



Eucalyptus pellita: Amazonia Reforestation's red mahogany

An e-book for tropical tree investors
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One of the most popular tropical tree plantation species is *Eucalyptus*. There are more than 700 varieties of *Eucalyptus* trees, the vast majority of which come from Australia. A commercially successful plantation tree should include rapid growth under plantation conditions, straight stems with limited branching, and decent wood quality for particular uses and products. Plantation species should also be tolerant of a variety of soils and location conditions, and be resistant to common pests and diseases. *Eucalyptus pellita* meets all of those criteria, as it has proven itself an excellent choice for tropical tree afforestation and reforestation efforts in places with high rainfall, distinct dry seasons and poor soil conditions. This e-book is designed to give the reader an opportunity to familiarize themselves with this important investment and plantation species.



Above: *Amazonia Reforestation* and *CO2 Tropical Trees* are examples of tropical tree plantations that routinely plant *Eucalyptus pellita*.



Eucalyptus pellita is sometimes referred to under the synonym *Eucalyptus spectabilis*. Internationally it is marketed as red mahogany or large-fruited red mahogany. The tree is closely related to *Eucalyptus resinifera*. Its other common names include daintree stringybark, large fruited stringy bark and red stringybark. The genus *Eucalyptus* belongs to the Myrtle family or *Myrtaceae*. The tree's second taxonomic name "pellita" comes from the Latin word "pellitus", which means "covered with skin". The name is possibly due to its bark, which is different from many other *Eucalyptus* species that are barkless. The name *Eucalyptus* itself comes from the Greek words for "eu" or well and "calyptos" or covered, because the trees' flowers are protected by an *operculum* (lid or cover). When the tree drops its woody opercula, children enjoy collecting and playing with them, while adults ponder uses for them.

Left: *Eucalyptus pellita* tree in the wild.

A medium height tropical tree, *Eucalyptus pellita* can grow to be 40 meters or some 130 feet in height, and measure approximately 1 meter or 40 inches in diameter at breast height (DBH). The DBH is a standard measurement used by foresters to track the growth of a tree, taken on the upslope side of the tree 137 centimetres or 4.5 feet from the ground. *Eucalyptus pellita* has a straight trunk with a large and heavily branched crown. The bark is rough, fibrous, coarsely fissured, and ranges from brown to reddish-brown in color. The fruits or seeds are larger than those of its immediate cousins, like *Eucalyptus resinifera*, which explains the common name of large fruited stringy bark.



Above: Bark of the *Eucalyptus pellita* tree.

<http://www.myreforestation.com>



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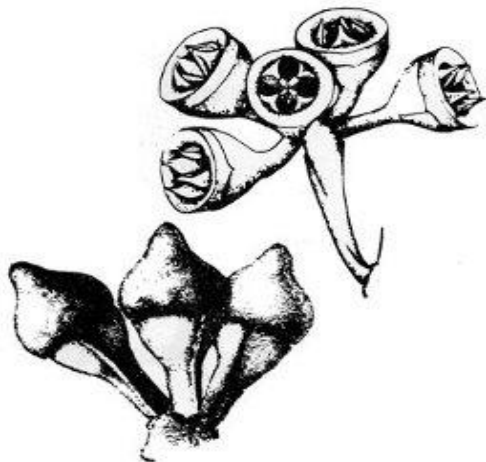
Distribution, Climate and Characteristics



Above: *Eucalyptus pellita* is an extremely fast growing tree. This plantation is only 10 months old and already more than 2 meters tall.

The tree prefers locations ranging from sea level to 800 meters or 2,625 feet above sea level, with mean annual temperatures ranging from 14° to 34° degrees Celsius (57° to 94° degrees Fahrenheit). This places the plantations of **Amazonia Reforestation** and **CO2 Tropical Trees** well within the ideal growing zone at an average of 60 meters above sea level and a mean annual temperature of 26° degrees Celsius or some 80° degrees Fahrenheit. *Eucalyptus pellita* likes a mean annual rainfall ranging from 900 to 4,000 mm (35.5 to 157.5 inches), once again putting the plantations of **Amazonia Reforestation** and **CO2 Tropical Trees** in the preferred zone at 2,400 mm (95 inches) of mean annual rainfall.

