

Key Words: High Risk, Naturalized, Environmental Weed, Ornamental & Forestry Tree, Autochorous

Family: *Myrtaceae*

Taxon: *Corymbia citriodora*

Synonym: *Eucalyptus citriodora* Hook. (basionym)

Common Name: Lemon-scented gum
Blue spotted gum
Lemon eucalyptus
Citron-scent gum

Questionnaire : current 20090513
Status: Assessor Approved

Assessor: Chuck Chimera
Data Entry Person: Chuck Chimera

Designation: H(HPWRA)

WRA Score 10

101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?	y=1, n=-1	
103	Does the species have weedy races?	y=1, n=-1	
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	y
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	
408	Creates a fire hazard in natural ecosystems	y=1, n=0	
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y

411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	y
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides	y=-1, n=1	
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	

Designation: H(HPWRA)

WRA Score 10

Supporting Data:

101	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Is the species highly domesticated?? No] No evidence
102	2012. WRA Specialist. Personal Communication.	NA
103	2012. WRA Specialist. Personal Communication.	NA
201	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Species suited to tropical or subtropical climate(s) 2-High] "The species is endemic to Queensland, Australia. The principal occurrence is in the region from north-west of Maryborough to north of Rockhampton, and west for up to 400 km, east of Clermont. There are also extensive stands inland from Mackay, west of Townsville, to the Atherton Tableland and the Windsor Tableland, and an inland occurrence north of Hughenden (Brooker and Kleinig, 1994). The latitudinal range of the northern area is 16°45'- 20°30'S and that of the southern areas, 22°45'- 26°S."
202	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Quality of climate match data 2-High]
203	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Broad climate suitability (environmental versatility)? Yes] "Climatic requirements for <i>E. citriodora</i> derived from both its natural distribution and the climate of sites where the species has been successful as an exotic were estimated by Booth and Pryor (1991) as follows: mean annual temp. 17-28°C, mean max. temp. hottest month 28-39°C, mean min. temp. coldest month 8-22°C, absolute min. temp. > 3°C, mean annual rainfall 650-2500 mm of summer, uniform or winter incidence, and dry season (i.e. <40 mm/month) 0-7 months. The analysis showed that while the species occurs naturally in summer rainfall zones, it is also capable of growing successfully in winter rainfall dominant sites. Climatic amplitude (estimates) - Altitude range: 0 - 1800 m - Mean annual rainfall: 650 - 2500 mm - Rainfall regime: summer; winter; bimodal; uniform - Dry season duration: 0 - 7 months - Mean annual temperature: 17 - 28°C - Mean maximum temperature of hottest month: 28 - 39°C - Mean minimum temperature of coldest month: 8 - 22°C - Absolute minimum temperature: -3 - -3°C"
203	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestry Database:a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Broad climate suitability (environmental versatility)? Yes] "Altitude: 0-1600 m, Mean annual temperature: 17-24 deg. C, Mean annual rainfall: 650-1600 mm"
204	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Native or naturalized in regions with tropical or subtropical climates? Yes] "The species is endemic to Queensland, Australia. The principal occurrence is in the region from north-west of Maryborough to north of Rockhampton, and west for up to 400 km, east of Clermont. There are also extensive stands inland from Mackay, west of Townsville, to the Atherton Tableland and the Windsor Tableland, and an inland occurrence north of Hughenden (Brooker and Kleinig, 1994). The latitudinal range of the northern area is 16°45'- 20°30'S and that of the southern areas, 22°45'- 26°S."
205	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Does the species have a history of repeated introductions outside its natural range? Yes] "E. citriodora has been extensively planted as an ornamental tree in many regions of the world, and has been planted for commercial purposes in many countries in Africa and South America, and in China, Fiji, India, South America (especially Brazil, where 6 million trees were planted), and Sri Lanka (Streets, 1962; Penfold and Willis, 1961; Poynton, 1979; Jacobs, 1981; Booth et al., 1988; Davidson, 1993)."
301	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Naturalized beyond native range? Yes] "In Hawai'i, widely planted and regenerating from seed in these areas"
301	2006. EUCLID. Eucalypts of Australia. Third Edition. Centre for Plant Biodiversity Research (CPBR), www.publish.csiro.au/samples/euclid/sample/html/index.htm	[Naturalized beyond native range? Yes] "Plants of <i>C. citriodora</i> are naturalized in the Darling Range near Maundering, Western Australia, and also in suburban Sydney, New South Wales, having spread from plantings. In Kings Park, Perth, has a famous, beautiful avenue of this species planted many years ago, but it has spread to become a serious weed there also (Hussey et al., 1997)."

