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A TREESMART FACTSHEET

Eucalyptus camaldulensis

Lynne McMahon

Farm Forestry Extension Officer

Brendan George

Industry Leader Bioenergy & Private Forestry

Industry Development, Agriculture & Forestry

Robyn Hean

Natural Resource Economist

Primary Industries Science & Research

Country of Origin: Australia

Common name/s: Murray Red Gum, Red Gum, River Gum, River Red Gum

Synonym/s: *Eucalyptus camaldulensis* var. *camaldulensis*, *Eucalyptus rostrata*

Species Summary

A hardy, fast growing gum that is tolerant of salinity, waterlogging, drought and frost, with a range of amenity and wood uses. As the eucalypt with the widest natural distribution, provenance variation for many traits is large, so selection of stock is important when planting. It is grown extensively, so much of its silvicultural and pest information is known. Due to its naturally spreading crown, close spacing and good management are required to develop a desirable form for timber production. The wood is hard, heavy and durable; care is needed in drying, but it is sought after for a range of uses and is prized for use in heavy furniture. It is regarded as excellent firewood.

Description and Form

E. camaldulensis is a relatively large riparian tree, commonly growing to 20 m in height, but rarely exceeding 50 m. In open woodlands it usually has a short, thick bole and a large, spreading crown with heavy branching. In plantations it can have a clear bole up to 20 m with a lightly-branched crown.

Northern and southern forms of *E. camaldulensis* are generally recognised: *E. camaldulensis* var. *camaldulensis* refers to the southern form and *E. camaldulensis* var. *obtusa* is the northern form.

E. camaldulensis var. *camaldulensis* has a basal stocking of rough bark for the first 1–2 m of the trunk. Above this, the bark is smooth, cream to white, pale grey or buff with grey and reddish patches. Leaves are non-glaucous and the flower buds form a beaked cap. *E. camaldulensis* var. *obtusa* has smooth bark to ground level. Bark is white to cream, sometimes with reddish brown patches. Leaves are glaucous (with a white waxy bloom) and flower buds are more rounded in shape.

E. camaldulensis is generally fast growing. Tree form is variable but is typically poor in southern Australia.

Weediness and Toxicity

Both var. *camaldulensis* and var. *obtusa* have become naturalised away from their natural distribution in areas of southern Western Australia (WA), Victoria (VIC) and Queensland (QLD).

Natural and Planted Distribution

E. camaldulensis has the widest distribution of all eucalypts and is the only species to occur naturally in all mainland states of Australia. It occurs along, or near, almost all of the seasonal watercourses in arid and semi-arid inland areas. It is also found along many other streams and rivers in the south-east of the continent, mainly on the inland side of the Great Dividing Range. It is generally a riparian tree, but sometimes extends to floodplains, for example, at Barmah on the Murray River in New South Wales (NSW), and to the slopes of ranges as in the Mt Lofty Ranges near Adelaide in South Australia (SA).

E. camaldulensis var. *camaldulensis* has a mainly temperate distribution in the Murray-Darling River system, extending from southern QLD to VIC. *E. camaldulensis* var. *obtusa* comprises all other

populations occurring outside the Murray-Darling Basin. It occurs extensively throughout tropical and subtropical Australia. *E. camaldulensis* subsp. *simulata* occurs along a few river systems in north-eastern QLD.

E. camaldulensis occurs on a variety of soil types and is mainly a tree of depositional or alluvial sites, although it sometimes occurs on the margins of salt lakes. It is common on heavy clays in southern Australia, but usually occurs on sandy alluvial soils in the north. It also grows on calcareous clay loams derived from limestone in SA.

Latitude 24°S is used as an indicator to separate northern and southern forms. The southern form is best suited for Mediterranean winter-rainfall climates and grows best on deep silty soils. The northern form is best suited to tropical, summer rainfall regions with sandy and alluvial soils, but will grow well on alkaline sodic sites.

Globally, *E. camaldulensis* is the most widely planted tree in arid and semi-arid lands. There have been extensive plantings in the Mediterranean region using seed from southern Australian provenances. Planting in the tropics, especially in South East Asia, Mexico and Brazil is increasing with the availability of seed from northern Australian provenances.

