Trema orientalis (=T. guineensis) (African elm, Charcoal tree)		**Answer**	**Score**
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 with mean annual precipitation of 40-70 inches.	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range.	y	2
3.02	Garden/amenity/disturbance weed	y	2
3.03	Weed of agriculture	y	4
3.04	Environmental weed	n	0
3.05	Congeneric weed	y	2
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	n	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	n	-1
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens	n	0
4.07	Causes allergies or is otherwise toxic to humans.	n	0
4.08	Creates a fire hazard in natural ecosystems	n	0
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).	y	1
4.11	Climbing or smothering growth habit	n	0
4.12	Forms dense thickets	n	0
5.01	Aquatic	n	0
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	?	
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1
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	n	-1

7.05	Propagules water dispersed	n	-1
7.06	Propagules bird dispersed	y	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	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05	Effective natural enemies present in Florida, or east of the continental divide.		
	Total Score	**13**	
	Implemented Pacific Second Screening	**No**	
	Risk Assessment Results	**Reject**	

	Reference	Source data
1.01		Cultivated, but no evidence of selection for reduced weediness.
1.02		
1.03		
2.01	1. PERAL NAPPFAST Global Plant Hardiness (http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lgnd.tif). 2. The National Arbor Day Foundation 2006 Hardiness Zones Map, arborday.org. 3. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948. 4. USDA, NRCS. 2011. The PLANTS Database (http://plants.usda.gov, 24 January 2011). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 5. Motooka et al. 2003. Excerpt from *Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide* . http://www.ctahr.hawaii.edu/invweed/WeedsHI/W_Trema_orientalis.pdf.	**No computer analysis was performed**. 1. World hardiness zones: 8-13. 2. US hardiness zones: 9-11. 3. Native distribution: Africa (throughout entire continent); Asia-Temperate (Arabia, China, Japan, Taiwan); Asia-Tropical (Bhutan, India, Nepal, Sri Lanka, Myanmar, Thailand, Vietnam, Indonesia, Malaysia, Papua New Guinea, Philippines); Australia (Northern Territory, Queensland). 4. Present in Hawaii. 5. Native to the Old World between Africa, Japan, Australia, and Polynesia.
2.02	Refer to all references in 2.01.	**No computer analysis was performed**. Native range is well known; refer to 2.01 source data.
2.03	1. Köppen-Geiger climate map (http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf). 2. Refer to all references in question 2.01.	1. Distribution in the native range is very widespread and occurs in more than 3 climatic groups. Also refer to source data in question 2.01.
2.04	1. Globalis (http://globalis.gvu.unu.edu/). 2. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011. 3. Hines, D.A. & K. Eckman. *Indigenous multipurpose trees of Tanzania: Uses and economic benefits for people* . Ottawa, Ontario, Canada. http://www.fao.org/docrep/x5327e/x5327e00.htm.	1. Native to areas with annual precipitations of 0"-118" (0 mm-3000 mm). 2. It requires 39"-79" (1000 mm-2000 mm) annual rainfall. 3. Minimum rainfall: 39" (1000 mm).
2.05	1. US Forest Service, Pacific Island Ecosystems at Risk (PIER). Online resource at http://www.hear.org/pier/ accessed [21 March 2011].	1.a. Introduced and considered invasive in Hawaii and La Réunion (France), and moderately invasive in the Soloman Islands (Wairiu & Wagatora 2002). 1.b Should not be introduced where not native.
3.01	1. www.hear.org.	1. Naturalized in Hawaii.