301	2009. Ritter, M./Yost, J.. Diversity, Reproduction, and Potential for Invasiveness of Eucalyptus in California. <i>Madroño</i> . 56(3): 155-167.	[Naturalized beyond native range? Yes] "Of the eighteen taxa that have become naturalized in the state, all but 3 are in the subgenus <i>Symphyomyrtus</i> (Pryor and Johnson 1971). The exceptions are <i>E. fastigata</i> (Fig. 1C) and <i>E. pulchella</i> Desf. (Fig. 2D), both in the subgenus <i>Eucalyptus</i> (<i>Monocalyptus</i> of Pryor and Johnson 1971), and <i>E. citriodora</i> in the subgenus <i>Corymbia</i> (see species notes for a brief discussion of the recent elevation of the subgenus <i>Corymbia</i> to the genus level)."
301	2011. Queensland Government. Weeds of Australia - Lemon-scented gum, <i>Corymbia citriodora</i> . http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Corymbia_citriodora.htm	[Naturalized beyond native range? Yes] "Naturalised in northern Victoria, south western Western Australia (i.e. in the Darling Range near Maundering and near Perth) and beyond its native range in central New South Wales (i.e. in suburban Sydney). Possibly also sparingly naturalised in south-eastern South Australia."
302	2007. Randall, R.P.. Global Compendium of Weeds - <i>Corymbia citriodora</i> [Online Database]. http://www.hear.org/gcw/species/corymbia_citriodora/	[Garden/amenity/disturbance weed? No] No evidence
303	2007. Randall, R.P.. Global Compendium of Weeds - <i>Corymbia citriodora</i> [Online Database]. http://www.hear.org/gcw/species/corymbia_citriodora/	[Agricultural/forestry/horticultural weed? No] No evidence
304	2004. Ruthrof, K.X.. Invasion by <i>Eucalyptus megacornuta</i> of an Urban Bushland in Southwestern Australia. <i>Weed Technology</i> ,	[Environmental weed? Potentially Yes] "Abstract: Eucalypts have been planted extensively beyond their natural range but few of these plantings have become invasive. The Kings Park bushland in Western Australia is an example of a native bushland in which a few nonlocal eucalypt species (Warted Yate, sugar gum, and lemon scented gum) were introduced as ornamentals and have since spread into the bushland."
304	2010. Australian Association of Bush Regenerators. Bushland Weeds of the Blue Mountains Region. http://www.aabr.org.au/index.php?option=com_content&view=article&id=53:bushland-weeds-of-the-blue-mountains-region&catid=92:weed-lists&Itemid=75	[Environmental weed? Potentially Yes] "Bushland Weeds of the Blue Mountains Region" ... "List 1: Trees" [<i>Eucalyptus citriodora</i> included in the list of trees. Impacts unspecified]
304	2010. Australian Association of Bush Regenerators. Bushland Weeds of the Sydney Region. http://www.aabr.org.au/index.php?option=com_content&view=article&id=52:bushland-weeds-of-the-sydney-region&catid=92:what-is-a-weed&Itemid=75	[Environmental weed? Yes] "List 3: MINOR WEEDS STILL CULTIVATED. It to bushland. They should be removed if proving weedy." [<i>Eucalyptus citriodora</i> is included in this list. An environmental weed of minor significance recommended for control in natural areas]
304	2011. Blue Mountains Bushcare Network. Minutes of Meeting Wednesday 16th February at 6pm. www.weedsbluemountains.org.au/pdf/BCN_Minutes_Feb_2011.pdf	[Environmental weed? Potentially Yes] "Tree weeds in Blue Mountain LGA" ... "The following list of tree weeds is based upon species noted in the Flora of NSW (including the web version called PlantNet) and includes some additional species that have been found invading within the Blue Mountains area, knowledge of which has yet to be added to PlantNet." [<i>Eucalyptus citriodora</i> included in the list of trees. Impacts unspecified]
304	2011. Queensland Government. Weeds of Australia - Lemon-scented gum, <i>Corymbia citriodora</i> . http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Corymbia_citriodora.htm	[Environmental weed? Yes] "This species is regarded as an environmental weed in Western Australia and in the wider Sydney and Blue Mountains region in central New South Wales. Lemon-scented gum (<i>Corymbia citriodora</i>) is spreading from deliberate plantings and invading open woodland areas, particularly in south-western Western Australia."
305	2012. Weeds Australia. Weed Identification - <i>Eucalyptus maculata</i> = <i>Corymbia maculata</i> . Australian Weeds Committee, http://www.weeds.org.au/cgi-bin/weedident.cgi?tpl=plant.tpl&ibra=all&card=E44	[Congeneric weed? Yes] " <i>Eucalyptus maculata</i> = <i>Corymbia maculata</i> " ... "It has been planted in southern Western Australia where it has become naturalised in Banksia and Tuart woodlands from Perth to Busselton. In Kings Park, Perth, Spotted gum has become a serious weed invading Banksia woodland and killing the understorey. Spotted gum is spread by seed."
401	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Produces spines, thorns or burrs? No] "Medium-sized to large, straight stemmed tree, 25-40 m tall, of handsome appearance, with smooth, pale grey, cream or pink, powdery bark throughout, decorticating in flakes. Foliage is fine, somewhat sparse in the crown and emits a strong lemon-scent after rain or when abraded. The lemon-scented leaves are very useful in identifying the species."

