

Australia/New Zealand Weed Risk Assessment adapted for United States.

Data used for analysis published in: Gordon, D.R. and C.A. Gantz. 2008. Potential impacts on the horticultural industry of screening new plants for invasiveness. Conservation Letters 1: 227-235. Available at: <http://www3.interscience.wiley.com/cgi-bin/fulltext/121448369/PDFSTART>

<i>Massularia acuminata</i>			
Question number	Question	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 U.S. climates (USDA hardiness zones; 0-low, 1-intermediate, 2-high)	1	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)	?	
2.04	Native or naturalized in regions with an average of 11-60 inches of annual precipitation	?	
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	n	0
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	n	0
4.06	Host for recognised pests and pathogens		
4.07	Causes allergies or is otherwise toxic to humans	n	0
4.08	Creates a fire hazard in natural ecosystems		
4.09	Is a shade tolerant plant at some stage of its life cycle	?	
4.1	Grows on one or more of the following soil types: alfisols, entisols, or mollisols	y	1
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	0
6.02	Produces viable seed		
6.03	Hybridizes naturally		
6.04	Self-compatible or apomictic		
6.05	Requires specialist pollinators		
6.06	Reproduction by vegetative fragmentation		
6.07	Minimum generative time (years)		
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n	-1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal	?	
7.05	Propagules water dispersed		
7.06	Propagules bird dispersed		
7.07	Propagules dispersed by other animals (externally)	?	
7.08	Propagules dispersed by other animals (internally)	?	
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		
8.05	Effective natural enemies present in U.S.		
Total Score			-2

Outcome	Accept
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section	# questions answered	satisfy minimum?
A	9	Yes
B	6	Yes
C	8	Yes
total	23	yes

Question number	Reference	Source data
1.01		used horticulturally, but no evidence of significant modification
1.02		
1.03		
2.01	<p>1. PERAL NAPPFAST Global Plant Hardiness (http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lgn.tif). 2. Keay, RWJ (1958) <i>Randia</i> and <i>Gardenia</i> in West Africa. <i>Bulletin du jardin botanique de l'Etat a Bruxelles</i>. Volume 28, Fasc. 1, pp. 15-72. National Botanic Garden Belgium, Meise. 3. Figueiredo, E (2007) The Rubiaceae of Cabinda (Angola). <i>Botanical Journal of the Linnean Society</i> 154: 455-495. 4. Aluka (http://www.aluka.org/action/showMetadata?doi=10.5555/AL.AP.UPWTA.4_925&pgs=&cookieSet=1). 5. World Wildlife Fund (http://www.worldwildlife.org/wildworld/profiles/terrestrial/at/at0122_full.html). 6. Butynski, TM and McCullough, J (2007) A Rapid Biological Assessment of Lokutu, Democratic Republic of Congo. <i>RAP Bulletin of Biological Assessment</i> 46. Conservation International Center for Applied Biodiversity Science, Arlington, Virginia. 7. Hoke, P, Demey, R, and Peal, A (2007) A Rapid Biological Assessment of North Lorma, Gola and Grebo National Forests, Liberia. <i>RAP Bulletin of Biological Assessment</i> 44. Conservation International Center for Applied Biodiversity Science, Arlington, Virginia. 8. Davis, AP and Figueiredo, E (2007) A checklist of the Rubiaceae (coffee family) of Bioko and Annobon (Equatorial Guinea, Gulf of Guinea). <i>Systematics and Biodiversity</i> 5(2): 159-186. 9. Burkill, HM (1997) <i>The Useful Plants of West Tropical Africa</i>. Edition 2. Volume 4, Families M-R. Royal Botanic Gardens Kew, London. 10. Hutchinson, J and Dalziel, JM (1948) <i>The useful plants of west tropical Africa: being an appendix to the Flora of west tropical Africa</i>. Published under the authority of the Secretary of State for the</p>	<p>1. Global hardiness zones 11-13. 2. "Extends from Sierra Leone to Belgian Congo." 3. "Distribution: From Guinea-Bissau to Cabinda." 4. "Common from Guinea to W Cameroons and Fernando Po, and extending into Zaïre". 5. Species occurs in the Niger Delta swamp forests (Southern Nigeria). 6. Species occurs in Lokutu, Democratic Republic of Congo. 7. Species occurs in Liberia. 8. "Distribution: West and West central tropical Africa. 22 GHA, GUI, IVO, LBR, NGA, SIE; 23 CAB, CAF, CMN, GAB, GGI-BI, ZAI." 9. "Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria"; "common from Guinea to W Cameroons and Fernando Po, and extending into Zaïre". 10. "Sierra Leone...Liberia".</p>