Right: *Eucalyptus pellita* seed collection in a plantation in Indonesia.



One of the advantages of *Eucalyptus pellita* is its tolerance for poor, infertile soils. The tree will grow in sand and rocky soils, on ridges and in low lying areas, provided they are well drained. It shows a preference for sandy soils, something that is quite common in the Orinoco River basin of Vichada, Colombia, where **Amazonia Reforestation** and **CO2 Tropical Trees** have their plantations. Plantations sow the seeds directly in the tropical tree nursery. There are approximately 69,000 viable seeds in a kilogram. No special preparations are required. The seeds can remain viable for many years under controlled storage conditions. The seedlings can be readily transplanted and because of their rapid growth tend to be weed tolerant.

Left: *Eucalyptus pellita* woody opercula and seeds.

<http://www.co2tropicaltrees.com>



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Growth Rates, Chemistry and Services

Extreme growth rates are a feature of *Eucalyptus pellita* and *Eucalyptus grandis*, both on average achieving growth of over 2 meters a year. Some of the trees planted by **Amazonia Reforestation** have achieved growth in excess of 6 meters in their first 12 months after transplantation from the tropical tree nursery. *Eucalyptus pellita* production rates average 40 cubic meters of wood per hectare per annum, though better managed forestry operations can have production rates exceeding 50 or even 60 cubic meters of wood per hectare per annum. This fast growth is of course important not just from a wood investor's point of view, but also because of the high carbon sequestration it implies, as discussed at the **CO2 Tropical Trees** web site. Depending on the use, *Eucalyptus pellita* is ready to be harvested after just 8 years by the pulp and paper industry and after just 10 years by the timber industry.



Left: A 6'1" tall Canadian forester between two 11 month old *Eucalyptus pellita* trees.



The chemical decomposition of *Eucalyptus pellita* dry litter is important for rebuilding depleted and infertile soils, though it is not as effective as trees like *Acacia mangium*. An analysis at a former bauxite mining site showed that this tree left 4,664.4 kg per hectare per year of dry litter behind. The dry litter in turn was composed of the following nutrients, which the trees normally deposit in the degraded soil: (P) Phosphorus 0.56 kg per hectare per year, (K) Potassium 2.75 kg per hectare per year, (Ca) Calcium 45.86 kg per hectare year, (Mg) Magnesium 4.86 kg per hectare per year, (N) Nitrogen 27.45 kg per hectare per year, with a high (C/N) Carbon/ Nitrogen relationship of 93.41 kg per hectare per year, meaning *Eucalyptus pellita* dry litter is slow to decompose, one reason it is not a significant NFT (nitrogen-fixing tree).

Left: *Eucalyptus pellita* in the **Amazonia Reforestation** tropical tree nursery.

Before discussing some of the products for which *Eucalyptus pellita* is used it should be mentioned that it is also popular for some of its services. For instance, the tree has been found to be useful in land reclamation and afforestation projects in coastal areas. Its rapid growth and heavily branched large crown make it an excellent shade tree and also an excellent windbreak. It has even found favour as an ornamental tree, with many Australian gardening web sites offering *Eucalyptus pellita* seeds for home gardeners. *Eucalyptus pellita* is not, *per se*, a nitrogen-fixing tree, but it requires very little in the way of nitrogen fertilizer to establish itself in poor soil conditions. Needless to say these services are over and above the lumber, product and carbon sequestration values of the tree.



Right: A Young *Eucalyptus pellita* growing happily in red ferrous oxide gravel.



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Products and Uses



Above: *Eucalyptus pellita* is an important lumber tree that is used in a very wide variety of applications due to its density, workability and attractive appearance.