3.02	1. Motooka et al. 2003. Excerpt from *Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide.* http://www.ctahr.hawaii.edu/invweed/WeedsHI/W_Trema_orientalis.pdf. 2. Hines, D.A. & K. Eckman. *Indigenous multipurpose trees of Tanzania: Uses and economic benefits for people* . Ottawa, Ontario, Canada. http://www.fao.org/docrep/x5327e/x5327e00.htm.	1. Invasive in disturbed forests and pastures. 2.a. *T. orientalis* is a pioneer species and is found in clearings and abandoned farmland (FAO 1986). 2.b. It quickly invades clearings and disturbed soil.
3.03	1. Motooka et al. 2003. Excerpt from *Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide.* http://www.ctahr.hawaii.edu/invweed/WeedsHI/W_Trema_orientalis.pdf. 2. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011.	1. Invasive in disturbed forests and pastures. 2. Caution is advised if *Trema orientalis* is to be introduced outside its natural habitat as it may spread insect pests to other plants of economic importance.
3.04		No evidence.
3.05	1. Holm et al. *A Geographical Atlas of World Weeds* . New York: John Wiley & Sons, 1979. Print.	1. *T. aspera* Bl. is a principal weed in Australia.
4.01		
4.02		No evidence.
4.03		
4.04	1. US Forest Service, Pacific Island Ecosystems at Risk (PIER). Online resource at http://www.hear.org/pier/ accessed [21 March 2011]. 2.a-b. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011. 3. Hines, D.A. & K. Eckman. *Indigenous multipurpose trees of Tanzania: Uses and economic benefits for people* . Ottawa, Ontario, Canada. http://www.fao.org/docrep/x5327e/x5327e00.htm.	1. Cattle relish the leaves of gunpowder trees (Sam Taka, researcher [Motooka et al 2003]). 2.a. In the Philippines, *Trema orientalis* silage is fed to cattle, buffaloes and goats. 2.b. Good palatability and feeding value. 3. Foilage is browsed by livestock and wild animals; the leaves, pods, and seeds are used as fodder.
4.05		No evidence.

4.06	1. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011. 2. Orwa C et al. 2009. *Agroforestree Database: A tree reference and selection guide version 4.0* (http://www.worldagroforestry.org/af/treedb/).	1. No serious diseases and pests are known. Larvae of *Sahyadrassus malabaricus* , a sapling borer of *Trema orientalis* , causes some damage in India, but can be controlled completely with insecticides. 2. A powdery mildew fungus (*Oidium udaiyanii*) is also known to infect the species.
4.07		No evidence.
4.08	1. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011.	1. It is intolerant of fire.
4.09	1.a-b. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011. 2. Cao, M. et al. Viable seeds buried in the tropical forest soils of Xishuangbanna, SW China. *Seed Science Research* , 10: 255-264.	1.a. *Trema orientalis* is often planted as a shade tree. Being a pioneer species, it is suitable for planting on poor soils to reforest denuded or disturbed areas. In South Africa it is planted to reforest riverine areas, thereby functioning as the first species in a succession of trees. 1.b. Seed requires a high light intensity for germination. 2. It does not germinate under the forest canopy because the filtering of light by leaf litter prevents germination (Chang, 1996).
4.10	1.a-b. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011. 2. Hines, D.A. & K. Eckman. *Indigenous multipurpose trees of Tanzania: Uses and economic benefits for people* . Ottawa, Ontario, Canada. http://www.fao.org/docrep/x5327e/x5327e00.htm.	1.a. It is suitable for planting on poor soils. 1.b. It grows on a wide range of soils from heavy clay to light sand. 2. Prefers sites on well-drained, exposed soils without leaf litter, demonstrating an ability to become established on poor or disturbed soil (Forest Division 1984).
4.11		No evidence.
4.12		No evidence.
5.01	1. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948.	1. Family: *Ulmaceae* .

5.02	1. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948.	1. Family: *Ulmaceae* .
5.03	1. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948. 2. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011. 3. Hines, D.A. & K. Eckman. *Indigenous multipurpose trees of Tanzania: Uses and economic benefits for people* . Ottawa, Ontario, Canada. http://www.fao.org/docrep/x5327e/x5327e00.htm. 4. Samantaray, S. et al. 1995. An in vitro study on organogenesis in *Trema orientalis* (Blume) Linn. *Plant Science* , 105: 87-94.	1. Family: *Ulmaceae* . 2. Early reports of nitrogen fixing nodules being found in *Trema orientalis* have not been confirmed. 3. *T. orientalis* is nitrogen fixing and considered to have immediate potential for the rehabilitation of poor exposed soils. 4. *T. orientalis* is nodulated by nitrogen-fixing rhizobia and grows rapidly on soils deficient of nitrogen.
5.04	1. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948.	1. Family: *Ulmaceae* .
6.01		
6.02	1. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011. 2.a-b. Orwa C et al. 2009. *Agroforestree Database: A tree reference and selection guide version 4.0* (http://www.worldagroforestry.org/af/treedb/).	1. *Trema orientalis* is propagated by seed. 2.a. Seeds germinate readily. 2.b. The tree regenerates profusely through its numerous seeds.
6.03		
6.04		
6.05	1. Hines, D.A. & K. Eckman. *Indigenous multipurpose trees of Tanzania: Uses and economic benefits for people* . Ottawa, Ontario, Canada. http://www.fao.org/docrep/x5327e/x5327e00.htm.	1. It is a host tree for butterflies and bees are attracted to the flowers.