402	2009. El-Rokiek, K.G.I./Eid, R.A.. Allelopathic effects of <i>Eucalyptus citriodora</i> on amaryllis and associated grassy weed. <i>Planta Daninha</i> . 27: 887-899.	[Allelopathic? Yes under laboratory conditions] "A Petri dish assay was carried out for screening different concentrations of aqueous extracts of fresh and dry leaves of <i>Eucalyptus citriodora</i> on germination and seedling growth of wild oat weed (<i>Avena fatua</i>). Seed germination, root and shoot length of wild oat exhibited different degrees of inhibition according to the concentration of the aqueous extract. Maximum inhibitions of germination percentage, root and shoot length were recorded when using 25% fresh leaf extract."
402	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. <i>Agroforestry Database: a tree reference and selection guide version 4.0</i> . World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Allelopathic? Possibly Yes] "Intercropping: Studies in Nigeria suggest that beans are incompatible with <i>E. citriodora</i> , but maize and sorghum may be compatible. Addition of fertilizer can offset to an extent the depressive effects of <i>E. citriodora</i> on crops."
403	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Parasitic? No] Myrtaceae [No evidence]
404	1984. Townsend, G.F.. <i>Multi-Purpose Trees for Honey Production</i> . ECHO Technical Note. ECHO, North Ft. Myers FL	[Unpalatable to grazing animals? Possibly No] " <i>Eucalyptus citriodora</i> " ... "Other Uses: Firewood, posts, general construction, fodder, food -- pods."
404	1994. Couto, L./Roath, R.L./Betters, D.R./Garcia, R./Almeida, J.C.C.. Cattle and sheep in eucalypt plantations: a silvopastoral alternative in Minas Gerais, Brazil. <i>Agroforestry Systems</i> . 28(2): 173-185.	[Unpalatable to grazing animals? Possibly Yes] "This study analyses the effects of cattle and sheep grazing in newly established eucalypt (<i>Eucalyptus citriodora</i>) plantations at Dionísio, in Minas Gerais state, Brazil. The major problem in plantation establishment in this area is infestation by the grass <i>Panicum maximum</i> . The research was carried out using six separate treatment plots (3 ha) each having a different combination and number of animals (9 and 6 head of cattle alone, 10 head of sheep alone, and cattle and sheep at ratios of 9:10 and 6:10, respectively, and control (non-grazed) plots within the main plots). Eucalypt seedlings were planted in 1986 on harrowed and ploughed land, chemically treated (with dodecachlor) for ant control, fertilized with NPK +B + Zn, and manually weeded 30 and 60 days after planting. Livestock were introduced at the time when a third weeding would have been necessary (at 6 months old) when the trees were 2 m tall. Manual weedings were continued in the control plots. The results indicate that the silvopastoral approach can help control grass competition and reduce stand establishment costs. The green grass was palatable to the animals, and can also be used to make hay. Eucalypt survival and growth (over the period 1986-88) was not affected by the animal grazing." [Grazing animal didn't used <i>E. citriodora</i>]
404	2012. Moreton Bay Regional Council. Fact sheet - Koalas. http://www.moretonbay.qld.gov.au/uploadedFiles/moretonbay/environment/fauna/KoalasFactSheet.pdf	[Unpalatable to grazing animals? No] "Koala food trees of our region" [Includes <i>Corymbia citriodora</i> , but koalas are adapted to eating foliage of <i>Eucalyptus</i> and related taxa]
405	2008. Wagstaff, D.J.. <i>International poisonous plants checklist: an evidence-based reference</i> . CRC Press, Boca Raton, FL	[Toxic to animals? No] No evidence
405	2009. Cornell University. <i>Plants Poisonous to Livestock and other Animals</i> . Department of Animal Science, http://www.ansci.cornell.edu/plants/index.html	[Toxic to animals? No] No evidence