Environmental Limits		
	Min	Max
Rainfall (mm)	150	2500
Temperature (°C)*	1	41
Altitude (m)	20	700
* Mean monthly temperature		

Commercial Product Information

Heartwood is red, fine textured with interlocked wavy grain, hard, heavy and very durable. The timber has a range of purposes including: heavy construction, poles, fence posts, railway sleepers, framing, flooring, plywood, veneer, specialty furniture and turnery. It is also excellent for firewood and charcoal production. Preservation treatment is required for durability of wood in the ground and sapwood is susceptible to lyctid borer attack.

Timber needs care when drying to minimise warping; some collapse occurs, with shrinkage approximately 4% radial and 8% tangential but reduces on reconditioning. It is unsuitable for steam bending.

Basic density ranges from 502–879 kg/m³. Wood from young trees is pink in colour with an air-dry density of around 650 kg/m³. An air-dry density of 778 kg/m³ for 17 year old trees has been measured.

Young plantation-grown trees are used overseas for pulpwood but pulp yields and quality are low in southern Australia. It is also used overseas for hardboard and particle board and shows potential for fibreboards.

E. camaldulensis is a good producer of pollen and honey. It often exudes an astringent gum with medicinal properties and the leaves of some provenances e.g., 'Petford' (QLD) give cineole-rich eucalyptus oil with fresh weights ranging from 0.3% to 2.8%.

Products and Services

Commercial Products	Suitability
Solid Timber (construction, furniture, packaging, posts, rails & poles, fencing, firewood, specialty timber and cabinet timber)	✓✓
Wood Panels (particleboard, fibreboard and panelling)	✓✓
Processed Wood (woodchips, pulp, paper, activated carbon and charcoal)	✓✓
Veneer (face veneer, rotary peeled veneer and laminated veneer)	✓
Brush Fencing	-
Chemical (tannins, oil, gum and latex)	✓
Flowers / Foliage (ornamental)	-
Fodder	-
Food (bush food, fruit)	-
Honey (honey, pollen and nectar)	✓✓
Medicinal	✓
Seed	-

Environmental Services	Suitability
Habitat	✓✓
Nitrogen Fixing	-
Salinity Control	✓
Shade / Shelter	✓✓
Soil / Water Conservation	✓
Windbreak	✓✓

✓ = Potentially Suitable ✓✓ = Very suitable

Wood Density			
	Min	Max	Mean
Green	-	-	1130
Air-dry *	650	975	900
Basic	-	-	710

* At 12% moisture content

Environmental Services Information

Useful for shade, shelter and in windbreaks; deep-rooted, which allows grass growth right up to the base; bark is resistant to stock damage. For south-eastern Australia, *E. camaldulensis* along with *Eucalyptus melliodora* (Yellow Box) and *Acacia melanoxylon* (Blackwood) are considered superior shade trees. It is also attractive as an ornamental for acreage plantings.

Useful for the reclamation of degraded lands, especially salt-affected land subject to seasonal waterlogging.

Excellent habitat; provides prolific pollen and nectar for a wide range of insects and birds. The foliage is an important food source for koalas and provides nesting sites for many birds. Stream bank trees are important for fish habitat—they provide shade, an insect source, and fallen branches for snags which provide egg-laying sites for native fish such as the Murray Cod.

Limiting Factors

Poor form and susceptibility to insect attack limit its use for plantation establishment in the low-rainfall zone of southern Australia and in coastal areas of QLD.

E. camaldulensis is not well adapted to calcareous soils, except one provenance on the lower Eyre Peninsula, SA, where it grows with *E. porosa* as a low, poorly-formed tree on shallow soils over limestone.

Diseases and Pests

Due to widespread planting and use, considerable disease and pest information is known about this species. It has low to high susceptibility to insect attack, depending on provenance and individual, but sapwood is susceptible to attack by lyctid borers.

Riverine provenances are damaged by sawfly (*Perga* spp.), gumleaf skeletoniser (*Uraba lugens*), Christmas beetle (*Anoplagnathus* spp.), psyllid/lerp (*Cardiaspina* spp., *Glycaspis* spp.), leafblister sawfly (*Phylacteophaga froggatti*), leaf beetle

(*Chrysophtharta* spp., *Paropsis* spp.), shothole miner (*Perthida* sp.) and cup moth (*Doratifera* spp.).

