

<b><i>Eucalyptus urograndis</i> (Hybrid of <i>E. grandis</i> &amp; <i>E. urophylla</i>) -- FLORIDA</b>		<b>Answer</b>	<b>Score</b>
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to FL climates (USDA hardiness zones; 0-low, 1-intermediate, 2-high)	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)	y	1
2.04	Native or naturalized in regions with an average of 11-60 inches of annual precipitation	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	n	-2
3.02	Garden/amenity/disturbance weed	n	0
3.03	Weed of agriculture	n	0
3.04	Environmental weed	n	0
3.05	Congeneric weed	y	2
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	?	
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals		
4.05	Toxic to animals		
4.06	Host for recognised pests and pathogens	?	
4.07	Causes allergies or is otherwise toxic to humans		
4.08	Creates a fire hazard in natural ecosystems	?	
4.09	Is a shade tolerant plant at some stage of its life cycle		
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.		
4.11	Climbing or smothering growth habit	n	0
4.12	Forms dense thickets	?	
5.01	Aquatic	n	0
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	
6.02	Produces viable seed		
6.03	Hybridizes naturally	?	
6.04	Self-compatible or apomictic	?	
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	y	1
6.07	Minimum generative time (years)		

7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant		
7.04	Propagules adapted to wind dispersal	?	
7.05	Propagules water dispersed	?	
7.06	Propagules bird dispersed	n	-1
7.07	Propagules dispersed by other animals (externally)		
7.08	Propagules dispersed by other animals (internally)	n	-1
8.01	Prolific seed production		
8.02	Evidence that a persistent propagule bank is formed (>1 yr)		
8.03	Well controlled by herbicides	?	
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05	Effective natural enemies present in U.S.		
	<b>Total Score</b>		<b>3</b>
	<b>Implemented Pacific Second Screening</b>		<b>Yes</b>
	<b>Risk Assessment Results</b>		<b>Evaluate</b>

	Reference	Source data
1.01		Cultivated, but no evidence of selection for reduced weediness.
1.02		Skip to 2.01
1.03		Skip to 2.01
2.01	1. PERAL NAPPFAST Global Plant Hardiness ( <a href="http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lgnd.tif">http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lgnd.tif</a> ).	<b>No computer analysis was performed.</b> 1. Global plant hardiness zones 11-12 (Espirito Santo, Brazil); 12-13 (Congo)
2.02		<b>No computer analysis was performed.</b>
2.03	1. Köppen-Geiger climate map ( <a href="http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf">http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf</a> ).	1. Distribution in the planted site of Brazil (Espirito Santo) and the Congo occurs in 2-3 climatic groups.
2.04	1. Globalis ( <a href="http://globalis.gvu.unu.edu/">http://globalis.gvu.unu.edu/</a> [Accessed: 9/9/2010]).	1. Espirito Santo, Brazil 1000-1400 mm (39-55 in); Congo 600-2000 mm (24-79 in)
2.05	1. Meskimen, G. & J.K. Francis. Rose Gum Eucalyptus. <a href="http://na.fs.fed.us/pubs/silvics_manual/volume_2/eucalyptus/grandis.htm">http://na.fs.fed.us/pubs/silvics_manual/volume_2/eucalyptus/grandis.htm</a> . Accessed: 9/8/2010. 2. Ad Hoc Panel of the Advisory Committee on Technology Innovation, Board on Science and Technology for International Development, Commission on International Relations. 1980. <i>Firewood crops: shrub and tree species for energy production</i> . National Academy of Sciences. Washington D.C.	<i>E. urograndis</i> is a genetically modified hybrid and therefore has no natural range. 1. In Espirito Santo, Brazil, hybrids between <i>E. grandis</i> and <i>E. urophylla</i> are planted as clonal stands from rooted cuttings. 2. A technique to raise <i>E. urophylla</i> and <i>E. urophylla</i> X <i>E. grandis</i> vegetatively by cuttings has been developed in Brazil and the Congo.
3.01		No evidence. <i>E. urograndis</i> is a genetically modified hybrid and therefore has no native range.
3.02		No evidence.
3.03		No evidence.
3.04		No evidence.
3.05	1. Holm, L. et al. 1979. A Geographical Atlas of World Weeds. John Wiley and Sons, New York. 2. Henderson, L. 2001. Alien Weeds and Invasive Plants. Agricultural Research Council. 3. An electronic Atlas of Weeds and Invasive Species. CD ROM version 1. 1997. Based on the original work 'A Geographical Atlas of Weeds' by Holm et al.	1. <i>Eucalyptus cambageana</i> is a principal weed in Australia. 2.a. <i>Eucalyptus diversicolor</i> is an invader in South Africa. 2.b. <i>E. grandis</i> was declared an invader (category 2). 3. Several <i>Eucalyptus</i> species such as <i>E. populnea</i> , <i>E. pilularis</i> , <i>E. ferruginear</i> and <i>E. cambageana</i> are listed as principal weeds in Australia.
4.01		Species does not possess these described morphological features.

