

# Farm Forestry Species Profile for North Central Victoria.



## Sugar gum

*Eucalyptus cladocalyx*

### Species attributes

Sugar gum is a large, smooth barked eucalypt with dense and durable wood that is pale in colour. It has long been a popular farm forestry species and woodlots are a common and familiar feature of Victoria's western plains. From a distance the open crowns appear like an odd series of umbrellas silhouetted against the sky. Up close, it becomes evident that this impression is a stand of sugar gums with the foliage concentrated on the end of long slender branches.

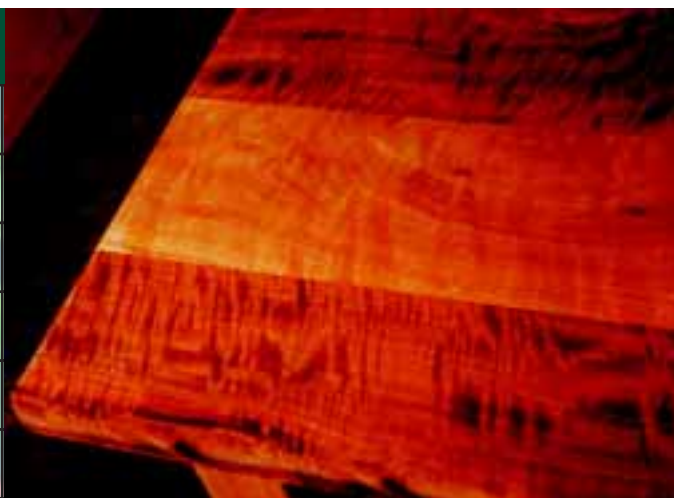
Sugar gum has excellent tolerance to drought and exposure, and since the expansion of farming into the more arid regions of south-eastern Australia, has proven to be a suitable species for shelter, firewood, posts and poles. It is increasingly becoming recognised as a solid construction and attractive furniture timber.

Sugar gum is suited to the lower rainfall parts of the region, and grows well on both irrigated and dry, seemingly infertile sites. It readily produces vigorous coppice regrowth when harvested.

Traditionally the timber was utilised for spears and clubs by aboriginal people, whilst burls were made into tarnaks (bowls). The gum secreted from the tree acted as a gluing agent and leaves were used to line the inside of shelters (gunya).

### Wood and timber products

Craftwood	Limited to select pieces
Furniture	Excellent turning and joinery timber
Flooring	Hard wearing
Construction	Outstanding structural timber
Fencing	Posts and droppers (including electric)
Firewood	Slow burning



### Market potential

Sugar gum is a hard, durable and attractive pale timber with an array of product options. Its performance in milling and ease of drying make it one of the best potential timber species in Australia.

These features, combined with its tolerance of exposure, drought and a wide range of conditions, has led to increasing interest from farm forestry and plantation investors.

*Eucalyptus cladocalyx* has great potential for farm forestry throughout the region.

### Species description

*Eucalyptus cladocalyx* (F. Mueller) is a medium to large tree with smooth whitish bark that has irregular patches of contrasting colours due to weathering. Periodic shedding of large flakes expose new bark which produces a mottled effect, and hues of slaty-blue, buff and deep grey contrast with the overall chalky appearance.

The tree is long-lived, straight in form (though this varies over its natural distribution) and may grow up to 40 metres in height. The foliage is composed of lance-shaped leaves arranged alternately around the stem. Leaves are quite leathery, with a distinctive mid-rib and may be up to 15 cm in length and 3 cm in width. They are deep green in colour, though paler on the underside, with a glazed appearance. New growth is reddish in colour and the common name refers to the sweet taste of the juvenile foliage.

Creamy white flowers in clusters of 4-16 are borne on leafless branchlets within the crown. Development of fruit after fertilisation produces barrel shaped seed capsules around 1 cm in length and 0.5 cm in width. These capsules are distinctly ribbed with deeply enclosed valves.