406	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Host for recognized pests and pathogens? Yes] "In Australia, <i>E. citriodora</i> has remained relatively free of diseases and pests. In Brazil, it has been damaged by a range of diseases including damping-off and leaf spots caused by <i>Cylindrocladium</i> spp., <i>Puccinia psidii</i> (a rust), and <i>Cryphonectria cubensis</i> (a stem canker) (Turnbull and Pryor, 1984; Krugner et al., 1990). Gummosis and cankers from infection by <i>Endothia havanensis</i> have also been noted (Cardoso May, 1973). In China, gummosis induced by <i>Cytospora</i> sp. and <i>Macrophoma</i> sp. has caused severe damage to <i>E. citriodora</i> (Zuo and Wang, 1989). In India, this species is susceptible to a range of diseases including <i>Cylindrocladium</i> (seedling blight), <i>Melampsora</i> sp. (a rust), <i>Corticium salmonicolor</i> (pink disease), and <i>Ganoderma</i> sp. (root rot) (Sehgal, 1983). A root rot fungus, <i>Pseudophaeolus baudonii</i> , attacked plantations of <i>E. citriodora</i> at Sege in Ghana, causing 50% mortality over three years (Ofosu, 1975). Most problems arise when the species planted off-site (e.g. on sites with high rainfall and humidity). Prevention is the best cure, so planting sites should be carefully selected and the appropriate nursery techniques applied to reduce disease risk. <i>E. citriodora</i> is very susceptible to termites (e.g. in India, <i>Microcerotermes minor</i> can cause 20-30% mortality in plantations and <i>Odontotermes horni</i> at least 10%) (FAO, 1974; Sen-Sarma and Thakur, 1983). Use of dangerous chemicals such as dieldrin, aldrin and chlordane for the protection of seedlings against termites has been phased out in most countries. Carbosulfan, a non persistent carbamate insecticide, is being used as an effective replacement for the organochlorine insecticides in several African countries and in India (Day et al., 1994; Doran and Turnbull, 1997). A range of defoliating insects and a stem borer, <i>Apate indistincta</i> , have been noted as causing occasional damage to plantations (Sen-Sarma and Thakur, 1983). ... " <i>E. citriodora</i> is susceptible to a range of fungal diseases and insect pests, however, these problems appear to be less severe than with many other eucalypts."
406	2011. Pérez, C.A./Wingfield, M.J./Altier, N.A./Simeto, S./Blanchette, R.A.. <i>Puccinia psidii</i> infecting cultivated <i>Eucalyptus</i> and native Myrtaceae in Uruguay. <i>Mycological Progress</i> . 10(3): 273-282.	[Host for recognized pests and pathogens? Yes] "The guava or <i>Eucalyptus</i> rust, <i>Puccinia psidii</i> Winter, was first found in 1884 on <i>Psidium guajava</i> L. (syn. <i>Psidium pomiferum</i> L.) in Brazil (Winter 1884) and was discovered on non native eucalypts (<i>Corymbia citriodora</i> (Hook) Hill & Johnson syn: <i>Eucalyptus citriodora</i> Hook), in the same country in 1944 (Joffily 1944). This was the first record of the rust having undergone a host jump from a native to a non-native tree (De Castro et al. 1983)."
