245	13647	Grass Patch WA	78
246	15406	Pallerup Rock WA	79
247	13634	Broomehill Area WA	79
249	13642	Ravensthorpe Area WA	79

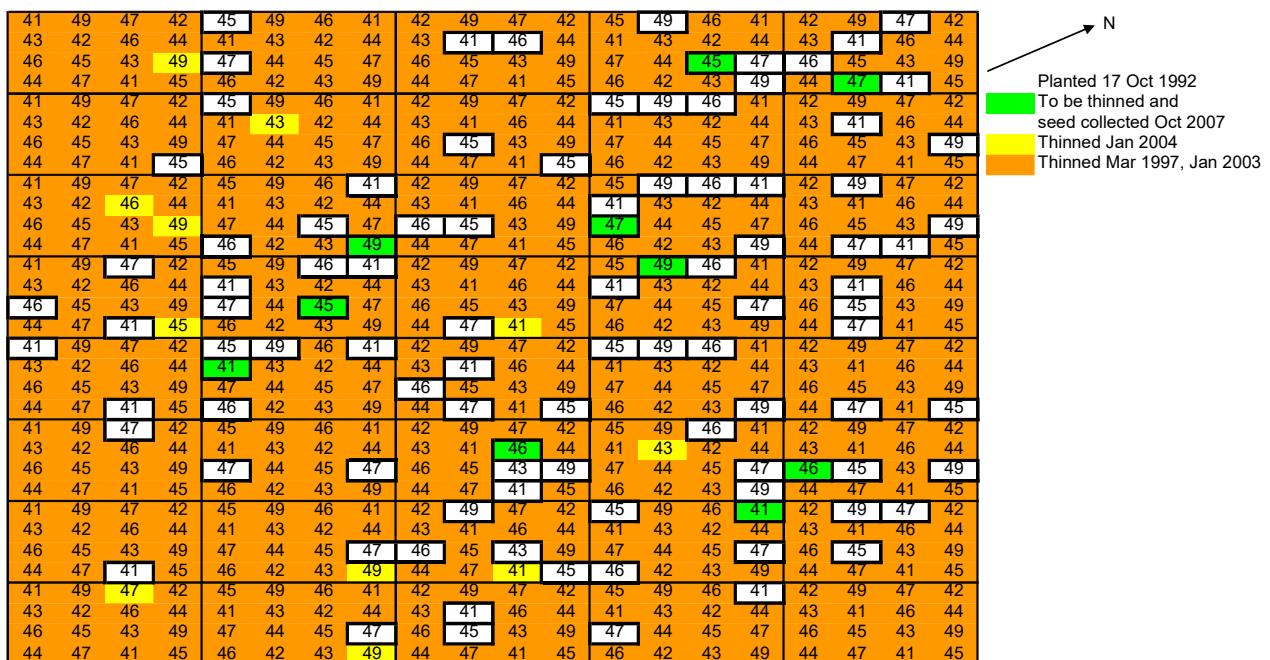


Figure 77: Overview of Bundaleer seed production area layout

Note: Provenances on map are coded with the last two (2) digits only.

### 6.3 Kersbrook Depot

Species:	<i>Eucalyptus cladocalyx</i>
Spacing:	2.5m x 2.5m
Site preparation:	Ripping and spraying
Number of provenances:	5
Number of replications:	91
Total No. of trees:	455
Design:	Open pollinated planted as a block of 13 rows of 35 trees
Plant Date:	October 15, 1992

Table 68: Overview of Kersbrook Depot seed production area planting details

Provenance No.	Collector or CSIRO No.	Provenance Details	No. of trees
232	15019	Wirrabara SA	91
233	15268	Wilmington SA	91
234	16018	Vanilla SA	91
235	16022	Flinders Chase Nat. Pk. KI SA	91
236	Thomas/Wood	Wirrabara F.R. SA	91

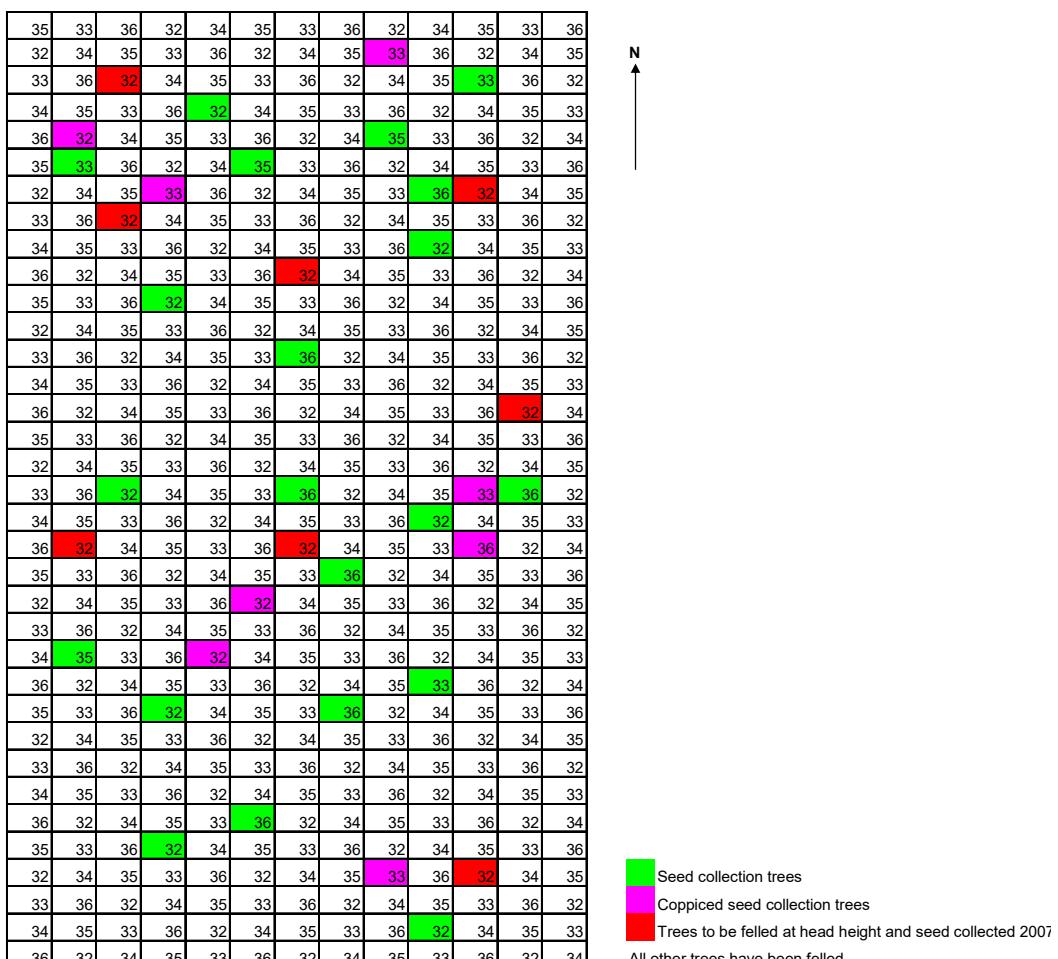


Figure 78: Overview of Kersbrook Depot seed production area layout

**Note:** Provenances on map are coded with last two (2) digits only.

## 6.4 Murray Bridge 'A'

Species:	<i>Pinus halepensis</i>
Spacing:	4m x 4m
Site preparation:	Strip spraying and bowling
Number of provenances:	13
Number of replications:	Variable from 20 to 68 (average of 54)
Total No. of trees:	672
Design:	Open pollinated planted as a block of 21 rows of 32 trees
Plant Date:	August 18, 1992

Table 69: Overview of Murray Bridge Seed production area 'A' planting details

Provenance No.	Collector or CSIRO No.	Provenance Details	No. of trees
291	H5	Balearic Islands, Spain	52
292	H14	Taksane, Tunisia	54
293	H18	Mellegue Romain, Tunisia	54
294	H27	Mt Rila, Tunisia	54
295	H35	Hebron, Jordan	54
296	H40	Djelfa, Algeria	55
297	H24	Oussletia/Kairovan, Tunisia	52
298	H25	Birino, Tunisia	68
299	H29	Tenin, Tunisia	20
300	H20	Overgha, Tunisia	55
301	H30	Desnaia, Tunisia	20
302	H37	Telagh, Algeria	53
303	H23	Kesseca, Tunisia	51

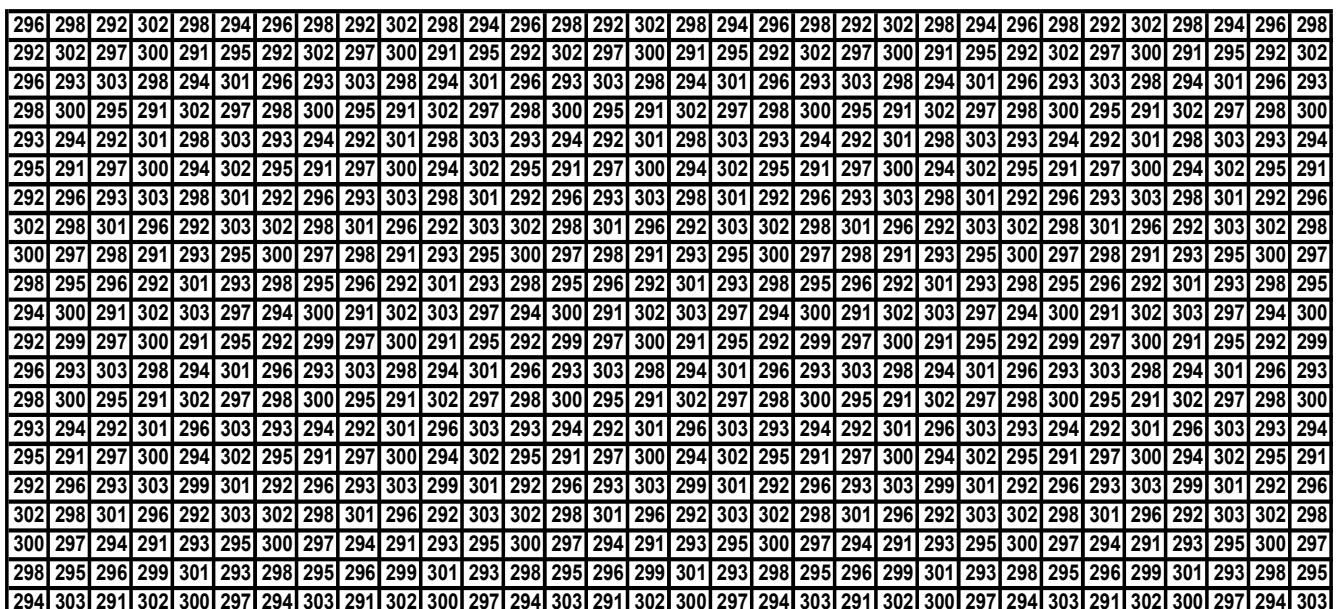


Figure 79: Overview of Murray Bridge seed production area 'A' layout

## 6.5 Murray Bridge 'B'

Species:	<i>Eucalyptus cladocalyx</i>
Spacing:	4m x 4m
Site preparation:	Strip spraying and bowling
Number of provenances:	5
Number of replications:	Approximately 83
Total No. of trees:	415
Design:	Polycross-planted as a block with the northern rows tapered. Blocks of 21 rows x 32 trees
Plant Date:	August 24, 1992

