

# Spotted gum (plantations)

**Species names:** *Corymbia citriodora* subsp. *variegata* (CCV), *C. citriodora* subsp. *citriodora* (CCC), *Corymbia* hybrids (hybrids between CCV or CCC and *C. torelliana*) are all recognised by the timber trade name 'spotted gum'.

**Other names:** lemon-scented gum, iron gum, spotty, *Corymbia* hybrids.



A ten year old spotted gum plantation thinned to 500 stems per hectare in south-eastern Queensland.



A ten year old spotted gum plantation in the subtropics, thinned to about 400 stems per hectare.



Planted spotted gum with grazing in south-eastern Queensland.

## Key attributes

Spotted gum is an important commercial tree in Queensland that produces a high quality, hard, durable and attractive timber. Currently, spotted gum is the highest volume native hardwood harvested in Queensland and has been used for construction, engineering, appearance products and round timbers. Spotted gum timber has a well-established market, and is in demand both nationally and internationally.

## The potential for spotted gum plantations in Queensland

More than 10 000 hectares have been planted in subtropical Queensland since the 1990s. Spotted gum plantations have also been established in most other Australian states as well as overseas.

When matched to appropriate sites plantation spotted gum has shown good growth rates and productivity, a relatively high tolerance to drought, pests and diseases and adaptability to a broad

range of site types in Queensland. The better-performing varieties in Queensland include some *Corymbia* hybrids and CCV varieties improved through tree breeding.

Plantation-grown spotted gum timber is potentially suitable for the same solid wood products and applications as spotted gum timber sourced from native forest, as well as veneers, pulpwood, other processed wood products, carbon sequestration and bioenergy fuel.

Spotted gum plantations can also be a good source of pollen and nectar for honey and play a role in land rehabilitation and management.

On appropriate sites, spotted gum plantations can provide shade and windbreak shelter, habitat, biodiversity, salinity control and the benefits of improved water quality.

## Growing spotted gum

### Rainfall

Better growth: sites that receive an annual average rainfall of >700 mm for 7 out of 10 years.

### Potential productivity

Research trials and current plantation performance suggest that potentially, the better growing regions for commercial wood products are North Tropical Coast; Herbert and Lower Burdekin; Central Coast; Capricornia; Wide Bay & Burnett (coastal and inland); Southeast Coast.

#### Productivity (volume) for young, plantation spotted gum in Queensland\*

MAI: mean annual increment (cubic metres/hectare/year)

<i>North Tropical Coast:</i>	MAI – best and average: 7 m <sup>3</sup> /ha/yr
<i>Central Coast:</i>	MAI - best provenances: 16 m <sup>3</sup> /ha/yr   average: 10 m <sup>3</sup> /ha/yr
<i>Capricornia:</i>	MAI - best provenances: 10 m <sup>3</sup> /ha/yr   average: 9 m <sup>3</sup> /ha/yr
<i>Wide Bay &amp; Burnett - coastal:</i>	MAI - best provenances: 16 m <sup>3</sup> /ha/yr   average: 8 m <sup>3</sup> /ha/yr
<i>Wide Bay &amp; Burnett - inland:</i>	MAI - best provenances : 6 m <sup>3</sup> /ha/yr   average: 4 m <sup>3</sup> /ha/yr
<i>Southeast Coast:</i>	MAI - best provenances: 10 m <sup>3</sup> /ha/yr   average: 4 m <sup>3</sup> /ha/yr

*\*During these trials, regional temperatures were 0.4–1.7°C higher than the long-term average and for most regions, rainfall was between 77% and 87% of the long-term average, but higher (108%) in the North Tropical Coast region.*

### Soils

Spotted gum grows on a wide range of soil types although better performance has been associated with deeper, moist, well-drained and moderately heavy soils. Higher productivity has

been achieved on red and yellow podzolics and some sodosols (e.g. soloths and solodized solonetz); Dermosol soils (e.g. prairie soils) Ferrosol soils (e.g. krasnozems).

### **Site conditions**

*Drainage:* Well-drained to moderately impeded soils are preferable. Extended water-logging can result in reduced productivity and moderate mortality.

*Soil fertility:* Low to high fertility and low to moderately high pH is preferable.

*Dry sites:* Relatively drought tolerant. Deep lateral roots improve access to water in the lower soil profile.

*Frost:* Only a mild tolerance to frost. Damage or mortality is possible in areas prone to medium or heavy frosts.

*Salinity:* Tolerant of low to medium salinity levels.

*Cyclone prone areas:* Moderately resilient to cyclonic winds, especially when planted away from the coast.

### **Pests and diseases**

*Leaf pests:* Seasonal outbreaks of erinose mite, leaf beetles, Christmas beetles and swarming scarabs can cause defoliation in young plantations, especially in drought stressed trees, resulting in poorer growth in the following season.

*Stem pests:* Spotted gum plantations have a relatively low incidence of attack by longicorn beetles, when compared with other plantation hardwoods. The incidence of attack by stem borers is variable among the varieties of *Corymbia* hybrids.