The dwarf, horticultural variety of sugar gum *Eucalyptus cladocalyx* var. *nana* is likely to have originated from seed of trees naturally occurring on the Eyre Peninsula. These sugar gums grow smaller in size with a bushier habit and twisted branches.

### Other products

Seed	\$150 to \$200 per kg uncleanrd
Honey	Good quality, moderate yield



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## Flowering period

Sugar gum flowers in late summer.

## Plant propagation

When collecting seed, select from healthy and vigorous specimens with desired form. Capsules collected should be dried to release the seed. Once released, the seed may require cleaning through a sieve to separate them from the chaff (aborted ovules), though this is not always necessary.

Sugar gum contains around 130 seeds per gram and requires no pre-treatment. Placing seed in a glass of water is a standard test for seed viability. The seeds that sink are usually viable and those that float to the top can be discarded or sown into a 'test' tray.

To germinate, sprinkle the seed evenly over trays or directly into cells containing a suitable seed-raising mix and cover lightly. For successful germination, a temperature of around 23°C and adequate light and moisture will be needed. Take care when watering so as not to dislodge the seed or disturb developing roots.

Germination of viable seed usually occurs within three weeks.

Clean seed should be stored away from sunlight in a cool dry place with adequate protection from insects and rodents. A sachet of naphthalene or a dusting of a pyrethrin-based insecticide may be useful if seeds are to be stored in a container or bag. Seed can be sown directly on prepared ground in warm moist conditions.

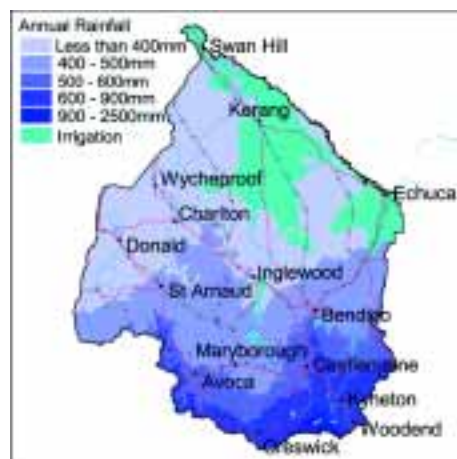
Seed viability	High
Pre-treatment required	No
Optimal germination temperature	23°C
Seeds per gram (approx.)	130



## Natural distribution

*E. cladocalyx* is endemic to South Australia where it occurs in three now separate and disconnected areas surrounding the Spencer Gulf. Tree growth and form differ over these three regions due to the local climatic and environmental conditions. The best known specimens occur in the southern Flinders Ranges and it is likely that most plantation specimens have been sourced from this provenance. On the Eyre Peninsula sugar gum forms a small crooked tree up to about 15 metres in height, and on Kangaroo Island grows to around 20 metres with a straighter, bowed form.

This distribution represents an altitudinal range from near sea level to 600 metres above, and rainfall within the 350-750 mm band. The main areas of distribution are composed of shallow skeletal soils that tend to be acidic. Less commonly it is found on ironstone gravel soils and sandy clay loams. Associated overstorey species include yellow gum *E. leucoxydon*, peppermint box *E. odorata*, grey box *E. microcarpa*, and long-leaved box *E. goniocalyx*. The understorey may be composed of a dense shrub layer, including a number of smaller wattles, accompanied by a grassy ground cover.



## Occurrence in North Central Victoria

Predominantly a woodlot and shelter species in rural districts, sugar gum is also a popular tree in gardens, public spaces, and along roadsides throughout the region. Consequently sugar gum can be found in many landscapes of varying soil type, aspect and climate.

## Site preference

Sugar gum is a highly versatile species with exceptional tolerance to drought and exposure to hot conditions. It grows best on the sandier clay loams but adapts to a wide range of soils, and will tolerate reasonably saline ground and moderately waterlogged conditions.

It should be noted that Sugar gum has only a low to moderate resistance to damage from frost, and is particularly susceptible when young. Naturally occurring sugar gum in the Flinders Ranges may only experience 20 frost days per year. Selective siting, planting adjacent species that may afford some protection, careful guarding and weed control can minimise risks. Another strategy growers should adopt to avoid frequent and severe frosts is to plant in late spring.