Table 70: Overview of Murray Bridge seed production area 'B' planting details

Provenance No.	Collector or CSIRO No.	Provenance Details	No. of trees
232	15019	Wirrabara, SA	83
233	15268	Wilmington, SA	82
234	16018	Wanila, SA	84
235	16022	Flinders Chase NP, SA	84
236	Thomas/Wood	Wirrabara FR, SA	83

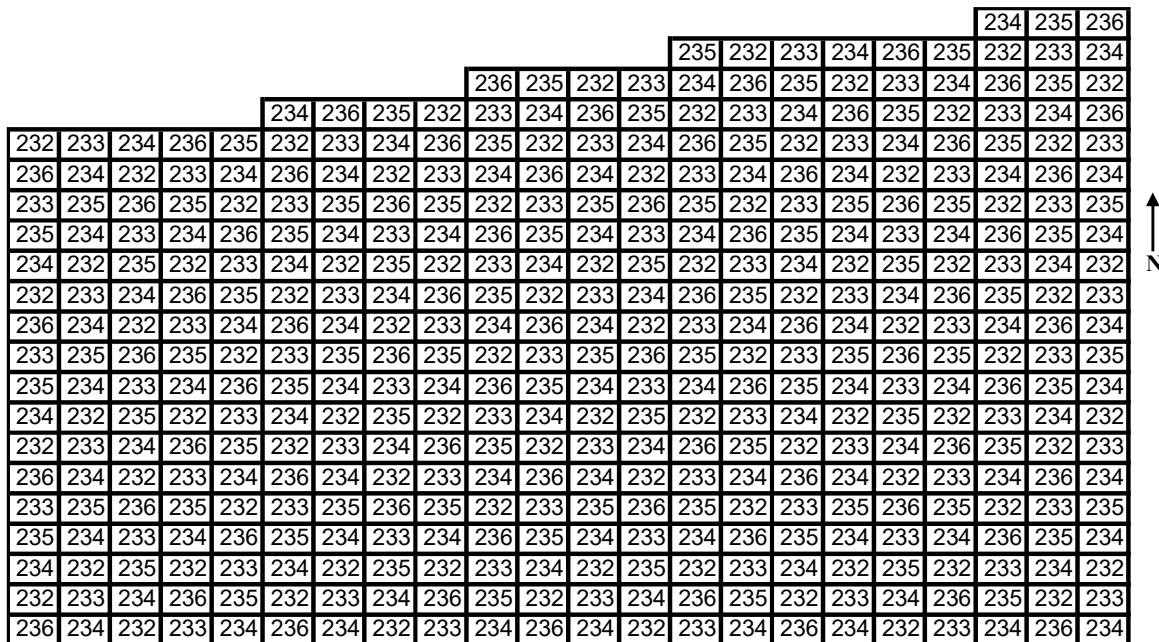


Figure 80: Overview of Murray Bridge seed production area 'B' layout

## 7.0 SUMMARY OF RECOMMENDED SPECIES

Location	<i>Acacia dealbata</i> ssp. <i>dealbata</i>	<i>Acacia decurrens</i>	<i>Acacia falcifolia</i>	<i>Acacia mearnsii</i>	<i>Acacia melanoxylon</i>	<i>Casuarina glauca</i>	<i>Corymbia maculata</i>	<i>Cupressus lusitanica</i>	<i>Cupressus macrocarpa</i>	<i>Grevillea robusta</i>	<i>Eucalyptus astringens</i>	<i>Eucalyptus botrysoides</i>	<i>Eucalyptus brockwayi</i>	<i>Eucalyptus camaldulensis</i>	<i>Eucalyptus cladocalyx</i>	<i>Eucalyptus cornuta</i>	<i>Eucalyptus dundasii</i>	<i>Eucalyptus fasciculosa</i>	<i>Eucalyptus globulus</i>	<i>Eucalyptus globulus</i> ssp. <i>bicostata</i>	<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	<i>Eucalyptus globulus</i> ssp. <i>maidenii</i>	<i>Eucalyptus gomphocephala</i>	<i>Eucalyptus kondininensis</i>	<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	<i>Eucalyptus obliqua</i>	<i>Eucalyptus occidentalis</i>	<i>Eucalyptus porosa</i>	<i>Eucalyptus punctata</i>	<i>Eucalyptus saligna</i>	<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	<i>Eucalyptus sideroxylon</i> ssp. <i>tricarpa</i>	<i>Eucalyptus tereticornis</i>	<i>Pinus halepensis</i>	<i>Robinia pseudoacacia</i>
Appila Springs																																					
Browns Hill																																					
Bundaleer Forest Reserve																																					
Mannanarie																																					
Mt Bryan																																					
Redhill																																					
Lameroo 'Bews' 1990																																					
Lameroo 'Bews' 1992																																					
Murray Bridge																																					
Paruna																																					
Pinnaroo																																					
Sherlock																																					
Cudlee creek																																					
Gumeracha																																					
Lenswood	✓	✓	✓	✓		✓	✓	✓																													
Montarra						✓																															
Kalangadoo						✓																															
Penola						✓	✓	✓																													
Struan																																					
Willalooka																																					
Woolumbool						✓																															

✓ Recommended species for future plantings

Site Type	<i>Eucalyptus astringens</i>	<i>Eucalyptus brockwayi</i>	<i>Eucalyptus cladocalyx</i>	<i>Eucalyptus cornuta</i>	<i>Eucalyptus dundasii</i>	<i>Eucalyptus fasciculosa</i>	<i>Eucalyptus kondininensis</i>	<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	<i>Eucalyptus occidentalis</i>	<i>Eucalyptus porosa</i>	<i>Pinus halepensis</i>
<b>Mid north</b>													
Alkaline (pH 9) shallow stoney sandy loam over limestone 200-700mm, annual rainfall 300-400mm		✓			✓						✓	✓	
Alkaline (pH 8.5) sandy loam over clay 600-800mm, annual rainfall 200-300mm					✓						✓		
Alkaline (pH 9) sandy loam over clay 200-600mm, annual rainfall 300-400mm	✓										✓		
Alkaline (pH 9) sandy loam over clay 200-700mm, annual rainfall 300-400mm	✓							✓	✓	✓			
Alkaline (pH 8-9) sandy loam over clay with some pure sand, annual rainfall 300-400mm	✓						✓	✓	✓	✓			
<b>Murray Mallee</b>													
Alkaline (pH 8.5) brown loam over clay 200-350mm, annual rainfall 400mm							✓				✓		
Alkaline (pH 9) brown loam 200-350mm, annual rainfall 300-400mm								✓			✓		
Alkaline (pH 8) brown loam 200-350mm, annual rainfall 300-400mm	✓							✓			✓		
Neutral (pH 6.5) shaly red brown loam 200-400mm, annual rainfall 400-500mm			✓	✓					✓		✓		
Acidic (pH 6) shaly red brown loam 200-350mm, annual rainfall 400mm	✓		✓	✓		✓		✓			✓		
Neutral (pH 7) red brown loam 200-400mm, annual rainfall 500mm+								✓	✓		✓		

Site Type	<i>Acacia dealbata</i> ssp. <i>dealbata</i>	<i>Acacia decurrens</i>	<i>Acacia filifolia</i>	<i>Acacia mearnsii</i>	<i>Acacia melanoxylon</i>	<i>Casuarina glauca</i>	<i>Corymbia maculata</i>	<i>Cupressus lusitanica</i>	<i>Cypressus macrocarpa</i>	<i>Eucalyptus astringens</i>	<i>Eucalyptus botryoides</i>	<i>Eucalyptus camaldulensis</i>	<i>Eucalyptus cladocalyx</i>	<i>Eucalyptus cornuta</i>	<i>Eucalyptus fasciculosa</i>	<i>Eucalyptus globulus</i>	<i>Eucalyptus globulus</i> ssp. <i>bicostata</i>	<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	<i>Eucalyptus globulus</i> ssp. <i>maidenii</i>	<i>Eucalyptus gomphocephala</i>	<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	<i>Eucalyptus megalocarpa</i>	<i>Eucalyptus obliqua</i>	<i>Eucalyptus occidentalis</i>	<i>Eucalyptus ovata</i>	<i>Eucalyptus punctata</i>	<i>Eucalyptus saligna</i>	<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	<i>Eucalyptus sideroxylon</i> ssp. <i>tricarpa</i>	<i>Eucalyptus tereticornis</i>	<i>Grevillea robusta</i>	<i>Robinia pseudoacacia</i>
<b>Mount Lofty Ranges</b>																																	
Acidic (pH 5-5.5) brown clay loam 200-400mm, annual rainfall 800-900mm					✓							✓	✓		✓												✓	✓					
Acidic (pH 5.5) brown clay-loam 200-500mm, annual rainfall 850mm+													✓				✓	✓	✓									✓	✓	✓			
Acidic (pH 6) brown clay loam 200-450mm, annual rainfall 850mm+																																	
Acidic (pH 6) sandy loam over clay/gravel 300-900mm, annual rainfall 850mm+						✓																											
Acidic (pH 5.5-6) brown clay-loam 400-600mm, annual rainfall 850mm+							✓					✓	✓					✓															
Acidic (pH 6) brown clay-loam 200-400mm, annual rainfall 900mm+	✓	✓	✓	✓																													
<b>South East</b>																																	
On salty area, alkaline (pH 9) sand over clay >1m neutral off salt, annual rainfall 500mm+						✓						✓															✓				✓		
Alkaline (pH 8.5) black clay 150-400mm, annual rainfall 500-600mm												✓										✓	✓				✓						
On rise, neutral (pH 7) sandy over clay 200-300mm on flat, annual rainfall 400-500mm												✓	✓									✓				✓	✓						
Acid (pH 6-6.5) deep sand >1m, annual rainfall 600-700mm							✓	✓	✓												✓		✓							✓			
Acidic (pH 5.5) sand over clay 400-900mm, annual rainfall 700-800mm												✓	✓									✓											
Acaidic (pH 4) sandy clay 300-400mm, annual rainfall 700-800mm						✓																											

## 8.0 SUMMARY OF PROVENANCE PERFORMANCE FOR RECOMMENDED SPECIES

### 8.1 *Acacia melanoxylon*

*A. melanoxylon* occurs on a wide range of soil types and can be utilised as prized cabinet timber. However poor form and growth has effected this species on sites with less acidic soils and lower rainfall (Penola and Struan). Provenances from Silver Creek and Blackwood Park when planted at Montarra (aged 10) and provenances from Mt Barker when planted at Gumeracha (age 14) are the best productive provenances (Figure 81). Provenances planted at Kalangadoo (age 7) have also produced some good height results when planted at Silver Creek.