*Diseases:* Quambalaria shoot blight (QSB) damages new shoots and leaves and can affect growth and form in spotted gum, although susceptibility varies between varieties and provenances.. Plantation trials indicate that *C. henryi* is generally more highly susceptible to QSB and that *Corymbia* hybrids generally have a higher tolerance of QSB. Tree breeding programs are developing varieties of spotted gum that are more tolerant of QSB. Spotted gum is potentially susceptible to myrtle rust (*Puccinia psidii*), although susceptibility may vary between provenances.

### **Tree improvement**

Queensland provenances of spotted gum with superior plantation productivity traits have been established in tree breeding programs. Superior traits of improved tree varieties include higher productivity, greater pest and disease tolerance, and better tree form and wood quality.

*Corymbia* hybrid varieties have also been produced from spotted gum breeding programs. On suitable sites *Corymbia* hybrids have several advantages over pure spotted gum varieties including better productivity, a greater tolerance to diseases, insects and frost, and more potential for vegetative propagation. The best varieties are also suitable for a wider range of site conditions, potentially increasing the availability of land suitable for plantation development. *Corymbia* hybrids have been incorporated in clonal trials as part of a commercialisation program for industry.

### **Seed availability**

Improved spotted gum seed (CCV) should be available from the Queensland Government's Department of Agriculture, Fisheries and Forestry from mid-2014. *Corymbia* hybrid seed is available via Clonal Solutions Australia Pty Ltd, with several months notice.

## Wood

Traditionally, spotted gum from native forests has been used for general construction and appearance products (e.g. flooring, decking, framing, furniture, fencing and parquetry) and engineering (e.g. poles, piles and girders). Nationally and internationally, it is also used for pulpwood products including woodchips, pulp, paper, cardboard, MDF, particleboard, fibreboard, activated carbon and charcoal.



An 11 year old *Corymbia* hybrid tree from the spotted gum improvement program.



Spotted gum logs at a mill.



The wood grain of mature spotted gum.

## Potential products and applications for plantation spotted gum

Wood properties and products research indicates that plantation spotted gum is potentially suitable for a number of product types:

*Solid sawn wood:* Potentially suitable for general sawn construction and appearance products, particularly when around 30 years old or older.

*Veneers and engineered wood:* Potentially suitable for panels, veneers and engineered timbers, particularly when 15 years old or older.

*Solid round wood:* Potentially suitable for round timber such as poles.

*Pulpwood, other processed wood and bioenergy fuel:* Potentially suitable.

## Wood properties

Spotted gum timber is very durable and has excellent wood properties including high density, hardness and strength. Recent research has established that the properties of plantation timber grown in Queensland are similar to those published for mature, spotted gum wood from native forests.

Wood properties	Plantation-grown (age)	Mature, native forest-grown
Air dry density (kg m <sup>3</sup> )	850 (12 years)	1,010
Heartwood proportion	45% (12 years)	-
Janka hardness (kN)	9 (12 years) (hard)	11 (very hard)
Unit shrinkage (% dimensional change per 1% moisture content change)	0.3 - radial 0.3 - tangential (40 years)	0.3 - radial 0.4 - tangential
Stiffness (GPa)	14–18 (12 years)	23
Estimated carbon content (kgm <sup>3</sup> )	-	420
Peeling recovery	35–60% (12 years)	-

### **Natural durability**

For highly durable species (assessed from natural-grown timber), mature (30+ years) plantation-grown trees appear to have similar durability.

*Above-ground durability:* Class 1 – life expectancy >40 years.

*In-ground durability:* Class 2 – life expectancy 15–25 years.

### **Wood pests**

*Lycine susceptibility:* Untreated sapwood is susceptible to lycine borer attack.

*Termite resistance:* Resistant.

### **Working with spotted gum wood**

Spotted gum wood machines well due to its natural greasiness. Fixing is straightforward with the use of standard fittings and fastenings. Machining and surface preparation is needed immediately before gluing, as with most high density species. It is suitable for steam bending and readily accepts paint, stain and polish.

### **Requirements for approved uses**

Permitted uses, conditions for use and required preservative treatments are given in: 'Construction Timbers in Queensland' and 'Timber Answers' (see below).

## More information

Australian timbers. Volume 1: Commercial timber species of eastern subtropical Australia. Sewell A (1997)

Forest Trees of Australia. Boland DJ, Brooker MIH, Chippendale GM, Hall N, Hyland BPM, Johnson RD, Kleinig DA, McDonald MW, Turner, JD (2006) CSIRO Publishing, Melbourne.

Index no. 343 in: [Construction Timbers in Queensland](#). Properties and specifications for satisfactory performance of construction timbers in Queensland. Books 1 and 2. Queensland Government, Brisbane, 2010.

[Pests and diseases](#). Pests and diseases in trees, forests and plantations.

[Plantation potential in Queensland's regions](#). Information about plantation forestry research trials in Queensland.

[Productivity of plantation forest tree species in north-eastern Australia](#): a report from the Forest Adaptation and Sequestration Alliance. Lee DJ, Brawner J, Smith TE, Hogg BW, Meder R and Osborne DO (2011). A report to the Australian Government Department of Agriculture, Fisheries and Forestry, 52 pp.

[Plantation hardwoods research](#). Read more about research and development in Queensland's plantation hardwoods.

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[Spotted gum](#). Wood properties of native forest spotted gum.