Inland provenances e.g., 'Silverton', 'Flinders Ranges' and clones are more resistant to lerp and leafblister sawfly, but susceptible to sawfly, gumtree hopper (*Eurymela* spp.) and tip-feeding bug (*Amorbus* spp.).

Disease and pest problems may be reduced by careful selection of provenances and by minimising environmental stresses through watering and adequate nutrient status, with fertiliser used where appropriate.

Flowers, Seed and Propagation

Flowers are white, in clusters of 7–11, generally from December to February, although flowering time depends on locality: summer in the south; autumn in the north-west; and winter-spring in the north-east of Australia. *E. camaldulensis* flowers heavily every two or three years, depending on the season. Seed collection is best from March to September, although collection times may vary due to regional and seasonal variability. The first seed crop from young trees can occur by age three.

Seeds are cuboid or pyramidal, with smooth faces, 1–1.5 mm long; yellow to brownish yellow, with two seed coats (other red gums have a single dark brown to black seed coat). There are between 230 and 1160 viable seeds/g. Refrigerated seed will keep for several years and no pre-sowing treatment is required.

When propagated under warmer conditions, seedlings can reach plantable size in 6–8 weeks, compared to 4 months in cooler southern areas. Improvements in root/seedling growth are possible when using nursery containers coated with copper carbonate, particularly when raising seedlings for dryland afforestation.

Flowering and Seed Collecting Periods												
	J	F	M	A	M	J	J	A	S	O	N	D
Flower	✓	✓	-	-	-	-	-	✓	✓	✓	✓	✓
Seed	-	-	✓	✓	✓	✓	✓	✓	✓	-	-	-

Silviculture and Management

E. camaldulensis can be successfully established with similar preparation and treatments as many other eucalypts, ensuring good weed control prior to planting. Seedlings can be either hand or mechanically planted. To allow machinery to be used, a spacing of 3–5 m between rows is required. When pulpwood production is the principal

objective, a spacing of 3 m x 2 m (1667 trees/ha) is often used. Wider spacing of 4 m x 2 m (1250 trees/ha) or 5 m x 2 m (1000 trees/ha) are recommended when larger trees are required. When growing for firewood, direct seeding at 250 g/linear km (approximately 750 g/ha) with rows 4 m apart is an option. Wider spacing between rows facilitates mechanical cultivation for weed control. Sow early to mid spring in the south to maximise soil water availability and to avoid heavy frosts.

Silviculture varies between northern and southern provenances as planting time should coincide with rainfall. Wider spacing and shorter rotation may be considered in warmer regions with weed control remaining critical, especially in early years. Progressive thinning and pruning is required for clearwood production.

All provenances coppice well for five or more rotations; good coppicing may be increased by felling trees outside the dry season with a cleanly cut short stump and minimum bark damage.

Economic Information

Good timber can be achieved in 30 years in well managed plantations and within 10 years for on-farm use (posts/firewood). Prices received are variable and dependent on local market conditions.

E. camaldulensis is not commonly planted for wood production in Australia due to its form and provenance variability. Large variation exists in growth rate and in tolerance to salinity, drought, frost and insect attack. It is therefore very important to select the correct provenance for the purpose and location for which the species is being grown. In the seasonally dry tropics, provenances like 'Petford' (QLD) and 'Katherine' (Northern Territory) are the most sought after for breeding programs. For southern temperate Australia, the best performing provenances (in terms of survival and growth) for saline and seasonally waterlogged conditions include 'Lake Albacutya' and 'Douglas River' (VIC) and 'Silverton' (NSW). In Western Australian trials, 'Laura' (SA) has performed well.

Tolerance Information

Soil Depth

Shallow:	Tolerates
Moderate:	Tolerates
Deep:	Prefers

Soil Fertility

Low:	-
Moderate:	Prefers
High:	-

Soil Salinity (dS/m)

Slight (2-4):	Tolerates
Moderate (4-8):	Tolerates
High (8-16):	Tolerates
Extreme (>16):	Avoid

Soil pH

Very acid (<4):	-
Acid (4-6):	Prefers
Neutral (6-8):	Prefers
Alkaline (8-10):	Tolerates
Very alkaline (>10):	Avoid