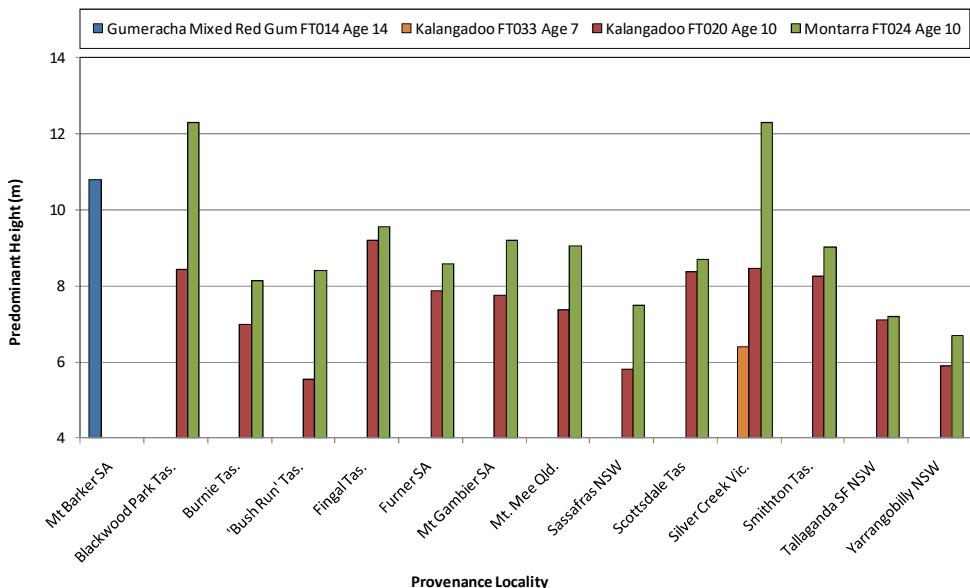


Figure 81: Comparative Predominant Height (m) performance of *A. melanoxylon* provenances. The Gumeracha *A. melanoxylon* trial was not graphed due to replants (age 1.6 years) and could not be used in this comparison.

At the Montarra trial site, Silver Creek provenance statistically shows the best volume production (Figure 82), followed by provenances from Scottdale, Mt Gambier, Smithton and Fingal. Interestingly results from Blackwood Park provenances when planted at Kalangadoo (FT020) and Montarra show excellent heights but TSV (m<sup>3</sup>/ha) is significantly lower than Silver Creek provenances which were of similar height and both age 10 (Figure 82). Provenances with Total Stem Volume results below 10 m<sup>3</sup>/ha have not been graphed for this comparison.

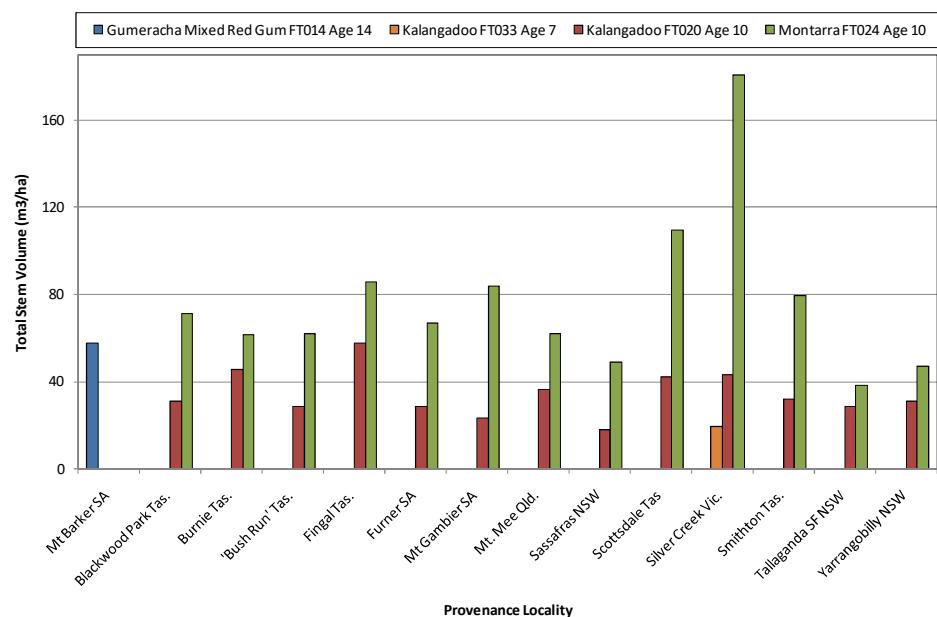


Figure 82: Comparative Total Stem Volume (m<sup>3</sup>/ha) performance of *A. melanoxylon* provenances.

## 8.2 *Corymbia maculata*

*C. maculata* is a tall tree which can reach 45m on favourable sites, is well suited to wetter sites and highly tolerant to pests and disease. *C. maculata* has only been trialed at four sites which are located on acidic soils with 600-900mm annual rainfall. Provenances collected from Batemans Bay when planted at Gumeracha FT014 (age 14) show the best predominant height results for this species (Figure 83). Provenances from Batemans Bay when planted at Gumeracha FT015 (age 14) show a good height comparison when compared to provenances from Orbost when planted at Penola (age 10), considering the 4 year age difference.

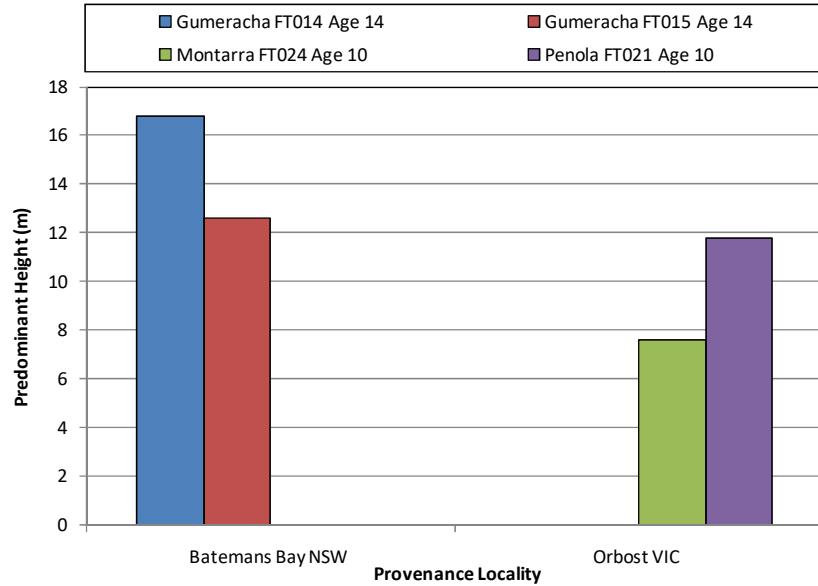


Figure 83: Comparative Predominant Height (m) performance of *C. maculata*.

Provenances collected from Batemans Bay when planted at Gumeracha FT014 (age 14) have produced the best volume (MAI) results for this species growing 16.3 m<sup>3</sup>/ha/yr (Figure 84). Provenances collected from Orbost have produced good volume results when planted on the acidic soils (pH 6.5) of Penola (age 10) with 600-700mm annual rainfall. However, volume decreased slightly when planted at Gumeracha FT015 (age 14) where the soil is more acidic (pH 5.5) and has a higher annual rainfall (850mm+).

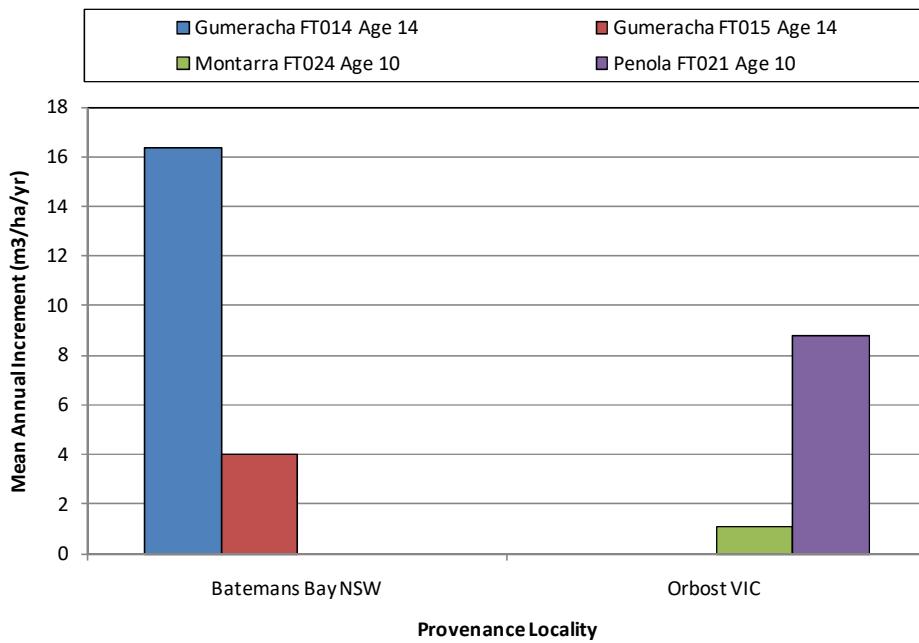


Figure 84: Comparative Mean Annual Increment (m<sup>3</sup>/ha/yr) performance of *C. maculata*.

### 8.3 *Eucalyptus astringens*

*E. astringens* is a fast growing species on well drained soils, widely used as windbreaks and for firewood. Provenances from Dryandra WA when planted at Murray Bridge (age 13) show the best predominant height results (Figure 85), closely followed by provenances from Cuballing and Dryandra when planted at Struan (age 8) and Ravensthorpe when planted at Mannanarie (age 11). Boyagin Rock and Kundip when planted at Struan appear to be less productive than other *E. astringens* provenances.

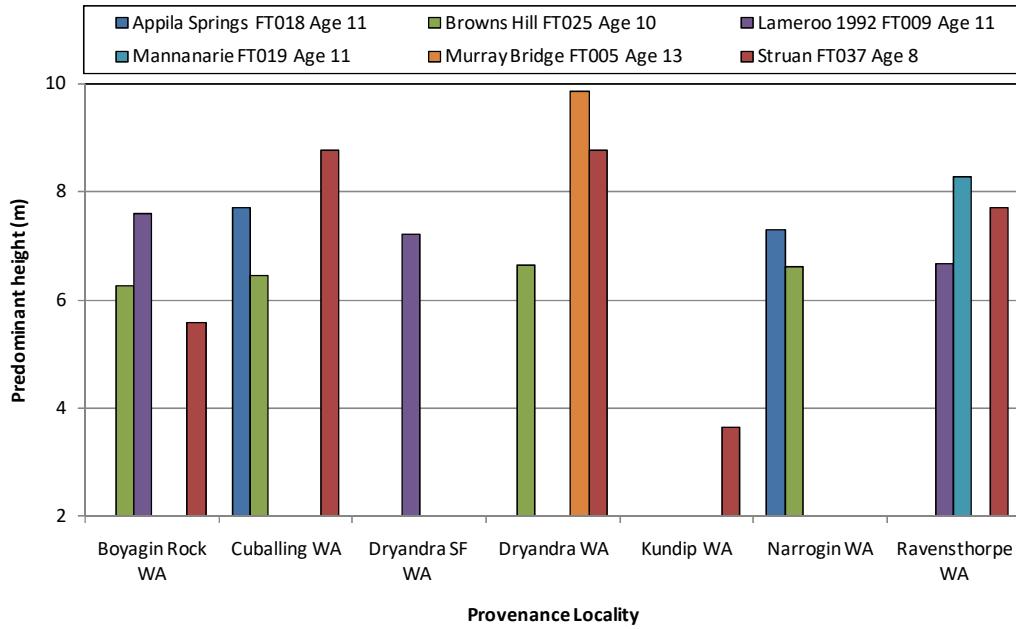


Figure 85: Comparative Predominant Height (m) performance of *E. astringens*.

The *E. astringens* provenance from Cuballing shows the best volume growth for this species when planted at Struan (age 8) producing 58.6 m<sup>3</sup>/ha (Figure 86), but volume decreased significantly when planted in the alkaline soils and low rainfall of Apilla Springs (age 11). Provenances from Dryandra WA when planted at Struan (age 8) and Murray Bridge (age 13) also have good volume results, but volume decreased when planted in the acidic soils of Brown's Hill. Provenances with Total Stem Volume results below 10 m<sup>3</sup>/ha are not graphed for this comparison.