Sugar gum is a highly versatile species with exceptional tolerance to drought and exposure to hot conditions.

## Recommended establishment density

830 trees per hectare and greater	4 x 3 m spacings
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## Silvicultural characteristics

The relatively isolated and fragmented natural range of sugar gum, combined with distinct variable growth characteristics, provide useful criteria for selection. Seed should be collected from trees with desired form and provenance information recorded. Seed from trees of the southern Flinders Ranges will grow larger and straighter in form than those of the Eyre Peninsula and Kangaroo Island.

The relatively isolated and fragmented

Many of the sugar gum plantations in the western district are likely to be from the Flinders Ranges and it is these that produce quality saw logs. Currently Wilmington, Wirrabara and Mt McIntyre provenances are being favoured for establishment. A tree-breeding program is under way with a number of trials established in south-eastern Australia. From these, better information on select provenances should soon become available.

## Establishment costs

Cost estimates for planting of 830 trees per hectare.

Soil preparation	\$200
Weed control	\$100
Seedlings	\$330
Planting	\$150
Guards	\$250
Guarding	\$170
<b>Total</b>	<b>\$1200</b>

Seedlings and young trees will need to be protected from grazing animals. The foliage of seedlings may poison stock due to the release of prussic acid from the sugars contained within the leaves. Adult foliage whilst green is palatable to stock, but also becomes toxic once leaves begin to wilt.



### Hardness & workability

Sugar gum has Class 1 durability rating with a fine and decorative interlocked grain. It is an exceptionally hard, strong timber, and though difficult to work, polishes to a superb finish. The strength and resistance to wear make sugar gum suitable for a range of applications. Its uses extend from quality indoor and outdoor furniture, flooring and decking, poles and posts, stair treads and benchtops, to heavy construction work. The strength of the timber allows for joinery and fine furniture designs without compromising robustness, although difficulties may be encountered with gluing.

## Pests and diseases

In a tree's natural habitat insects and diseases are continually present, and a certain amount of damage can be expected in plantations. In the longer term a balance is usually achieved and tree growth sustained. Often a decline in tree health is the culmination of various stresses. Imbalance for example, may result from severe insect attack combined with extreme environmental conditions such as prolonged waterlogged conditions. Weakened trees will prove more susceptible to pests and diseases. Select healthy trees and aim to minimise impacts by reducing competition through thinning.

### Wood

The heartwood of sugar gum has good resistance to decay and attack from the lyctid borer, though the sapwood may prove susceptible. Larger borers, such as larvae of the longicorn beetle will damage trees when stressed. Despite its Class 1 durability rating, the wood of sugar gum is particularly susceptible to damage from termites (white ants), reducing its resistance to decay. Infestation is most likely where trees have been damaged or pollarded.

### Foliage

Sugar gum has few insect pests or associated fungal diseases, though periodically may be subject to attack from sap sucking scale insects and leaf feeders such as sawflies, leaf and Christmas beetles. Severe infestations are rare. Seedlings and young trees may host grey mould in exceptionally warm, humid conditions.

Christmas beetles (*Anoplagnathus* spp.) are generally considered minor pests on eucalypts by feeding on the young leaves during the warm months. The beetle larvae (Curl grubs) feed in the soil on developing roots and organic material and usually only pose a problem during the establishment period, if feeding in sufficiently large numbers.

Chrysomelid leaf beetles (*Paropsis* spp.) are dome shaped with a distinct margin along their back where the wings meet. They are on average around 10 mm in length, of variable colour, with relatively long antennae. Both adults and their larvae feed on the foliage during spring, particularly the younger leaves. Damage is very conspicuous with rounded segments chewed out of the leaf margins, occasionally only leaving the midrib. Manual control is usually not practical and relying on predators and parasites to control populations during the larval stage is usually more effective.