406	2012. Carnegie, A.J./Lidbetter, J.R.. Rapidly expanding host range for <i>Puccinia psidii</i> sensu lato in Australia. <i>Australasian Plant Pathology</i> . 41: 13-29.	[Host for recognized pests and pathogens? Yes] "Appendix I. Species of Myrtaceae reported to show some susceptibility to <i>Puccinia psidii</i> outside Australia from field observations and host testing. Plant names according to Govaerts et al. (2011)" [Includes <i>Corymbia citriodora</i>]
407	2000. Boral, D./Bhattacharya, K.. Aerobiology, allergenicity and biochemistry of three pollen types in Berhampore town of West Bengal, India. <i>Aerobiologia</i> . 16: 417-422.	[Causes allergies or is otherwise toxic to humans? Possibly among susceptible people] "Results of our study confirms that <i>Acacia auriculiformis</i> , <i>Eucalyptus citriodora</i> and <i>Madhuca indica</i> (Boral et al., 1999) are common airborne pollen grains in India causing allergic symptoms in susceptible patients. Among the three pollen grains <i>Eucalyptus</i> is found to be the most potent aeroallergen."
407	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Causes allergies or is otherwise toxic to humans? No] No evidence of toxicity
408	2002. Burrows, G.E.. Epicormic strand structure in <i>Angophora</i> , <i>Eucalyptus</i> and <i>Lophostemon</i> (Myrtaceae) – implications for fire resistance and recovery. <i>New Phytologist</i> . 153: 111-131.	[Creates a fire hazard in natural ecosystems? Potentially] "Epicormic bud producing structures in the eucalypts, a large group of woody plants of considerable ecological, horticultural and silvicultural importance, are described. The outer portion of epicormic strands excised from the bark of large diameter stems of 18 <i>Eucalyptus</i> species (<i>E. eximia</i> , <i>E. citriodora</i> , <i>E. calophylla</i> , <i>E. ficifolia</i> , <i>E. macrorhyncha</i> , <i>E. rossii</i> , <i>E. leucoxylo</i> , <i>E. melliodora</i> , <i>E. sideroxylo</i> , <i>E. caesia</i> , <i>E. lehmannii</i> , <i>E. macrocarpa</i> , <i>E. occidentalis</i> , <i>E. torquata</i> , <i>E. blakelyi</i> , <i>E. cinerea</i> , <i>E. globulus</i> and <i>E. nicholii</i>), two <i>Angophora</i> species (<i>A. hispida</i> and <i>A. melanoxylon</i>) and <i>Lophostemon confertus</i> was examined anatomically in semithin sections. In the inner bark, each eucalypt strand usually possessed 5-12 radially orientated strips of tissue of meristematic appearance. The meristem strips were approx equal to 30-50 micro m high, 70-110 micro m wide and 2000-10 000 micro m long, with a lacuna above the meristem surface. Few buds or bud primordia were associated with the strands and the strands appeared to have a reduced regenerative potential in the outer bark. In most angiosperm trees dormant epicormic buds are present in the outer bark, a position where they could be killed by fire. By contrast, in eucalypts the greatest epicormic bud initiation potential is at the level of the vascular cambium, which is protected by the maximum bark thickness. This might explain the pronounced ability of eucalypts to produce bole and branch epicormic shoots after moderate to intense fire." [possibly a fire hazard due to litter and debris, including flaking bark?]