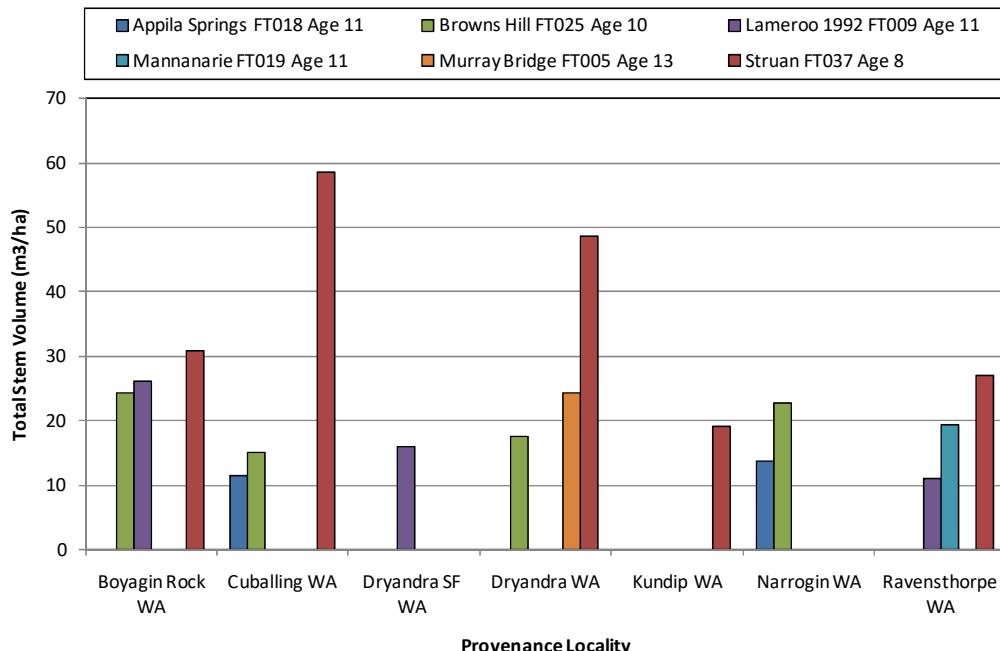


Figure 86: Comparative Total Stem Volume (m<sup>3</sup>/ha) performance of *E. astringens*.

#### 8.4 *Eucalyptus camaldulensis*

*E. camaldulensis* is the most widely distributed Eucalypt on mainland Australia which has durable timber and salinity tolerance. Provenances from Lowan Valley, Lake Albacutya, Lake Coorong, Lake Hindmarsh and Wimmera River when planted at Gumeracha Red Gum Mixed (age 14) produced the best height growth (Figure 87). *E. camaldulensis* provenances collected from Kalangadoo, Lake Albacutya and Silverton when planted at Woolumbool and provenances from Lake Albacutya when planted at Willalooka (both age 9) show good predominant height comparison when compared to Gumeracha Red Gum Mixed trial site, considering the 5 year age difference.

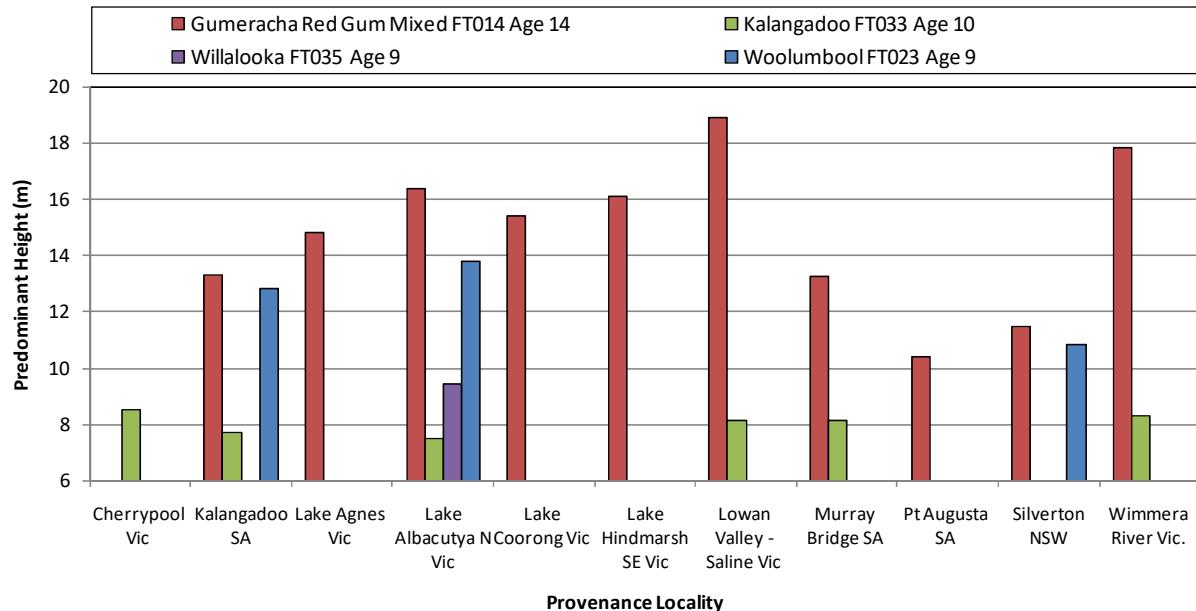


Figure 87: Comparative Predominant Height (m) performance of *E. camaldulensis* provenances.

The Gumeracha trial site has shown excellent volume (MAI) results with provenances from Wimmera River, Lowan Valley and Lake Albacutya performing the best (Figure 88). Provenances planted at Woolumbool have also shown good volume results, particularly from Lake Albacutya. Provenances with a Mean Annual Increment below 5 m<sup>3</sup>/ha/yr are not graphed for this comparison.

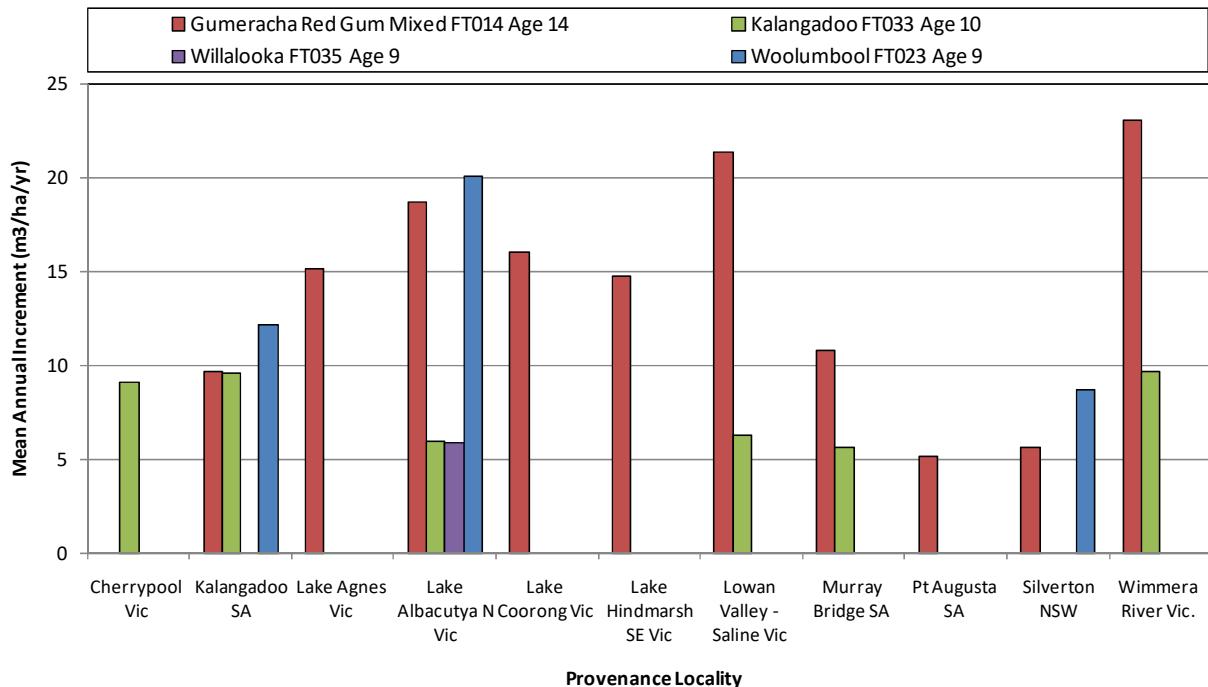


Figure 88: Comparative Mean Annual Increment (m<sup>3</sup>/ha/yr) performance of *E. camaldulensis* provenances.

## 8.5 *Eucalyptus cladocalyx*

*E. cladocalyx* has relatively fast growth rates with moderately durable and malleable timber. Provenances collected from Flinders Chase, Wilmington, Wirrabara F.R and Wirrabara S.A. when planted at Gumeracha FT012 & FT015 trial sites (both age 14) show the best predominant height results across all sites (Figure 89). Provenances from Flinders Chase, Kangaroo Island and Wilmington when planted at Montarra and Kalangadoo (both age 10) are growing well compared to Gumeracha trial sites, considering the 4 year age difference. Provenances collected from Cleve Hills (age 9) would not be recommended as a suitable provenance for future farm tree applications.

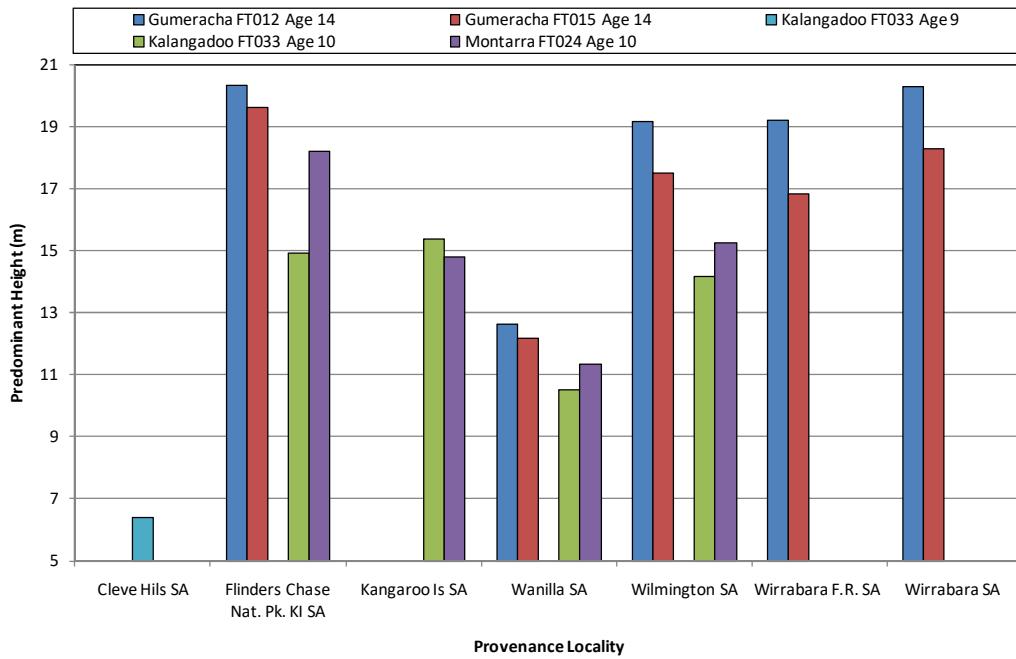


Figure 89: Comparative Predominant Height (m) performance of *E. cladocalyx* provenances.