Chrysomelid and Christmas Beetles.

## Timber characteristics

### Appearance

Sugar gum is a blonde timber that polishes to a light ginger-orange colour. It has fine even texture and is often free of defect, due in part to the self-pruning nature of this species. The timber grain of certain trees may produce features such as beeswing and fiddleback.

### Shrinkage & Drying

Shrinkage is indicated by the difference between the green and air dry density and is due to moisture loss from the timber on drying. With sugar gum this is about 6% through, and 10.5% across the face of back-sawn boards. Sugar gum is relatively slow to air dry. It can usually be air-dried without significant degrade if handled efficiently and carefully. Although care must be taken during the drying process, it is relatively easy to avoid surface checking. Log ends should be sealed. Ensure facilities are appropriate for correct drying of timber. Timber should be evenly stacked to allow free circulation around each piece and positioned level, with sufficient clearance from the ground. This will enable a balance in the air and moisture circulation during the drying or seasoning process.

Sugar gum is highly suited to kiln drying with minimal surface checking and degrade. It is possible that some reduction in shrinkage can be achieved through steam reconditioning at around 20% moisture content.



## Wood properties

Green density <sup>1</sup>	1200 kg/m <sup>3</sup>
Air dry density <sup>1</sup>	1090 kg/m <sup>3</sup>
Durability <sup>2</sup>	High (Class 1)



## Product specifications

Sound logs with a diameter of 300mm or more are suitable for milling. Sawlogs are preferably green, between

2.4 and 3.6 metres in length, though this depends on the intended end use. Bark can be left on. Sapwood can be retained for most applications and percentage recovery of timber from logs is typically high.

Sawn timber can be used green for many applications including fencing, posts, construction and decking. Where necessary, allowance must be made for shrinkage. Shorter lengths and smaller diameters are suited to posts, palings and droppers.

Sugar gum timber can be air dried to 15-17% moisture content. Kiln drying to 8 – 12% is essential for higher value markets such as fine furniture and flooring. Timber is preferably air dried before kiln drying.

Processing costs for milling of high value timber is \$160 - \$240 per m<sup>3</sup>. Kiln drying green timber under contract costs \$300-\$600 per m<sup>3</sup>.

## Markets

Sugar gum hasn't yet developed a firm place in existing timber markets, though indications suggest it has many marketable attributes. Its strength and durability make it highly suitable for a wide range of applications and markets.

Despite its exceptional hardness it is soft in appearance and can possess significant variation in colour and grain characteristics.

Recognition of sugar gum as a fine timber species is on the increase. Currently, kiln dried timber retails for \$1800 to \$2700 per m<sup>3</sup>. Choice pieces may sell for higher prices. Structural grade timbers sell for \$800 - \$1600 per m<sup>3</sup>. Dry firewood currently fetches \$50 - \$100 per tonne, although production costs are high. Due to its smooth gum bark and self-pruning habit, this species lends itself to mechanical firewood processing.



Coppice for firewood.

## Risks

Although *E. cladocalyx* is not indigenous to the region, it is highly suited as a plantation eucalypt, and offers flexibility via a range of product and market options.

It is a vigorous plantation species that is being extensively trialed and has a history of farm use in the region for lower value products such as firewood and fencing. It has however, the capacity to produce higher value sawn timbers, for which it is increasingly being utilised. In a plantation situation (where good genetic material has been used) it is of good form – lending itself to sawlog production with minimal management requirements. This, combined with recently developed knowledge relating to its performance in processing explains why adoption of this species for farm forestry is on the increase.

Its timber rivals other pale hardwoods on the market such as Victorian Ash, but offers greater strength, durability and advantages in processing. Markets exist for small dimension and roundwood products, improving the likelihood of a commercial thinning operation, minimising waste, and potentially increasing overall returns. To minimise risks, producers should aim to grow quality products for premium markets, and participate in the marketing and promotion of the species.



## References

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<sup>2</sup>CSIRO *Revised Natural Durability Classification* CSIRO, 1997.

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