6.06	1. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011.	1. *Trema orientalis* is propagated by stump cuttings.
6.07	1. Cao, M. et al. Viable seeds buried in the tropical forest soils of Xishuangbanna, SW China. *Seed Science Research* , 10: 255-264.	Cannot determine, but1. *Trema orientalis* forest (Tof), a 4-yr-old forest, showed the most abundant seed bank.
7.01	1. Orwa C et al. 2009. *Agroforestree Database: A tree reference and selection guide version 4.0* (http://www.worldagroforestry.org/af/treedb/).	Seeds could be transported in tires from disturbed pastures. 1. Often planted as a shade tree in coffee and cocoa plantations and also in other crops in Asia and Africa.
7.02	1. Hines, D.A. & K. Eckman. *Indigenous multipurpose trees of Tanzania: Uses and economic benefits for people* . Ottawa, Ontario, Canada. http://www.fao.org/docrep/x5327e/x5327e00.htm. 2. Orwa C et al. 2009. *Agroforestree Database: A tree reference and selection guide version 4.0* (http://www.worldagroforestry.org/af/treedb/).	1. Uses: medicine, land improvement, fodder. 2.a. Products: Food, fodder, apiculture, fuel, fiber, timber, tannin or dyestuff, lipids, medicine. 2.b. Services: Erosion control, shade, reclamation, soil improver, ornamental.
7.03	1. Orwa C et al. 2009. *Agroforestree Database: A tree reference and selection guide version 4.0* (http://www.worldagroforestry.org/af/treedb/).	1. Often planted as a shade tree in coffee and cocoa plantations and also in other crops in Asia and Africa.
7.04		No evidence.
7.05		No evidence.
7.06	1. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011.	1. The fleshy drupes are dispersed by birds.
7.07	1. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011.	1. Ants and rodents favor the fruits.
7.08		No evidence.
8.01	1. Orwa C et al. 2009. *Agroforestree Database: A tree reference and selection guide version 4.0* (http://www.worldagroforestry.org/af/treedb/).	1. The tree regenerates profusely through its numerous seeds.

8.02	1. Samantaray, S. et al. 1995. An in vitro study on organogenesis in Trema orientalis (Blume) Linn. *Plant Science* , 105: 87-94.	1. *Trema* seeds have short viability.
8.03	1. US Forest Service, Pacific Island Ecosystems at Risk (PIER). Online resource at http://www.hear.org/pier/ accessed [21 March 2011].	1. Sensitive to cut-surface applications (to drilled holes) of hormone-type herbicides and glyphosate. HAVO staff reported control with triclopyr amine at 10% product in water applied to cut stumps (Chris Zimmer, HAVO). Also sensitive to basal bark, frill, and cut-stump applications of triclopyr (Motooka et al., 2003).
8.04	1. Hanum, I.F. 1997. *Trema oriantalis* (L.) Blume. Eds. Faridah Hanum, I & van der Maesen, L.J.G.. In: *Plant Resources of South-East Asia No. 11: Auxiliary Plants* . Backhuys Publisher, Leiden, The Netherlands. Internet record from Proseabase; PROSEA (Plant Resources of South-East Asia) Foundation. Bogor, Indonesia. http://www.proseanet.org. Accessed: 25 January 2011. 2. Hines, D.A. & K. Eckman. *Indigenous multipurpose trees of Tanzania: Uses and economic benefits for people* . Ottawa, Ontario, Canada. http://www.fao.org/docrep/x5327e/x5327e00.htm.	1. It coppices well. 2. The tree has the ability to coppice readily.
8.05		