At the Montarra trial site, Flinders Chase provenances show the best volume (MAI) production with 52.4 m<sup>3</sup>/ha/yr (Figure 90). Provenances from Flinders Chase and Kangaroo Island when planted at Kalangadoo (age 10) also show good volume growth. Interestingly, Gumeracha trial sites volume was lower compared to Montarra trial site which both have acidic soil and rainfall greater than 850mm annually. Provenances with a Mean Annual Increment below 5 m<sup>3</sup>/ha/yr are not graphed for this comparison.

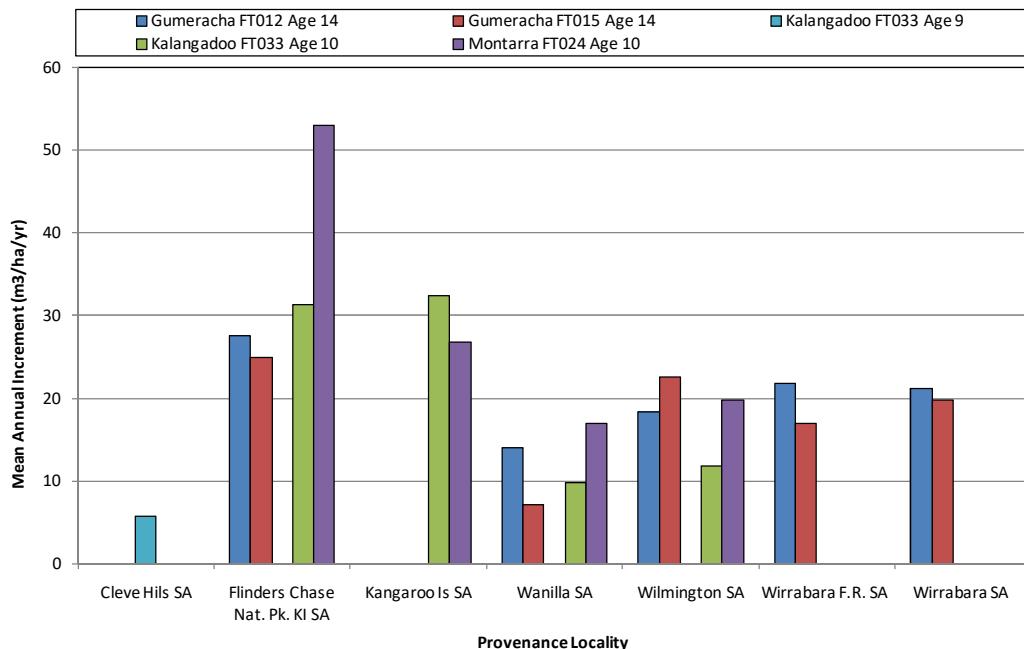


Figure 90: Comparative Mean Annual Increment (m<sup>3</sup>/ha/yr) performance of *E. cladocalyx* provenances.

## 8.6 *Eucalyptus botryoides*

*E. botryoides* is a fast growing tree that tolerates saline soils with heavy clay or sandy soils. Provenances collected from Orbost when planted at Montarra (age 8) and Termeil when planted at Kalangadoo (age 7) show the best predominant height results for this species (Figure 91). Narooma provenances have resulted in a lower predominant height when planted at Willalooka (age 9) which has less acidic soil (pH 7) and lower annual rainfall (400-500mm) than the Montarra and Kalangadoo trial sites (pH 5.5, annual rainfall 700-900mm).

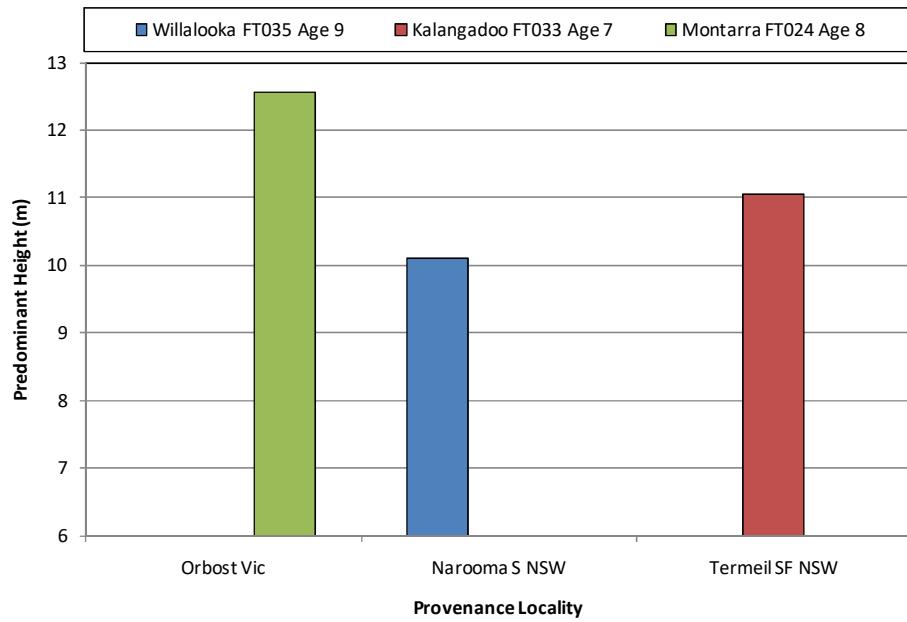


Figure 91: Comparative Predominant Height (m) performance of *E. botryoides* provenances.

Provenances collected from Orbost when planted at Montarra and provenances from Termeil when planted at Kalangadoo have shown excellent Total Stem Volume results with a TSV greater than 120m<sup>3</sup>/ha (Figure 92). Willalooka trial sites have a significantly lower TSV possibly due to soil properties and lower annual rainfall for this area.

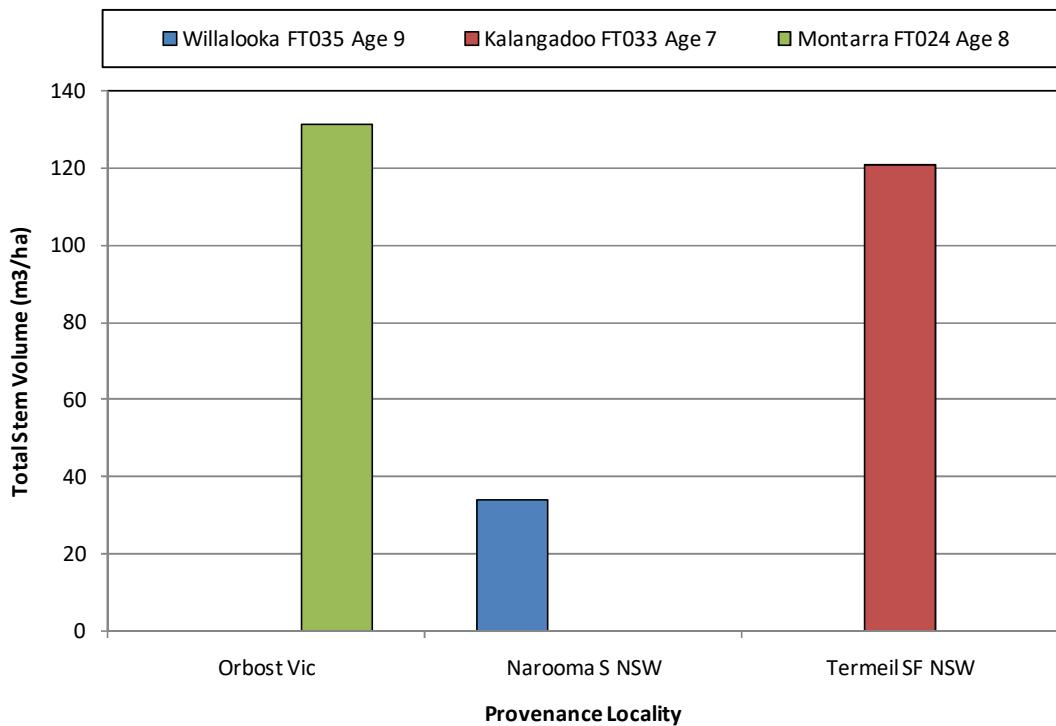


Figure 92: Comparative Total Stem Volume (m<sup>3</sup>/ha) performance of *E. botryoides* provenances.

## 8.7 *Eucalyptus globulus*

*E. globulus* is a fast growing species that is millable and suitable for pulpwood. Provenances from Rylstone and Bruthen are *E. globulus* ssp. *bicostata*, while provenances from Cann Valley are *E. globulus* ssp. *maidenii*. The remaining provenances collected are *E. globulus* ssp. *globulus*. Generally *E. globulus* ssp. *globulus* is more vigorous and has better form than the other *E. globulus* subspecies.

Provenances from Huonville when planted at Gumeracha FT014 (age 14) appear to be the best performing of this species, (Figure 93). Provenances collected from Police Point and Huonville when planted at Gumeracha FT016 (both age 14) show excellent height results which are similar to all provenances planted at this trial site. *E. globulus* collected from Otways (age 10) when planted at Montarra are showing good height when compared to provenances planted at Gumeracha (age 14) considering the 4 year age difference.

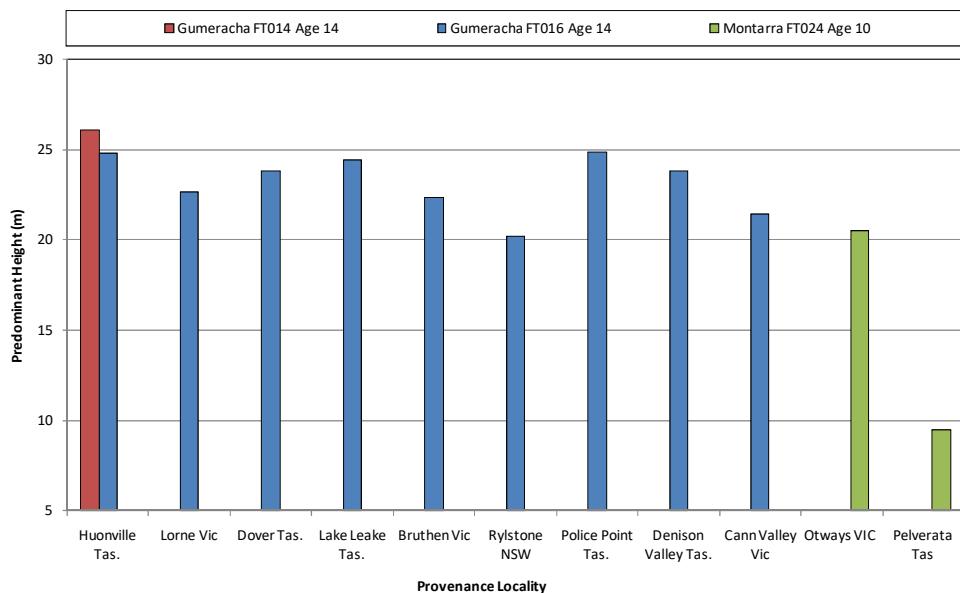


Figure 93: Comparative Predominant Height (m) performance of *E. globulus* provenances, including subspecies *bicostata* and *maidenii*.