409	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Is a shade tolerant plant at some stage of its life cycle? No] "The ability of the species to compete with weeds is poor such that inadequate weed control may lead to the complete failure of a planting. Mechanical or manual cultivation is the main means of controlling weeds. <i>E. citriodora</i> is very light demanding, frequent and regular thinning is a prerequisite for healthy, vigorous plantations (Poynton, 1979)."
410	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates a wide range of soil conditions / Yes] "E. citriodora is commonly found on rather poor gravelly soils, podzols and residual podzols of lateritic origin. Stands also occur on deep red loams, hard gravelly clay, and on soils derived from sandstone (Turnbull and Pryor, 1984). The soils are usually well drained. It occurs on rolling or undulating country, including plateaux and dry ridges. In dry regions and on sandy soils, it occurs in valley bottoms and along drainage lines (Boland et al., 1984). Soil descriptors - Soil texture: light; medium - Soil drainage: free - Soil reaction: acid - Special soil tolerances: infertile - Soil types: acid soils; lateritic soils; podzols; red soils; sandy soils"
410	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. Agroforestry Database: a tree reference and selection guide version 4.0. World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Tolerates a wide range of soil conditions? Yes] "Soil type: It is tolerant of a variety of soils. Commonly found on poor, gravelly soils, Podzols and residual Podzols of lateritic origin, and prefers well-drained but somewhat gravelly subsoils."
411	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Climbing or smothering growth habit? No] "Medium-sized to large, straight stemmed tree, 25-40 m tall,"
412	2006. EUCLID. Eucalypts of Australia. Third Edition. Centre for Plant Biodiversity Research (CPBR), www.publish.csiro.au/samples/euclid/sample/html/index.htm	[Forms dense thickets? No] "Plants of <i>C. citriodora</i> are naturalized in the Darling Range near Maundering, Western Australia, and also in suburban Sydney, New South Wales, having spread from plantings. In Kings Park, Perth, has a famous, beautiful avenue of this species planted many years ago, but it has spread to become a serious weed there also (Hussey et al., 1997)." [No evidence]
412	2009. Ritter, M./Yost, J.. Diversity, Reproduction, and Potential for Invasiveness of Eucalyptus in California. <i>Madroño</i> . 56(3): 155-167.	[Forms dense thickets? No] No evidence
501	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Aquatic? No] terrestrial
502	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Grass? No] Myrtaceae
503	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Nitrogen fixing woody plant? No] Myrtaceae
504	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Medium-sized to large, straight stemmed tree, 25-40 m tall, of handsome appearance, with smooth, pale grey, cream or pink, powdery bark throughout, decorticating in flakes."
601	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Evidence of substantial reproductive failure in native habitat? No] "In its natural habitat this species is locally abundant over a wide area, and is not at risk. " [No evidence]
602	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Produces viable seed? Yes] "Flowering in natural stands has been observed in all months of the year with a peak during April to June. The main seed collecting months are September through to January with natural seed fall coinciding with the summer wet season (Australian Tree Seed Centre records, 1997). The difficulty with obtaining good seed crops in the wild, contrasts with the abundant seed crops often found on planted specimens. In Thailand the optimum seed collecting month for <i>E. citriodora</i> is April (Pukittayacamee et al., 1993)." ... "E. citriodora is usually propagated from seed."
603	1984. Kapoor, M.L./Sharma, V.K.. Hybrids between <i>Eucalyptus citriodora</i> Hook. and <i>E. torelliana</i> F. v. Muell. in India. <i>Silvae Genetica</i> . 33: 2-3.	[Hybridizes naturally? Yes] "Spontaneous hybrids between <i>E. citriodora</i> and <i>E. torelliana</i> belonging to subgenus <i>Corymbia</i> have been reported for the first time from India."