As with many tropical trees, *Eucalyptus pellita* is the basis for a variety of products. The obvious one is its lumber, which is extremely strong, dense, durable and moderately heavy. Despite the sometimes interlocking grain of the wood, it can be worked rather readily. This means that the wood finds applications in many profitable areas. It is used for decorative purposes and to make fine furniture (remember the trade name of *red mahogany*), for outdoor furniture, and for fine turnery. As sawn timber for construction and building it is used for house framing, cladding, internal and external flooring, decking, linings, joinery, fencing, landscaping and retaining walls. In engineering and heavy construction applications the sawn and round timber is used in wharf and bridge construction, as railway sleepers, cross arms, utility poles, piles, and mining timbers, as well as for heavy ornamental wood work. Other uses include boat building, such as keel, planking and framing components, in coach, vehicle and carriage building, in agricultural machinery, and for the manufacture of structural plywood.

Eucalyptus pellita is an exotic wood, because the heartwood is generally deep red or dark red in color, though it may be lighter in younger trees, while the sapwood is distinctively paler. The texture of the wood is uniform, with a medium grain that is often interlocked, producing some attractive figures. Sometimes, the wood will display an occasional tight gum vein. There are generally no growth rings, but some specimens may tend to show medium sized, solitary vessels arranged in diffuse patterns, especially conspicuous on longitudinal surfaces. The wood may contain dark gum deposits. Rays in the wood are very fine and visible only with a lens.



Right: *Eucalyptus pellita* plank with its distinctive red color.



It is interesting to note that *Eucalyptus pellita* is rated as termite resistant according to Australian Standard AS5604-2003, and moderately resistant to the dead tissue or stem canker disease *Cryphonectria cubensis*. If left untreated, the lighter, outer sapwood may be susceptible to attack by *Lyctus* borers, but not the heartwood. The sapwood readily accepts preservative impregnation. However, because of its density the penetration of preservatives into the heartwood is negligible using currently available commercial processes. These factors, together with their straight trunks, have led *Eucalyptus pellita* to be used for utility and telephone poles in places like Uganda and Kenya. Untreated above-ground durability is excellent with a life expectancy of 40 years, while untreated in-ground durability ranges from 15 to 25 years.



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Density, Hardness and Drying

Eucalyptus pellita has a density of 995 kg/m³ at 12% moisture content, meaning that there is approximately 1.0 cubic metre of seasoned sawn timber per metric ton. To understand this we need to know that 1,000 kg of pure water = 1 cubic meter, so materials with a density under 1000 kg/m³ will float, while those that are more dense (weigh more than 1,000 kg/m³) will sink. Another way this is expressed is as 1.0 specific gravity. *Eucalyptus pellita* has a specific gravity of 0.995, just shy of 1.0 specific gravity, so it still can float.

Right: Calling *Eucalyptus pellita* dense is a compliment!



Above: Stained *Eucalyptus pellita* veneer.

The lumber has an exceptional Janka hardness rating ranging from 12 kN (kilonewtons) in mature natives to 5 kN in 8.5 year old plantation specimens. It is rated very hard on a scale of 1 to 6 for ease of woodwork using hand tools. However, it machines well. There is no difficulty using standard fittings and fastenings. Typical of high density species, machining and surface preparation should be done immediately before gluing. *Eucalyptus pellita* boards will readily accept paint, stain and polish and is considered one of the best *Eucalyptus* for painting, since the wood has good resistance to surface checking. The wood may be "ebonised" to a rich black colour by treatment with a ferric chloride solution.

Wood changes its size based on moisture content. *Eucalyptus pellita* lumber can be satisfactorily dried using conventional air and kiln seasoning methods, with minimal shrinkage, and will air dry with little degrade if carefully stacked. In 8.5 year old plantation-grown trees shrinkage when drying was found to be minimal at 0.28% tangential and 0.17% radial. These are all factors that make *Eucalyptus* wood a preferred source for the manufacture of tropical hardwood plywood.

Right: Fresh *Eucalyptus* logs waiting to be kiln-dried.