The most productive *E. globulus* provenances are from Huonville when planted at Gumeracha (age 14) and Otways when planted at Montarra (age 10). These localities have similar characteristics with each having a slightly acidic soil and comparatively high rainfall. Figure 94 shows the adaptability of *E. globulus* across a range of site types, with the subspecies *bicostata* and *maidenii* performing quite well, but not as well as the more vigorous ssp. *globulus*. Provenances collected from Pelverata show poor volume growth when planted at Montarra. Better representation of *E. globulus* provenances are needed for comparison across all sites.

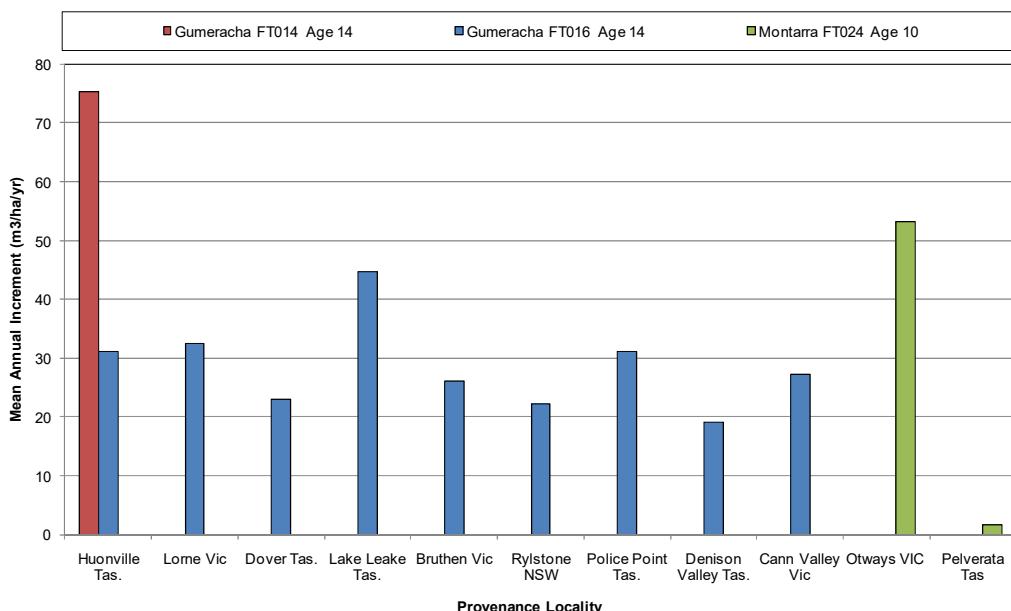


Figure 94: Comparative Mean Annual Increment ( $m^3/ha/yr$ ) performance of *E. globulus* provenances.

## 8.8 *Eucalyptus leucoxylon*

*E. leucoxylon* is a widespread and adaptable species that can produce a durable timber suitable for in-ground use and good mill applications. Provenances collected from Naracoorte and planted at Gumeracha FT014 (age 14) show the best predominant height results (Figure 95), closely followed by provenances from Kangaroo Island, Rushworth and Wirrabara when planted at Gumeracha FT015 (age 14). Provenances collected from Nelson/Glenelg are *E. leucoxylon* ssp. *megalocarpa* and provenances collected from Williamstown are *E. leucoxylon* ssp. *pruinosa*. These subspecies have performed well on the acidic soils of Cudlee Creek (age 7) considering the age difference between all other trial sites.

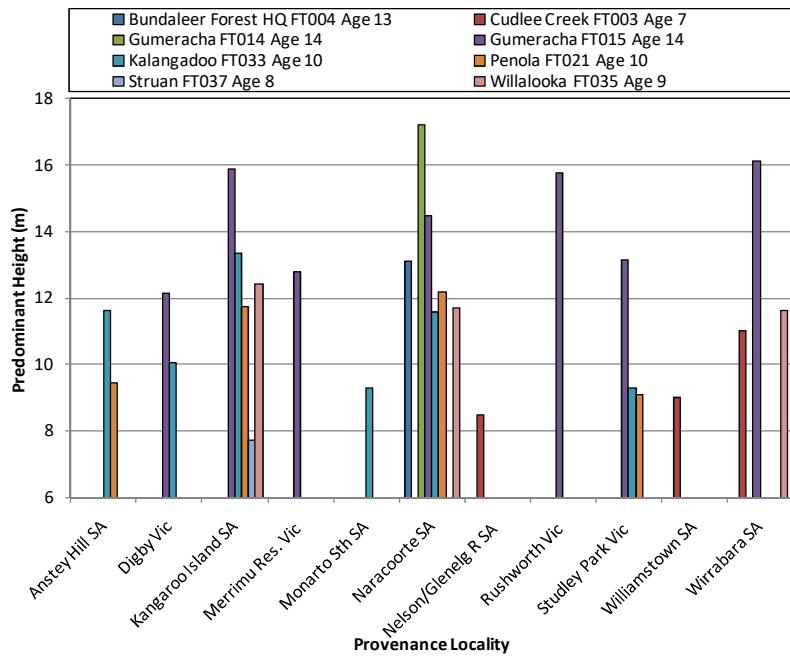


Figure 95: Comparative Predominant Height (m) performance of *E. leucoxylon* provenances.

Kangaroo Island is the most productive *E. leucoxylon* provenance when planted at Kalangadoo (age 10) with a Mean Annual Increment of more than 30 m<sup>3</sup>/ha/yr (Figure 96), closely followed by provenances collected from Naracoorte when planted at Gumeracha FT014 and Kangaroo Island and Rushworth when planted at Gumeracha FT015 (both age 14). Provenances collected from Anstey Hill when planted at Kalangadoo (age 10) and Wirrabara when planted at Gumeracha (age 14) also show very good volume. Provenances with a Mean Annual Increment below 5 m<sup>3</sup>/ha/yr are not graphed for this comparison.

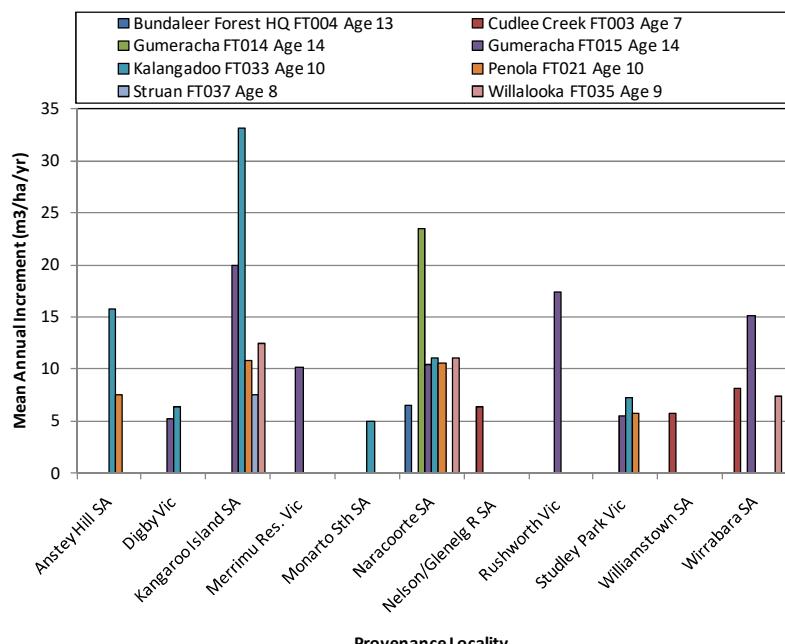


Figure 96: Comparative Mean Annual Increment (m<sup>3</sup>/ha/yr) performance of *E. leucoxylon* provenances.

## 8.9 *Eucalyptus occidentalis*

*E. occidentalis* is a fast growing species that is salt tolerant and produces heavy and strong timber. Sites with alkaline soils appear to suit this species with provenances planted at Redhill, Willalooka and Wolumbool growing best at these sites (Figure 97). Provenance collected from Pallerup Rock is the most tested provenance and showed strong results at all localities. Provenances planted at Struan (age 8) are showing excellent height when compared to Redhill (age 11) and Willalooka (age 9) considering the age difference. Murray Bridge provenances (age 13) have not performed as well possibly due to a lower rainfall zone.

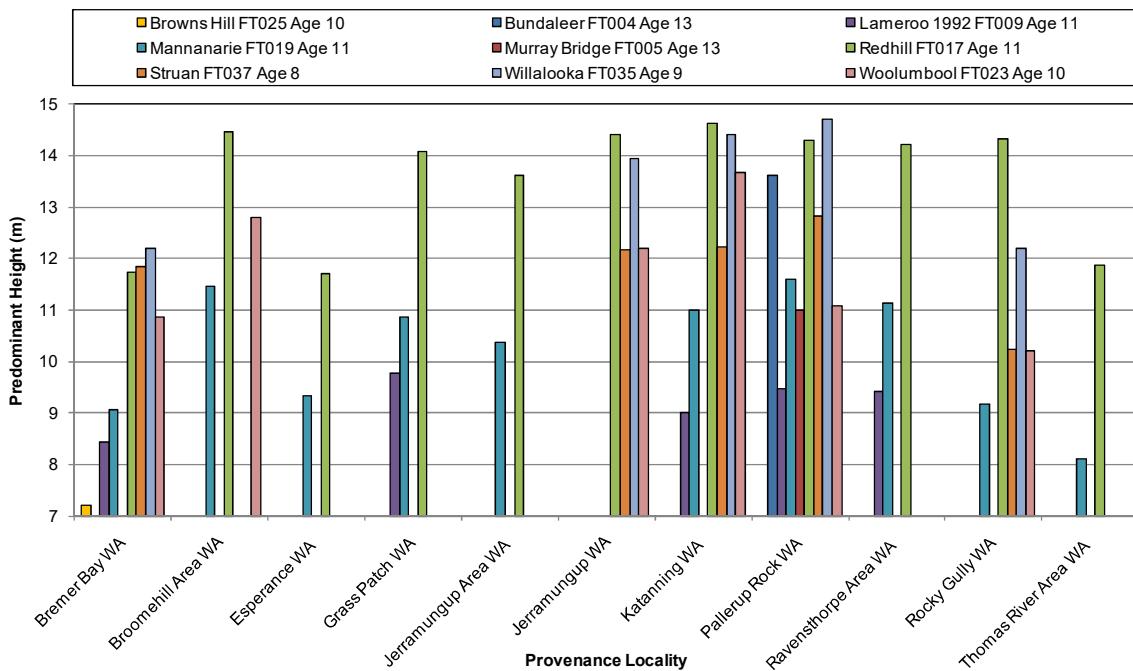


Figure 97: Comparative Predominant Height (m) performance of *E. occidentalis* provenances.

*E. occidentalis* provenances planted at Redhill trial site produced the best volume growth of this species overall, closely followed by provenances from Jerramungup and Pallerup Rock when planted at Willalooka (age 9) (Figure 98). The fast growing nature and salt tolerance of this species is evident by the values recorded at the saline site of Redhill. Provenances with a Total Stem Volume below 20 m<sup>3</sup>/ha are not graphed for this comparison.