4.02	<p>1. Anonymous. 2009. "Focus on Eucalypts." <i>SAPIA NEWS No. 12</i> . ARC-Plant Protection Research Institute, South Africa. 2. Anonymous. October 2010. Scotland, Forestry Commission. Interim Guidance on the Grant Aiding and Planting of Eucalypts in Scotland. Accessed: 18 January 2012. 3. Rejmánek, M. &amp; D.M. Richardson. 2011. Eucalypts (203-209). In D. Simberloff &amp; M. Rejmánek, eds. <i>Encyclopedia of Biological Invasions</i> . Berkeley: University of California Press.</p>	<p>1. It is likely that most <i>Eucalypts</i> are allelopathic-having the potential to suppress understory plants through chemical inhibitors that leach into the soil. 2. There are many reports in global literature of toxic inhibition of germination and growth of other plant species (allelopathic effects), which inhibits the growth of an understory. 3. Concerns expressed about suppression of ground vegetation due to possible allelopathic effects. Allelopathic effects are widely reported and these reports are largely based on laboratory bioassays. If not chemical inhibition then at least accumulation of dead material of the floor of eucalypt plantations hinders regeneration of native species.</p>
4.03		No description of parasitism.
4.04		
4.05		
4.06	<p>1. Nyeko, P. et al. (2009) Eucalypts infestations by <i>Leptocybe invasa</i> in Uganda. <i>African Journal of Ecology</i> , 47: 299-307.</p>	<p>1. Outbreaks of the blue gum chalcid, <i>Leptocybe invasa</i> , on <i>Eucalyptus</i> species in many countries in Africa, Asia, the Middle East, and Europe illustrate how pest problems raise serious concerns to developers of tropical tree plantation enterprises. <i>E. urophylla</i> is NOT a preferred species by the insect, however <i>E. grandis</i> IS a suitable host. The hybrid <i>E. grandis</i> X <i>E. urophylla</i> (GU) shows less infestation than the <i>E. grandis</i> X <i>E. camaldulensis</i> (GC) hybrid (these two parent species are the preferred species for <i>L. invasa</i> ).</p>
4.07		
4.08	<p>1. National Academy of Sciences (1980) Firewood Crops: Shrub and Tree Species for Energy Production. Washington, D.C. 2. Turnbull, J.W. &amp; J.C. Doran (1997) <i>Eucalyptus urophylla</i> S.T. Blake [Internet] Record from PROSEABASE. Faridah Hanum, I &amp; van der Maesen, L.J.G. (Editors). PROSEA Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. <a href="http://www.proseanet.org">http://www.proseanet.org</a>. Accessed: 8 December 2009.</p>	<p>1. <i>E. grandis</i> ...is very sensitive to fire. 2. <i>E. urophylla</i> is relatively resist to fire.</p>
4.09		
4.10		