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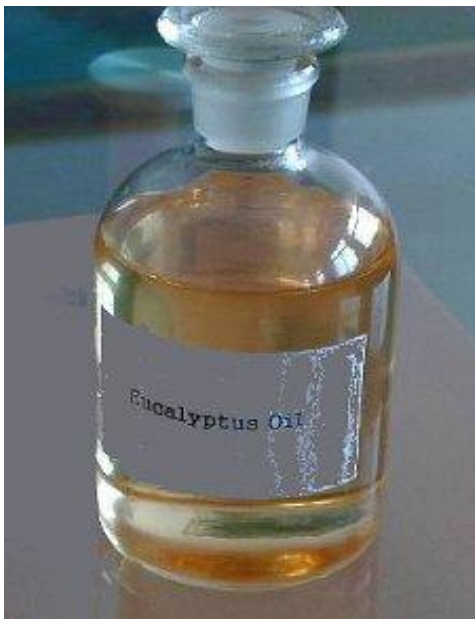
Other Products and Applications



Beyond the traditional uses *Eucalyptus pellita* has an excellent reputation as a source of charcoal and firewood. For example, a match-sized splinter can be burned to charcoal without ash. The wood has a high calorific value at 4800 kcal per kg or 8,640 BTU/lb. Together with its natural resin or gum content this makes the tree an excellent source of renewable energy, and a source for the production of charcoal briquettes and wood pellets. Several organizations are touting the tree as a possible fuelwood species for the humid tropics.

Left: The world demand for firewood and renewable fuel sources is huge, which adds to the high returns an investment in *Eucalyptus* and other tropical trees can provide.

Eucalyptus pellita is an acknowledged apiculture resource, with the flowers producing a thin, strong-flavoured honey that not everyone may find appealing. The honey is valued in the bakery industry and is sought after for retail sale in the health-food industry, where it is considered to be strengthening, blood-forming, blood-purifying, nourishing, and appetite producing. In places where pollination is important *Eucalyptus pellita* is known to be a good attractor of bees and butterflies thanks to its nectar. Apiculturists value the bee pollen obtained from hives set up adjacent to plantations with this tropical tree. Needless to say apiculture creates additional socio-economic development in developing countries, since some hives may produce as much as 120 lbs or 54 kg of honey per year, fetching a high price thanks to its reputed medicinal value.



Natural oil is another by-product of *Eucalyptus pellita* cultivation. Oil obtained from the tree is essentially monoterpenoid. Monoterpenes are emitted by forests and form aerosols that can serve as cloud condensation nuclei. Such aerosols can increase the brightness of clouds and cool the climate, which is important in the struggle against climate change. The major components of the oil are alpha-pinene (20-51%), limonene (11-44%), gamma-terpinene (0.2-23%), rho-cymene (0.3-11%), beta-pinene (2-6%) and terpinolene (0.5-3%). Oil yield is about 0.1%, meaning that one would get about 1 kg (2.2 lbs) of oil per 1,000 kg of foliage. A study in Cuba found that the essential oils extracted from *Eucalyptus pellita* foliage had a highly repellent effect on a type of ant damaging to forests and fruit crops. The oil itself can be used for medicinal purposes and in perfumes. In industry the oil offers great promise as a degreaser that does not deplete ozone like other petro-chemical solvents, another climate change plus.

Left: Eucalyptus oil has many uses and fetches high prices.



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Additional Uses

Excelsior or wood-wool can be made from *Eucalyptus pellita*. Wood-wool or excelsior is a product made of wood slivers, cut from logs, mainly used in packaging, but also for cooling pads in home evaporative systems (swamp coolers), for erosion control mats, and possibly most usefully as a raw material for the production of products like wood-wool cement boards. It is perhaps interesting to note that *Eucalyptus pellita* wood-wool can be dyed depending on the product being manufactured. Since many natural dyes fade, chemicals are used to fix the color in a process called mordanting. Alum, copper and iron will mordant natural yellow, beige, olive green and dark grey dyes in wood-wool made from this tree.

Right: Excelsior is an excellent replacement for plastic and Styrofoam packaging.



Wood-wool cement boards are manufactured in many tropical countries which have extensive Eucalyptus and Acacia plantations. In testing it was found that *Eucalyptus pellita* was most compatible with cement when mixed as wood-flour, whereas *Acacia mangium* wood-wool fared better when mixed with cement. However, the testing was primarily based on immersion in water, which is not a normal use of wood-wool or wood-flour cement boards. This means that even low-grade Eucalyptus pellita wood-wool has a ready market in this type of building material, not just its wood-flour.