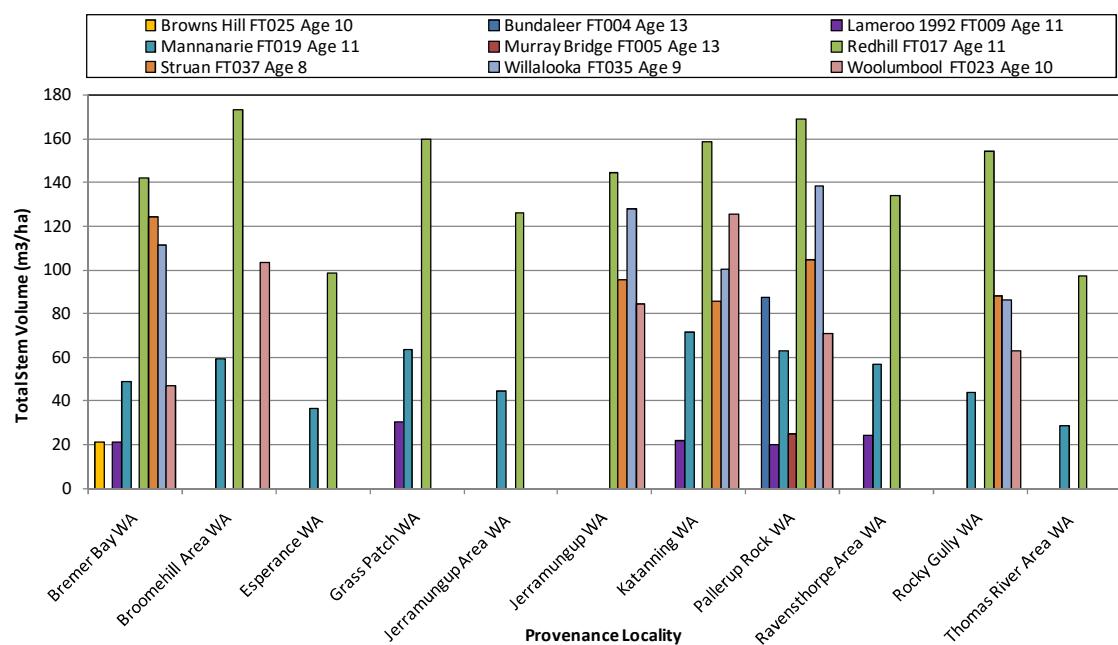


Figure 98: Comparative Total Stem Volume (m<sup>3</sup>/ha) performance of *E. occidentalis* provenances.

## 8.10 *Melaleuca uncinata*

*Melaleuca uncinata* (Broombush) does not like compacted soils but has a high tolerance to saline soils. *M. uncinata* provenances from Lameroo when planted at Paruna (age 10) show the best predominant height results (Figure 99), closely followed by provenances from Kangaroo Island when planted at Redhill (age 11) and Keith Saltpans when planted at Mt Bryan (age 9). Poor heights have been recorded for Karoonda and Murray Bridge when planted at Mt Bryan (age 9) and Lameroo when planted at Appila Springs (age 11).

Due to the form of this species, diameters results were not recorded; therefore no volume estimates were calculated. A form assessment is recommended for this species across all localities.

According to previous assessments the Kangaroo Island provenance has the better form for brush fencing with very few seed capsules in comparison to the other provenances trialled.

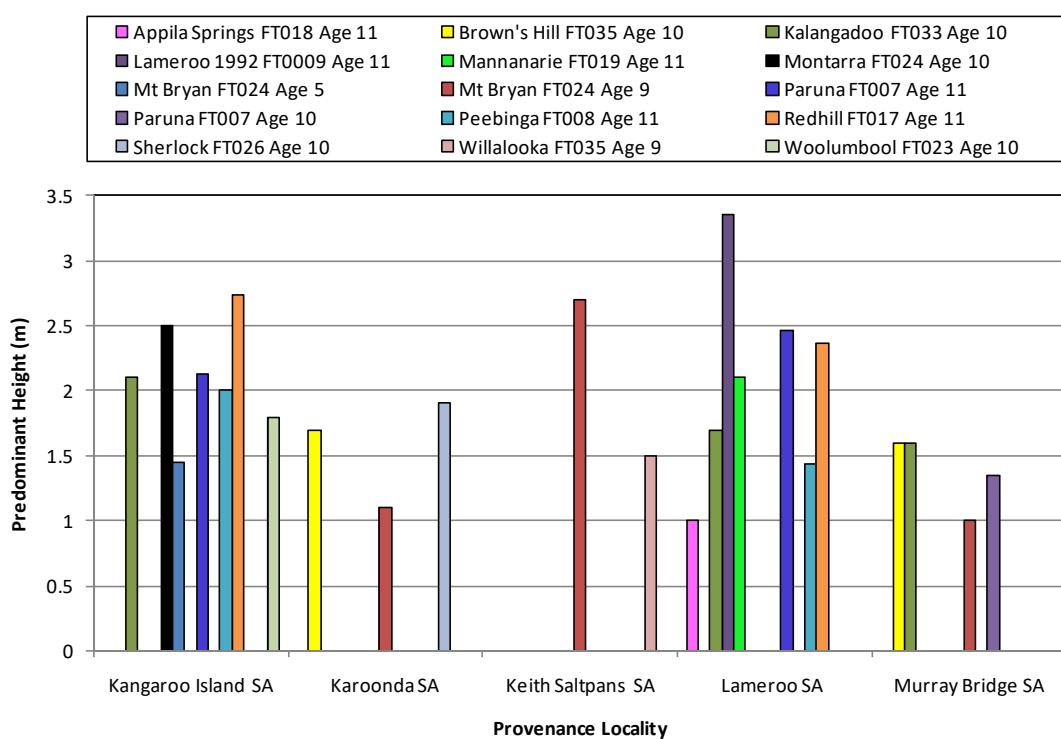


Figure 99: Comparative Predominant Height (m) performance of *M. uncinata* provenances.

## 9.0 APPENDIX 1 - SPECIES AND LOCATION INFORMATION

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<b>Species</b>	<b>Location</b>
<i>Acacia dealbata</i> ssp. <i>dealbata</i>	Lenswood
<i>Acacia decurrens</i>	Lenswood
<i>Acacia decurrens</i>	Struan
<i>Acacia filicifolia</i>	Lenswood
<i>Acacia mearnsii</i>	Lenswood
<i>Acacia mearnsii</i>	Struan
<i>Acacia melanoxylon</i>	Gumeracha Blackwood Site
<i>Acacia melanoxylon</i>	Gumeracha Mixed Red Gum Site
<i>Acacia melanoxylon</i>	Kalangadoo - Blackwood's
<i>Acacia melanoxylon</i>	Kalangadoo - Hunt's
<i>Acacia melanoxylon</i>	Montarra - Burgan's
<i>Acacia melanoxylon</i>	Penola - Murray's
<i>Acacia melanoxylon</i>	Struan
<i>Acacia salicina</i>	Gumeracha Blue Gum Site
<i>Acacia salicina</i>	Redhill - Dunsford's
<i>Acacia salicina</i>	Willalooka - Jackson's
<i>Acacia salicina</i>	Woolumbool - Del Fabbro's
<i>Acacia stenophylla</i>	Redhill – Dunsford's
<i>Acacia stenophylla</i>	Willalooka – Jackson's
<i>Acacia stenophylla</i>	Woolumbool - Del Fabbro's
<i>Allocasuarina fraseriana</i>	Gumeracha Mixed Blue Gum Site
<i>Allocasuarina leuhmannii</i>	Gumeracha Mixed Blue Gum Site
<i>Allocasuarina leuhmannii</i>	Gumeracha Mixed Red Gum Site
<i>Allocasuarina torulosa</i>	Gumeracha Mixed Blue Gum Site
<i>Allocasuarina torulosa</i>	Gumeracha Mixed Red Gum Site
<i>Callitris columellaris</i>	Appila Springs Reserve
<i>Callitris columellaris</i>	Coombe - Brookman's
<i>Callitris columellaris</i>	Mt Bryan - Quinn's
<i>Callitris columellaris</i>	Paruna
<i>Callitris columellaris</i>	Peebinga
<i>Callitris columellaris</i>	Sherlock - Woidt's
<i>Callitris preissii</i>	Appila Springs Reserve
<i>Callitris preissii</i>	Coombe - Brookman
<i>Callitris preissii</i>	Mt Bryan - Quinn's
<i>Callitris preissii</i>	Peebinga
<i>Casuarina cunninghamiana</i>	Kalangadoo – Hunt's
<i>Casuarina cunninghamiana</i>	Murray Bridge
<i>Casuarina glauca</i>	Browns Hill - Hagger's
<i>Casuarina glauca</i>	Kalangadoo - Hunt's
<i>Casuarina glauca</i>	Mannanarie - Young's
<i>Casuarina glauca</i>	Mt Bryan - Quinn's
<i>Casuarina glauca</i>	Penola - Murray's
<i>Casuarina glauca</i>	Redhill - Dunsford's
<i>Casuarina glauca</i>	Struan
<i>Casuarina glauca</i>	Willalooka - Jackson's
<i>Casuarina glauca</i>	Woolumbool - Del Fabbro's

<b>Species</b>	<b>Location</b>
<i>Casuarina pauper</i> ssp. <i>cristata</i>	Appila Springs Reserve
<i>Casuarina pauper</i> ssp. <i>cristata</i>	Browns Hill - Hagger's
<i>Casuarina pauper</i> ssp. <i>cristata</i>	Coombe - Brookman's
<i>Casuarina pauper</i> ssp. <i>cristata</i>	Lameroo 1992
<i>Casuarina pauper</i> ssp. <i>cristata</i>	Mannanarie – Young's
<i>Casuarina pauper</i> ssp. <i>cristata</i>	Mt Bryan - Quinn's
<i>Casuarina pauper</i> ssp. <i>cristata</i>	Paruna
<i>Casuarina pauper</i> ssp. <i>cristata</i>	Peebinga
<i>Corymbia maculata</i>	Gumeracha Mixed Red Gum Site
<i>Corymbia maculata</i>	Gumeracha Mixed Blue Gum Site
<i>Corymbia maculata</i>	Montarra - Burgan's
<i>Corymbia maculata</i>	Penola - Murray's
<i>Cupressus lusitanica</i>	Coombe – Brookman's
<i>Cupressus lusitanica</i>	Penola – Murray's
<i>Cupressus macrocarpa</i>	Coombe – Brookman's
<i>Cupressus macrocarpa</i>	Kalangadoo - Hunt's
<i>Cupressus macrocarpa</i>	Penola – Murray's
<i>Cupressus macrocarpa</i>	Struan
<i>Eucalyptus anoracea</i> ssp. <i>baxteri</i>	Coombe - Brookman's
<i>Eucalyptus astringens</i>	Appila Springs Reserve
<i>Eucalyptus astringens</i>	Browns Hill - Hagger's
<i>Eucalyptus astringens</i>	Bundaleer Forest HQ.
<i>Eucalyptus astringens</i>	Coombe - Brookman's
<i>Eucalyptus astringens</i>	Lameroo 1992
<i>Eucalyptus astringens</i>	Mannanarie – Young's
<i>Eucalyptus astringens</i>	Minnipa
<i>Eucalyptus astringens</i>	Murray Bridge
<i>Eucalyptus astringens</i>	Pinnaroo
<i>Eucalyptus astringens</i>	Struan
<i>Eucalyptus botryoides</i>	Kalangadoo - Hunt's
<i>Eucalyptus botryoides</i>	Montarra - Burgan's
<i>Eucalyptus botryoides</i>	Willalooka - Jackson's
<i>Eucalyptus brockwayi</i>	Appila Springs Reserve
<i>Eucalyptus brockwayi</i>	Browns Hill - Hagger's
<i>Eucalyptus brockwayi</i>	Mt Bryan - Quinn's
<i>Eucalyptus brockwayi</i>	Sherlock - Woidt's
<i>Eucalyptus camaldulensis</i>	Gumeracha Mixed Red Gum Site
<i>Eucalyptus camaldulensis</i>	Kalangadoo - Hunt's
<i>Eucalyptus camaldulensis</i>	Minnipa
<i>Eucalyptus camaldulensis</i>	Redhill - Dunsford's
<i>Eucalyptus camaldulensis</i>	Struan
<i>Eucalyptus camaldulensis</i>	Willalooka - Jackson's
<i>Eucalyptus camaldulensis</i>	Woolumbool - Del Fabbro's
<i>Eucalyptus camaldulensis</i> ssp. <i>obtusa</i>	Gumeracha Mixed Red Gum Site
<i>Eucalyptus camaldulensis</i> ssp. <i>obtusa</i>	Kalangadoo - Hunt's
<i>Eucalyptus cladocalyx</i>	Browns Hill - Hagger's
<i>Eucalyptus cladocalyx</i>	Coombe - Brookman's
<i>Eucalyptus cladocalyx</i>	Gumeracha Sugar Gum Site
<i>Eucalyptus cladocalyx</i>	Gumeracha Mixed Blue Gum Site
<i>Eucalyptus cladocalyx</i>	Kalangadoo - Hunt's
<i>Eucalyptus cladocalyx</i>	Lameroo 1992
<i>Eucalyptus cladocalyx</i>	Mannanarie - Young's
<i>Eucalyptus cladocalyx</i>	Montarra - Burgan's
<i>Eucalyptus cladocalyx</i>	Mt Bryan - Quinn's
<i>Eucalyptus cladocalyx</i>	Penola - Murray's