4.11	<p>1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924">http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924</a> (1 May 2012 [<i>Eucalyptus grandis</i> ]; 1 May 2012 [<i>Eucalyptus urophylla</i> ]).</p> <p>2. Food and Agriculture Organization of the United Nations (1979) Eucalypts for Planting. Rome. 3. Turnbull, J.W. &amp; J.C. Doran (1997) <i>Eucalyptus urophylla</i> S.T. Blake [Internet] Record from PROSEABASE. Faridah Hanum, I &amp; van der Maesen, L.J.G. (Editors). PROSEA Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. <a href="http://www.proseanet.org">http://www.proseanet.org</a>. Accessed: 8 December 2009.</p>	<p>1. From two species of the family: <i>Myrtaceae</i> . 2. <i>E. grandis</i> tree height in Australia: 45-55 m. 3. <i>E. urophylla</i> is an evergreen tree up to 45-55 m tall (in unfavorable environments a gnarled shrub)</p>
4.12	<p>1. Food and Agriculture Organization of the United Nations (1979) Eucalypts for Planting. Rome. 2. Turnbull, J.W. &amp; J.C. Doran (1997) <i>Eucalyptus urophylla</i> S.T. Blake [Internet] Record from PROSEABASE. Faridah Hanum, I &amp; van der Maesen, L.J.G. (Editors). PROSEA Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. <a href="http://www.proseanet.org">http://www.proseanet.org</a>. Accessed: 8 December 2009.</p>	<p>1. <i>E. grandis</i> tree usually with an excellent trunk and a widespreading rather thin crown. 2. <i>E. urophylla</i> bole usually straight, branchless for up to 30 m.</p>
5.01	<p>1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924">http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924</a> (1 May 2012 [<i>Eucalyptus grandis</i> ]; 1 May 2012 [<i>Eucalyptus urophylla</i> ]).</p>	<p>Tree.</p>
5.02	<p>1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924">http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924</a> (1 May 2012 [<i>Eucalyptus grandis</i> ]; 1 May 2012 [<i>Eucalyptus urophylla</i> ]).</p>	<p>1. From two species of the family: <i>Myrtaceae</i> .</p>
5.03	<p>1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924">http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924</a> (1 May 2012 [<i>Eucalyptus grandis</i> ]; 1 May 2012 [<i>Eucalyptus urophylla</i> ]).</p>	<p>1. From two species of the family: <i>Myrtaceae</i> .</p>

5.04	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924">http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924</a> (1 May 2012 [ <i>Eucalyptus grandis</i> ]; 1 May 2012 [ <i>Eucalyptus urophylla</i> ]).	Tree.
6.01		
6.02		
6.03	1. Pepe et al. 2004. Conservation status of natural populations of <i>Eucalyptus urophylla</i> in Indonesia and international efforts to protect dwindling gene pools. Forest Genetic Resources No. 31, FAO. Rome, Italy.	1. Contamination of pure lines of <i>E. urophylla</i> with pollen of other eucalypts, such as <i>E. grandis</i> and <i>E. alba</i> .
6.04	1. Horsley, T.N. & S.D. Johnson (2007) Is <i>Eucalyptus</i> cryptically self-incompatible? <i>Annals of Botany</i> 100: 1373-1378.	1. <i>Eucalyptus</i> is considered to have a breeding system that is preferentially out-crossing, although selfing is not uncommon.
6.05	1. Chaix, G, et al. (2007) Are phenological observations sufficient to estimate the quality of seed crops from a <i>Eucalyptus grandis</i> open-pollinated seed orchard? Consequences for seed collections. <i>New Forests</i> 33 (1): 41-52. 2.a-b. Turnbull, J.W. & J.C. Doran (1997) <i>Eucalyptus urophylla</i> S.T. Blake [Internet] Record from PROSEABASE. Faridah Hanum, I & van der Maesen, L.J.G. (Editors). PROSEA Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. <a href="http://www.proseanet.org">http://www.proseanet.org</a> . Accessed: 8 December 2009.	Both parent species of the hybrid <i>E. urograndis</i> are pollinated by insects. 1. Insect pollinated <i>Eucalyptus</i> do not express specificity regarding the pollinating insects. 2.a. Pollination is by insects. 2.b. Bisexual flowers are open to many pollen vectors, such as insects, birds, or small mammals. Some wind pollination is also possible.
6.06	1. Meskimen, G. & J.K. Francis. Rose Gum <i>Eucalyptus</i> . <a href="http://na.fs.fed.us/pubs/silvics_manual/volume_2/eucalyptus/grandis.htm">http://na.fs.fed.us/pubs/silvics_manual/volume_2/eucalyptus/grandis.htm</a> . Accessed: 9/8/2010. 2. Ad Hoc Panel of the Advisory Committee on Technology Innovation, Board on Science and Technology for International Development, Commission on International Relations. 1980. <i>Firewood crops: shrub and tree species for energy production</i> . National Academy of Sciences. Washington D.C.	1. In Espirito Santo, Brazil, hybrids between <i>E. grandis</i> and <i>E. urophylla</i> are planted as clonal stands from rooted cuttings. 2. A technique to raise <i>E. urophylla</i> and <i>E. urophylla</i> X <i>E. grandis</i> vegetatively by cuttings has been developed in Brazil and the Congo.
6.07		
7.01		
7.02	1. Silvério, F.O. et al. 2007. Characterization of lipophilic wood extractives from clones of <i>Eucalyptus urograndis</i> cultivate in Brazil. <i>BioResources</i> , 2(2): 157-168.	1. <i>E. urograndis</i> is one of the main species used for pulp production, and is the dominant <i>Eucalyptus</i> species planted in Brazil. <i>E. urograndis</i> has many desirable features including high forest productivity (in excess of 60 m <sup>3</sup> /Ha/year), strong disease resistance, high industrial pulping yield, and high quality fiber for paper production (Gomide et al. 2005).
7.03		