603	2007. Lee, D.J.. Achievements in forest tree genetic improvement in Australia and New Zealand 2: Development of <i>Corymbia</i> species and hybrids for plantations in eastern Australia. <i>Australian Forestry</i> . 70(1): 11-16.	[Hybridizes naturally? Yes] "This paper describes the establishment of provenance seedling seed orchards of three spotted gums and cadaga (all species of <i>Corymbia</i> ex <i>Eucalyptus</i>). It also discusses the limitations of growing the spotted gums as pure species including: lack of mass flowering, susceptibility to a fungal shoot blight and low amenability to vegetative propagation. These limitations, together with observation of putative natural hybrids of the spotted gums with cadaga, and the early promise of manipulated hybrids, led to an intensive breeding and testing program. Many hybrid families have significant advantages in growth and tolerance to disease, insects and frost, and can be vegetatively propagated. They also exhibit broad environmental plasticity, allowing the best varieties to be planted across a wider range of sites than the spotted gums, resulting in more land being suitable for plantation development."
604	1983. Yeh, F.C./Brune, Arno William M. Cheliak, Diane C. Chipman. Mating system of <i>Eucalyptus citriodora</i> in a seed-production area. <i>Canadian Journal of Forest Research</i> . 13(6): 1051-1055.	[Self-compatible or apomictic? Yes] "Arrays of open-pollinated seeds were assayed for allozyme polymorphisms at three loci (<i>Adh</i> , <i>Gdh</i> , and <i>Mdh-2</i>) to obtain a quantitative estimate of outcrossing rate in a seed-production area of <i>Eucalyptus citriodora</i> (Hook). Rate of outcrossing varied among loci, but suggested overall that up to 14.7% of the seed might be derived from self-fertilization at the viable embryo stage. Such a level of partial self-fertilization, together with local variation in the mating system, yielded an observed average inbreeding coefficient of 0.205 for these loci in the progeny arrays. By contrast, the mature trees exhibited substantial excesses of heterozygotes ($F = -0.300$), concordant with but not necessarily supportive of earlier hypotheses that selection against homozygotes through the life cycle occurred in eucalypts."
604	2005. Bhattacharya, A./Mondal, S./Mandal, S.. Pollinating Agents of <i>Eucalyptus citriodora</i> Hook. - Insects or Wind?. <i>Asian Journal of Plant Sciences</i> . 4(5): 492-495.	[Self-compatible or apomictic? Yes] " <i>Eucalyptus citriodora</i> is a self-compatible, protandrous, monoicous, mass-bloomer tree. Protandrous nature prevents intrafloral selfing. Geitonogamy becomes predominant."
604	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Self-compatible or apomictic? Yes] "A study of mating system parameters in a seed production area using allozymes as genetic markers was undertaken as part of this programme (Yeh et al., 1983). The results indicated reasonably high levels (14.7%) of self fertilization and low levels of heterozygosity in progeny from these stands."
605	2005. Bhattacharya, A./Mondal, S./Mandal, S.. Pollinating Agents of <i>Eucalyptus citriodora</i> Hook. - Insects or Wind?. <i>Asian Journal of Plant Sciences</i> . 4(5): 492-495.	[Requires specialist pollinators? No] "Thus, the inefficiency of insects, unreliability of resource base of entomophily and the gamete wastage of anemophily appear to be the positive sites of <i>Eucalyptus citriodora</i> in its pollination system by resorting to the anemophily, which could be considered as an adaptive feature of tropical country."
605	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Requires specialist pollinators? No] "Inflorescences clustered on short, leafless shoots in axils of leaves towards ends of branchlets, 3-flowered; peduncles 0.3-0.7 cm long. Buds pedicellate, clavate, to 1 x 0.6 cm, no scar; operculum conical to slightly beaked, 0.3-0.4 cm long, 0.4-0.5 cm wide; flowers creamy white; fruit on pedicels 0.1-0.6 cm long, truncate-ovoid to urceolate, often warty, 0.8-1.5 cm long, 0.7-1.1 cm diameter; 3 locular; disc approximately 0.2 cm wide, seeds glossy red-black, dorsiventrally compressed, keeled on dorsal side, hilum ventral, minute cracks in the seed coat, 0.2-0.3 mm long, 1.5-2.5 mm wide (Boland et al., 1980; Hill and Johnson, 1995)." ... "Pollination is mainly by insects, but also by birds and small mammals." ... "E. citriodora is an important source of nectar for bees and yields a light amber honey (Clemson, 1985; Blake and Roff, 1988)."
605	2009. Orwa, C./Mutua, A./Kindt, R./Jamnadass, R./Simons, A.. <i>Agroforestry Database: a tree reference and selection guide version 4.0</i> . World Agroforestry Centre, (http://www.worldagroforestry.org/af/treedb/)	[Requires specialist pollinators? No] "E. citriodora is cross-pollinated, and the pollinating agents are usually blow flies, ants and, in particular, bees."
606	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Reproduction by vegetative fragmentation? No] "E. citriodora is usually propagated from seed." ... "E. citriodora can be regenerated vegetatively by micropropagation (review in Hartney, 1982), and Mascarenhas et al. (1988) discuss the benefits of the use of tissue cultured plantlets, from selected parent trees, for oil production in India. However, this technique has only been applied on a research scale at this stage. Propagation by cuttings is very difficult." [No evidence]
607	2005. CAB International. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	[Minimum generative time (years)? 2+] "Flowering usually starts within two years after planting, and seeds are produced abundantly by 5 years of age (Turnbull and Pryor, 1984; Wasuwanich, 1989)."
701	2004. Frenedoza, R.C.. <i>Plant Reproductive Phenology and Dispersal Patterns After Natural Regeneration</i> . <i>Brazilian Archives of Biology and Technology</i> . 47(2): 261-271.	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] No evidence