<b>Species</b>	<b>Location</b>
<i>Eucalyptus cladocalyx</i> ssp. <i>nana</i>	Browns Hill - Hagger's
<i>Eucalyptus cladocalyx</i> ssp. <i>nana</i>	Coombe - Brookman's
<i>Eucalyptus cneorifolia</i>	Struan
<i>Eucalyptus cneorifolia</i>	Willalooka - Jackson's
<i>Eucalyptus cornuta</i>	Browns Hill - Hagger's
<i>Eucalyptus cornuta</i>	Mt Bryan - Quinn's
<i>Eucalyptus cornuta</i>	Struan
<i>Eucalyptus dumosa</i>	Sherlock - Woidt's
<i>Eucalyptus dundasii</i>	Appila Springs Reserve
<i>Eucalyptus dundasii</i>	Browns Hill - Hagger's
<i>Eucalyptus dundasii</i>	Lameroo 1992
<i>Eucalyptus dundasii</i>	Mannanarie - Young's
<i>Eucalyptus dundasii</i>	Mt Bryan - Quinn's
<i>Eucalyptus dundasii</i>	Paruna
<i>Eucalyptus dundasii</i>	Sherlock - Woidt's
<i>Eucalyptus famelica</i>	Woolumbool - Del Fabbro's
<i>Eucalyptus famelica</i>	Redhill - Dunsford's
<i>Eucalyptus fasciculosa</i>	Browns Hill - Hagger's
<i>Eucalyptus fasciculosa</i>	Coombe - Brookman's
<i>Eucalyptus fasciculosa</i>	Montarra - Burgan's
<i>Eucalyptus fasciculosa</i>	Willalooka - Jackson's
<i>Eucalyptus globulus</i> ssp. <i>bicostata</i>	Gumeracha Mixed Blue Gum Site
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	Gumeracha Blue Gum Site
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	Gumeracha Mixed Red Gum Site
<i>Eucalyptus globulus</i> ssp. <i>globulus</i>	Montarra - Burgan's
<i>Eucalyptus globulus</i> ssp. <i>Maidenii</i>	Gumeracha Blue Gum Site
<i>Eucalyptus gomphocephala</i>	Struan
<i>Eucalyptus gracilis</i>	Paruna
<i>Eucalyptus gracilis</i>	Peebinga
<i>Eucalyptus grandis</i>	Kalangadoo - Hunt's
<i>Eucalyptus grandis</i>	Lameroo 1992
<i>Eucalyptus halophila</i>	Redhill - Dunsford's
<i>Eucalyptus incrassata</i>	Paruna
<i>Eucalyptus incrassata</i>	Peebinga
<i>Eucalyptus kondininensis</i>	Mt Bryan - Quinn's
<i>Eucalyptus kondininensis</i>	Redhill - Dunsford's
<i>Eucalyptus kondininensis</i>	Struan
<i>Eucalyptus largiflorens</i>	Penola - Murray's
<i>Eucalyptus largiflorens</i>	Struan
<i>Eucalyptus largiflorens</i>	Willalooka - Jackson's
<i>Eucalyptus leptophylla</i>	Sherlock - Woidt's
<i>Eucalyptus leptophylla</i>	Lameroo 1992
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Appila Springs Reserve
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Browns Hill - Hagger's
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Bundaleer Forest HQ.
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Cudlee Creek
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Gumeracha Mixed Blue Gum Site
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Gumeracha Mixed Red Gum Site
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Kalangadoo - Hunt's
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Lameroo 'Bews' 1990

<b>Species</b>	<b>Location</b>
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Lameroo 1992
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Mannanarie - Young's
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Minnipa
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Mt Bryan - Quinn's
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Murray Bridge
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Penola - Murray's
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Pinnaroo
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Struan
<i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i>	Willalooka - Jackson's
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	Bundaleer Forest HQ.
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	Cudlee Creek
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	Lameroo 'Bews' 1990
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	Minnipa
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	Murray Bridge
<i>Eucalyptus leucoxylon</i> ssp. <i>megalocarpa</i>	Pinnaroo
<i>Eucalyptus leucoxylon</i> ssp. <i>pauperita</i>	Murray Bridge
<i>Eucalyptus leucoxylon</i> ssp. <i>petiolaris</i>	Minnipa
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	Browns Hill - Hagger's
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	Bundaleer Forest HQ.
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	Cudlee Creek
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	Lameroo 'Bews' 1990
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	Minnipa
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	Mt Bryan - Quinn's
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	Murray Bridge
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	Pinnaroo
<i>Eucalyptus leucoxylon</i> ssp. <i>pruinosa</i>	Willalooka - Jackson's
<i>Eucalyptus longicornis</i>	Appila Springs Reserve
<i>Eucalyptus longicornis</i>	Mt Bryan - Quinn's
<i>Eucalyptus longicornis</i>	Lameroo 1992
<i>Eucalyptus obliqua</i>	Penola - Murray's
<i>Eucalyptus occidentalis</i>	Appila Springs Reserve
<i>Eucalyptus occidentalis</i>	Browns Hill - Hagger's
<i>Eucalyptus occidentalis</i>	Bundaleer Forest HQ.
<i>Eucalyptus occidentalis</i>	Lameroo 1992
<i>Eucalyptus occidentalis</i>	Mannanarie - Young's
<i>Eucalyptus occidentalis</i>	Minnipa
<i>Eucalyptus occidentalis</i>	Mt Bryan - Quinn's
<i>Eucalyptus occidentalis</i>	Murray Bridge
<i>Eucalyptus occidentalis</i>	Paruna
<i>Eucalyptus occidentalis</i>	Pinnaroo
<i>Eucalyptus occidentalis</i>	Redhill - Dunsford's
<i>Eucalyptus occidentalis</i>	Struan
<i>Eucalyptus occidentalis</i>	Willalooka - Jackson's
<i>Eucalyptus occidentalis</i>	Woolumbool - Del Fabbro's
<i>Eucalyptus odorata</i>	Appila Springs Reserve
<i>Eucalyptus ovata</i>	Kalangadoo - Hunt's
<i>Eucalyptus ovata</i>	Struan
<i>Eucalyptus ovata</i>	Willalooka - Jackson

<b>Species</b>	<b>Location</b>
<i>Eucalyptus porosa</i>	Appila Springs Reserve
<i>Eucalyptus porosa</i>	Coombe - Brookman's
<i>Eucalyptus porosa</i>	Mannanarie - Young's
<i>Eucalyptus porosa</i>	Mt Bryan - Quinn's
<i>Eucalyptus porosa</i>	Paruna
<i>Eucalyptus porosa</i>	Lameroo 1992
<i>Eucalyptus porosa</i>	Redhill - Dunsford's
<i>Eucalyptus porosa</i>	Sherlock - Woidt's
<i>Eucalyptus punctara</i>	Montarra - Burgan's
<i>Eucalyptus salicola</i>	Redhill - Dunsford's
<i>Eucalyptus saligna</i>	Kalangadoo - Hunt's
<i>Eucalyptus saligna</i>	Montarra - Burgan's
<i>Eucalyptus salmonopholia</i>	Browns Hill - Hagger's
<i>Eucalyptus salmonopholia</i>	Mt Bryan - Quinn's
<i>Eucalyptus salmonopholia</i>	Sherlock - Woidt's
<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	Gumeracha Mixed Blue Gum Site
<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	Gumeracha Mixed Red Gum Site
<i>Eucalyptus sideroxylon</i> ssp. <i>sideroxylon</i>	Minnipa
<i>Eucalyptus sideroxylon</i> ssp. <i>tricarpa</i>	Browns Hill - Hagger's
<i>Eucalyptus sideroxylon</i> ssp. <i>tricarpa</i>	Gumeracha Mixed Blue Gum Site
<i>Eucalyptus tereticornis</i>	Kalangadoo - Hunt's
<i>Eucalyptus tereticornis</i>	Penola - Murray's
<i>Eucalyptus tereticornis</i>	Struan
<i>Eucalyptus tereticornis</i>	Woolumbool - Del Fabbro's
<i>Eucalyptus viminalis</i>	Willalooka - Jackson's
<i>Eucalyptus viminalis</i> ssp. <i>clygnatensis</i>	Coombe - Brookman's
<i>Grevillea robusta</i>	Gumeracha Silky Oak Site
<i>Grevillea striata</i>	Paruna
<i>Melaleuca cuticularis</i>	Redhill - Dunsford's
<i>Melaleuca cuticularis</i>	Willalooka - Jackson's
<i>Melaleuca cuticularis</i>	Woolumbool - Del Fabbro's
<i>Melaleuca uncinata</i>	Appila Springs Reserve
<i>Melaleuca uncinata</i>	Browns Hill - Hagger's
<i>Melaleuca uncinata</i>	Coombe - Brookman's
<i>Melaleuca uncinata</i>	Gumeracha Mixed Blue Gum Site
<i>Melaleuca uncinata</i>	Kalangadoo - Hunt's
<i>Melaleuca uncinata</i>	Lameroo 1992
<i>Melaleuca uncinata</i>	Mannanarie - Young's
<i>Melaleuca uncinata</i>	Montarra - Burgan's
<i>Melaleuca uncinata</i>	Mt Bryan - Quinn's
<i>Melaleuca uncinata</i>	Paruna
<i>Melaleuca uncinata</i>	Peebinga
<i>Melaleuca uncinata</i>	Redhill - Dunsford's
<i>Melaleuca uncinata</i>	Sherlock - Woidt's
<i>Melaleuca uncinata</i>	Willalooka - Jackson's
<i>Meleleuca uncinata</i>	Woolumbool - Del Fabbro's
<i>Pawlonia tomentosa</i>	Montarra - Burgan's
<i>Pinus halepensis</i>	Browns Hill - Hagger
<i>Pinus halepensis</i>	Sherlock - Woidt's
<i>Robinia pseudoacacia</i>	Gumeracha Black Locust Site
<i>Robinia pseudoacacia</i>	Gumeracha Mixed Red Gum Site
<i>Robinia pseudoacacia</i>	Montarra - Burgan's