7.04	<p>1. Potts, B. 1990. The response of eucalypt populations to a changing environment. <i>Tasforests</i>, December: 179-193. 2. Cremer, K.W. 1977. Distance of seed dispersal in Eucalypts estimated from seed weights. <i>Australian Forest Research</i>, 7(4): 225-228. 3. Rejmánek, M. &amp; D.M. Richardson. 2011. Eucalypts (203-209). In: D. Simberloff &amp; M. Rejmánek, eds. <i>Encyclopedia of Biological Invasions</i>. Berkeley: University of California Press.</p>	<p>No description of seed could be found. 1. Seed dispersal in most eucalypt species is mainly by wind and gravity. 2. Wind is probably the only important agent of seed dispersal in the eucalypts, except possibly in species growing on river margins or flood plains where water could also transport the seed. 3. Relatively limited seed dispersal; planted eucalypts are very small and have no adaptations for dispersal (wings or fleshy). The passive release of seeds is undoubtedly aided by wind; however all rigorous studies of eucalypt seed dispersal and seedling spatial distribution show that in general seeds are dispersed over quite short distances that are in agreement with measurement of terminal descent velocity.</p>
7.05	<p>1. Rejmánek, M. &amp; D.M. Richardson. 2011. Eucalypts (203-209). In D. Simberloff &amp; M. Rejmánek, eds. <i>Encyclopedia of Biological Invasions</i>. Berkeley: University of California Press.</p>	<p>1. Eucalypts should not be planted near rivers/streams. Temporarily flooded or eroded river/stream banks are suitable habitat for spontaneous establishment of seedlings. Additionally, their seeds can be dispersed for long distances by running water.</p>
7.06	<p>1. Southern, S.G. et al. 2004. Review of gene movement by bats and birds and its potential significance for eucalypt plantation forestry. <i>Australian Forestry</i>, 67(1): 44-53.</p>	<p>1. Dispersal in animal droppings does not occur, although many birds eat eucalypt seed, because the seed does not survive passage through the alimentary canal of mammals and birds (Joseph 1986).</p>
7.07		
7.08	<p>1. Southern, S.G. et al. 2004. Review of gene movement by bats and birds and its potential significance for eucalypt plantation forestry. <i>Australian Forestry</i>, 67(1): 44-53.</p>	<p>1. Dispersal in animal droppings does not occur, although many birds eat eucalypt seed, because the seed does not survive passage through the alimentary canal of mammals and birds (Joseph 1986).</p>
8.01		
8.02		
8.03	<p>1. Rockwood p 3,8,13; Little, K, du Toit, B (2002) Management of <i>Eucalyptus grandis</i> Coppice Regeneration of Seedling Parent Stock in Zululand, South Africa. Institute for Commercial Forestry Research (Scottsville, Pietermaritzburg, South Africa). 2. Santos, L.D.T, et al. (2007) Morphological responses of different eucalypt clones submitted to glyphosate drift. <i>Environmental and Experimental Botany</i> 59: 11-20.</p>	<p>1. <i>E. grandis</i> - Glyphosate, a systemic herbicide, resulted in the death of the coppice regrowth following translocation of the active ingredient without negatively affecting the performance of the remaining coppice stems. 2. <i>E. urophylla</i> - Plants submitted to 172.8 and 345.6 g e.a. ha<sup>-1</sup> of glyphosate had severe injuries in the aerial part, affecting their development and leading to reduced height, stem diameter and biomass.</p>

8.04	1. Hinchee, M. et al. 2009. Short-rotation woody crops for bioenergy and biofuels applications. <i>In Vitro Cellular and Developmental Biology - Plant</i> , 45: 619-629.	1. Coppicing produces multiple harvest from crops; <i>E. urograndis</i> initial harvest at 3 years, followed by three coppice rotations.
8.05		