Left: Use of wood-wool cement boards and similar building materials is growing.

Not much is known about the possible medicinal uses of *Eucalyptus pellita*, though it shares many of the characteristics of its close Eucalyptus cousins. Possibly the best known by-product is kino, a pure and energetic astringent that may be used for chronic dysentery, but is better for the internal treatment of *menorrhagia* (abnormally prolonged and regular menstrual periods), and for the topical treatment of *leucorrhoea* (a persistent white vaginal discharge). It can also be used for the treatment of sore throat and for *aphthae* or canker sores in the mouth. Infusions of kino can also be used to stop nasal and palate haemorrhages. The kino is made by collecting the resin or gum of a Eucalyptus tree, evaporating it into a pan and then dissolving it in alcohol or water to produce either a powder or a tincture. Kino is very high in tannic acid. The key to making kino is to not rely on resin that has been exposed to air for long periods of time, but to rather tap the resin or gum located in the ducts of the tree between the bark and the wood, in which case large quantities of resin or gum can be obtained, ranging anywhere from 1 to 4 gallons or 3.78 to 15 liters.





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Pulp, Paper and Opportunity



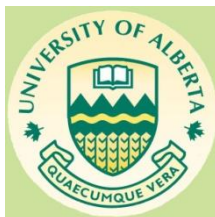
It should be stressed that *Eucalyptus pellita* is also one of the preferred raw material species for the pulp and paper industry. The improvements in plantation wood quality and the high cellulose content of *Eucalyptus pellita* benefit from the increasing global pulp and paper demand. *Eucalyptus pellita* can be harvested in just 8 years after planting for pulp and paper purposes (or when the tree reaches 35 meters in height). Plantation owners can attest that Eucalyptus trees are twice as productive as planted conifers like *Pinus caribaea*. The pulp and paper industry likes the tree because of its fiber's unique characteristics, which guarantee paper with high opacity, softness and good absorption, all qualities that are important in the production of tissue, printing and specialty papers. The fiber length of *Eucalyptus pellita* is small; in fact it is one of the shortest hardwood fibers available. Typical temperate zone trees like beech, birch or aspen, in contrast, have fibers that are up to 40% longer, with most softwood well above even that.

Left: Cellulose for paper manufacturing. *Eucalyptus pellita* is good for all premium papers.

The fibre coarseness of *Eucalyptus pellita* is one of the lowest of the pulp fibres available in the market. Coarseness is the weight of a fiber divided by its length. That means that slender fibers, as an example, have a low coarseness. The number of fibers per gram is high in Eucalyptus, which in turn is a consequence of its short fiber length and low coarseness. A typical Eucalyptus has 20 million fibres per gram, compared to only 1 million in a typical southern pine from the United States. Despite the large fibre count, Eucalyptus fibres resist collapse, because their wall thickness is high. These factors contribute to make Eucalyptus pulp into paper with a consistently high brightness and low dirt count. Chances are that the next time you buy photo paper or laminated paper products they are made out of Eucalyptus fibers for just those reasons. *Eucalyptus pellita* is a valuable pulp and paper tree that consistently delivers high quality results, while being extremely profitable to plantation tree owners.



<http://www.omacha.org>



<http://www.ales.ualberta.ca>



<http://www.weforest.org>



<http://co2tropicaltrees.blogspot.com>

Amazonia Reforestation at <http://www.myreforestation.com> and **CO2 Tropical Trees** at <http://www.co2tropicaltrees.com> are proud to be associated with the renowned **Omacha Foundation** in Colombia, with **Weforest** in Belgium and Switzerland, and with the University of Alberta's **Faculty of Agricultural, Life & Environmental Sciences** in Canada. We are the proud founders of the **Reserva Natural La Pedregoza** at <http://www.pedregoza.org> in Vichada, Colombia, for the conservation and preservation of native tree species in the Orinoco River basin. If you would like to profit from tropical trees, or offset your carbon emissions with tropical trees, then please contact the author of this e-book, **Dexter B. Dombro**, at trees@myreforestation.com for more information, or call +1-780-628-7281. Go green with us for a better world. Let's root out deforestation together!