702	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Propagules dispersed intentionally by people? Yes] "E. citriodora is widely used in park and avenue plantings as an attractive, large-sized ornamental tree noted for its bark colour, branching habit and glossy leaves. However, its crown is too sparse for shelterbelts."
703	2004. Frenedoza, R.C.. Plant Reproductive Phenology and Dispersal Patterns After Natural Regeneration. Brazilian Archives of Biology and Technology. 47(2): 261-271.	[Propagules likely to disperse as a produce contaminant? No] No evidence
704	2004. Frenedoza, R.C.. Plant Reproductive Phenology and Dispersal Patterns After Natural Regeneration. Brazilian Archives of Biology and Technology. 47(2): 261-271.	[Propagules adapted to wind dispersal? Possibly] "Table 3 - List of collected woody species at limestone mining quarries, Rio Claro, SP (coordinates)." [Eucalyptus citriodora listed as autochorous, rather than anemochorous]
704	2006. EUCLID. Eucalypts of Australia. Third Edition. Centre for Plant Biodiversity Research (CPBR), www.publish.csiro.au/samples/euclid/sample/html/index.htm	[Propagules adapted to wind dispersal? Possibly] "Fruit pedicellate (pedicels 0.1–0.7 cm long), urceolate or barrel-shaped, 0.8–1.5 cm long, 0.7–1.2 cm wide, disc descending, valves 3, enclosed. Seed reddish black, glossy, 2.3–5 mm long, boat-shaped (flattened with a slight dorsal keel), dorsal surface smooth, not winged, hilum ventral." [Small seeds, but not winged. Possibly dispersed short distances by wind or gravity]
705	2004. Frenedoza, R.C.. Plant Reproductive Phenology and Dispersal Patterns After Natural Regeneration. Brazilian Archives of Biology and Technology. 47(2): 261-271.	[Propagules water dispersed? No] No evidence
706	2006. EUCLID. Eucalypts of Australia. Third Edition. Centre for Plant Biodiversity Research (CPBR), www.publish.csiro.au/samples/euclid/sample/html/index.htm	[Propagules bird dispersed? No] "Fruit pedicellate (pedicels 0.1–0.7 cm long), urceolate or barrel-shaped, 0.8–1.5 cm long, 0.7–1.2 cm wide, disc descending, valves 3, enclosed. Seed reddish black, glossy, 2.3–5 mm long, boat-shaped (flattened with a slight dorsal keel), dorsal surface smooth, not winged, hilum ventral." [Dry fruit]
707	2006. EUCLID. Eucalypts of Australia. Third Edition. Centre for Plant Biodiversity Research (CPBR), www.publish.csiro.au/samples/euclid/sample/html/index.htm	[Propagules dispersed by other animals (externally)? No] "Fruit pedicellate (pedicels 0.1–0.7 cm long), urceolate or barrel-shaped, 0.8–1.5 cm long, 0.7–1.2 cm wide, disc descending, valves 3, enclosed. Seed reddish black, glossy, 2.3–5 mm long, boat-shaped (flattened with a slight dorsal keel), dorsal surface smooth, not winged, hilum ventral." [No means of external attachment]
708	2004. Frenedoza, R.C.. Plant Reproductive Phenology and Dispersal Patterns After Natural Regeneration. Brazilian Archives of Biology and Technology. 47(2): 261-271.	[Propagules survive passage through the gut? No] "Fruit pedicellate (pedicels 0.1–0.7 cm long), urceolate or barrel-shaped, 0.8–1.5 cm long, 0.7–1.2 cm wide, disc descending, valves 3, enclosed. Seed reddish black, glossy, 2.3–5 mm long, boat-shaped (flattened with a slight dorsal keel), dorsal surface smooth, not winged, hilum ventral." [Probably No. Not adapted for internal dispersal]
801	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Prolific seed production (>1000/m ²)? Yes] "There are an average of 109,000 viable seed per kilogram of seed and chaff mix (Turnbull and Doran, 1987). Seedlots vary in germination rate, but usually average 30-50%."
802	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "No pre-sowing treatment is required. Rapid and complete germination is achieved under moist, warm (25-30°C is optimal in the laboratory) conditions in the presence of light."
803	2012. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown] No information on herbicide efficacy or chemical control of this species
804	2005. CAB International. Forestry Compendium. CAB International, Wallingford, UK	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "E. citriodora is a lignotuberous species which is resistant to damage by fire." ... "- Tolerates drought; fire; frost - Ability to self-prune; coppice; pollard"
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]

Summary of Risk Traits

High Risk / Undesirable Traits

- Broad climate suitability
- Naturalized in Australia (outside native range), Hawaii, California
- Environmental Weed of Australia
- Potentially allelopathic
- Alternate host of *Puccinia psidii*
- Tolerates many soil conditions (and potentially able to exploit many different habitat types)
- Hybridizes with other *Corymbia* species
- Pods dispersed whole by wind
- Self-compatible
- Prolific seed production
- Tolerates fire, and can coppice

Low Risk / Desirable Traits

- Non-toxic
- Non-spiny
- Ornamental value
- Timber tree
- Intolerant of shade