Surface Soil Texture

Light:	Tolerates
Medium:	Tolerates
Heavy:	Prefers

Drainage

Rapid:	-
Good:	-
Poor:	Tolerates

Inundation

Short Term:	Prefers
Long Term:	Tolerates

Landscape Position

Ridge Top:	-
Upper Slope:	-
Mid Slope:	Tolerates
Lower Slope:	Tolerates
Flat:	Prefers
Creek / River side:	Prefers

Frost (min Temp oC)

Light (>2):	Tolerates
Medium (2 to -2):	Tolerates
Heavy (-2 to -6):	Tolerates
Extreme (>-6):	-

Qualifying Tolerance Information

Moderately salt-tolerant, although there is considerable provenance variation for tolerance to salinity and waterlogging. Expect reduced growth at about ECe 5 dS/m and reduced survival above about ECe10 dS/m. (ECe refers to the Electrical Conductivity of a saturated soil paste extract).

Tolerates extremes of heat and cold and great variation in rainfall; has a moderate to high drought tolerance. Often occurs naturally along watercourses, so low rainfall in its natural habitat does not always indicate the extent of drought tolerance. It prefers access to a water table or periodic flooding and will withstand long periods of flooding.

Frost tolerance varies with provenance, however very good tolerance, even when young, has been found in some inland provenances; up to 20 frosts a year may be experienced in southern and inland areas.

A recent revision of climatic requirements for establishment of *E. camaldulensis* for farm forestry suggests that a mean annual rainfall of 400-2000 mm is needed and that particular care should be taken when planting in lower rainfall environments to ensure that local conditions are suitable and appropriate planting densities are used.

Glossary

A glossary of terms is available on our website.

References

- Boland, D.J., Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P. M., Johnston, R.D., Kleinig, D.A. & Turner, J.D. (2006). *Forest trees of Australia*, 5th Edition, CSIRO Publishing, Melbourne.
- Bonney, N. (1997). *Economic native trees and shrubs for South Australia*. Greening Australia (South Australia) Inc. Campbelltown, SA.
- Bootle, K.R. (1983). *Wood in Australia: types, properties and uses*. McGraw Hill Publishing, Sydney.
- Brooker, M. I. H., Connors, J. R. & Slee, A. V. (2002). *Euclid: Eucalypts of southern Australia*. CSIRO Publishing. Victoria. (CD Rom).
- Carnegie, A. J. (2002). *Field guide to common pests and diseases in eucalypt plantations in NSW*. Research and Development Division, State Forests of NSW.
- Clarke, B., McLeod, I. & Vercoe, T. (Eds.) (2009). *Trees for farm forestry: 22 promising species*, RIRDC Publication No. 09/015. RIRDC, Canberra.
<https://rirdc.infoservices.com.au/downloads/09-015.pdf>
- Cremer, K.W. (Ed.) (1990). *Trees for rural Australia*. CSIRO Division of Forestry and Forest Products, Inkata Press, Melbourne.
- Dunn, G.M., Huth, J.R. & Lewty, M.J. (1997). 'Coating nursery containers with copper carbonate improves root morphology of five native Australian species used in agroforestry systems', *Agroforestry Systems* 37: 143-155 (1997).
- Jovanovic, T. & Booth, T. (2002). *Improved species climatic profiles*. RIRDC Publication No 02/095, RIRDC, Canberra.
- Kater, A. (2003). *Farm forestry species for the Hunter Valley and Central Coast*. Greening Australia NSW Inc., Sydney.
- Lambert, M. J. & Turner, J. (2000). *Commercial forest plantations on saline lands*. CSIRO Publishing, Melbourne.
- Marcar, N. & Crawford, D. (2004). *Trees for saline landscapes*. RIRDC Publication No. 03/108. RIRDC, Canberra.
- Marcar, N., Crawford, D., Leppert, P., Jovanovic, T., Floyd, R. & Farrow, R. (1995). *Trees for saltland: a guide to selecting native species for Australia*. CSIRO publishing, Canberra.
- Rural Industries Research & Development Corporation (2002). *Breeding trees for the low rainfall regions of southern Australia*, Joint Venture Agroforestry Program Research Update Series No. 4. RIRDC Canberra.
- Stelling, F. (1998). *From little things big things grow...South West Slopes revegetation guide*. Murray Catchment Management Committee and Department of Land and Water Conservation, Albury NSW.

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