	Colonies by the Crown Agents for the Colonies, London.	
2.02		
2.03	<p>1. Köppen-Geiger climate map (http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf).</p> <p>2. Keay, RWJ (1958) <i>Randia</i> and <i>Gardenia</i> in West Africa. <i>Bulletin du jardin botanique de l'Etat a Bruxelles</i>. Volume 28, Fasc. 1, pp. 15-72. National Botanic Garden Belgium, Meise.</p> <p>3. Figueiredo, E (2007) The Rubiaceae of Cabinda (Angola). <i>Botanical Journal of the Linnean Society</i> 154: 455-495.</p> <p>4. Aluka (http://www.aluka.org/action/showMetadata?doi=10.5555/AL.AP.UPWTA.4_925&pgs=&cookieSet=1).</p> <p>5. World Wildlife Fund (http://www.worldwildlife.org/wildworld/profiles/terrestrial/at/at0122_full.html).</p> <p>6. Butynski, TM and McCullough, J (2007) A Rapid Biological Assessment of Lokutu, Democratic Republic of Congo. <i>RAP Bulletin of Biological Assessment</i> 46. Conservation International Center for Applied Biodiversity Science, Arlington, Virginia.</p> <p>7. Hoke, P, Demey, R, and Peal, A (2007) A Rapid Biological Assessment of North Lorma, Gola and Grebo National Forests, Liberia. <i>RAP Bulletin of Biological Assessment</i> 44. Conservation International Center for Applied Biodiversity Science, Arlington, Virginia.</p> <p>8. Davis, AP and Figueiredo, E (2007) A checklist of the Rubiaceae (coffee family) of Bioko and Annobon (Equatorial Guinea, Gulf of Guinea). <i>Systematics and Biodiversity</i> 5(2): 159-186.</p> <p>9. Burkill, HM (1997) <i>The Useful Plants of West Tropical Africa</i>. Edition 2. Volume 4, Families M-R. Royal Botanic Gardens Kew, London.</p> <p>10. Hutchinson, J and Dalziel, JM (1948) <i>The useful plants of west tropical Africa: being an appendix to the Flora of west tropical Africa</i>. Published under the authority of the Secretary of State for the Colonies by the Crown Agents for the Colonies, London.</p>	<p>1. Distribution range is uncertain -- possibly 2-3 climatic regions.</p> <p>2. "Extends from Sierra Leone to Belgian Congo."</p> <p>3. "Distribution: From Guinea-Bissau to Cabinda."</p> <p>4. "Common from Guinea to W Cameroons and Fernando Po, and extending into Zaïre".</p> <p>5. Species occurs in the Niger Delta swamp forests (Southern Nigeria).</p> <p>6. Species occurs in Lokutu, Democratic Republic of Congo.</p> <p>7. Species occurs in Liberia.</p> <p>8. "Distribution: West and West central tropical Africa. 22 GHA, GUI, IVO, LBR, NGA, SIE; 23 CAB, CAF, CMN, GAB, GGI-BI, ZAI."</p> <p>9. "Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria"; "common from Guinea to W Cameroons and Fernando Po, and extending into Zaïre".</p> <p>10. "Sierra Leone...Liberia".</p>
2.04	<p>1. <i>Altapedia Online</i> (http://www.atlapedia.com/online/countries/cameroon.htm).</p> <p>2. <i>Altapedia Online</i> (http://www.atlapedia.com/online/countries/liber</p>	<p>1. For Cameroon: Average annual precipitation is 4,030 mm (159 inches).</p> <p>2. For Liberia: Liberia has a tropical climate with two wet seasons in the southeast</p>

	<p>ia.htm). 3. Atlapedia Online (http://www.atlapedia.com/online/countries/guinea.htm). 4. Atlapedia Online (http://www.atlapedia.com/online/countries/DemRepCongo.htm). 5. Atlapedia Online (http://www.atlapedia.com/online/countries/nigeria.htm).</p>	<p>and one wet season from May to October for the rest of the country. Average annual precipitation in Monrovia is 4,150 mm (163 inches). 3. For Guinea: average annual precipitation at Conakry is 4,923 mm (193 inches). 4. For Zaire (Democratic Republic of Congo): Democratic Republic of the Congo (Zaire) is crossed by the Equator and the seasons are reversed in the north and south. Both regions have two short wet seasons and two short dry seasons while the central area has an equatorial climate with an average annual precipitation of 1,700 mm (67 inches). 5. For Nigeria: Average annual precipitation varies from 1,770 mm (70 inches) in the west to 4,310 mm (170 inches) along the east coast, and to 470 mm (50 inches) in the central areas.</p>
2.05	<p>1. Spearson Limited (http://spearson.en.ec21.com/). 2. United Nations Environment Programme World Conservation Monitoring Centre (2002) Conservation and cultivation of medicinal plants in Ghana (http://www.unep-wcmc.org/species/plants/ghana/pdfs/aburi_data.pdf). [Accessed 27 May 2008].</p>	<p>1. Seeds sold internationally from Ghana. 2. Cultivated at Aburi Botanic Garden, Ghana.</p>
3.01		no evidence
3.02		no evidence
3.03		no evidence
3.04		no evidence
3.05	<p>Keay, RWJ (1958) <i>Randia</i> and <i>Gardenia</i> in West Africa. Bulletin du jardin botanique de l'Etat a Bruxelles. Volume 28, Fasc. 1, pp. 15-72. National Botanic Garden Belgium, Meise.</p>	<p><i>Massularia</i> is a monotypic genus.</p>
4.01		no description of these traits
4.02		
4.03		no description of parasitism
4.04	<p>Klaus-Hugi, C, Klaus, G, Schmid, B, and Konig, B (1999) Feeding ecology of a large social</p>	<p>"According to the selectivity index [0.89], the bongos [<i>Tragelaphus eurycerus</i>] of</p>

	antelope in the rainforest. <i>Oecologia</i> 119: 81-90.	the Dzanga National Park exhibited a preference (positive index) for 26 plant species...The highest indices were found for <i>Macaranga</i> sp. (Mosomba), <i>Massularia acuminata</i> (Dyedi), <i>Cleistopholis patens</i> (Gambu) and <i>Entada gigas</i> (Bongombongo)."
4.05	Klaus-Hugi, C, Klaus, G, Schmid, B, and Konig, B (1999) Feeding ecology of a large social antelope in the rainforest. <i>Oecologia</i> 119: 81-90.	"According to the selectivity index [0.89], the bongos [<i>Tragelaphus eurycerus</i>] of the Dzanga National Park exhibited a preference (positive index) for 26 plant species...The highest indices were found for <i>Macaranga</i> sp. (Mosomba), <i>Massularia acuminata</i> (Dyedi), <i>Cleistopholis patens</i> (Gambu) and <i>Entada gigas</i> (Bongombongo)." [no evidence of toxicity]
4.06		
4.07	1. Burkill, HM (1997) <i>The Useful Plants of West Tropical Africa</i> . Edition 2. Volume 4, Families M-R. Royal Botanic Gardens Kew, London. 2. Aluka (http://www.aluka.org/action/showMetadata?doi=10.5555/AL.AP.UPWTA.4_925&pgs=&cookieSet=1). 3. Hutchinson, J and Dalziel, JM (1948) <i>The useful plants of west tropical Africa: being an appendix to the Flora of west tropical Africa</i> . Published under the authority of the Secretary of State for the Colonies by the Crown Agents for the Colonies, London.	1. "The twigs have a bitter taste. They supply the commonest-used chew-sticks in Nigeria, the smaller twigs whole, the larger ones split." 2. The bark, fruit, and roots are used medicinally. The twigs are used as chew-sticks. 3. "The fruit is cut and the juice dropped in the eye for eye troubles". [no evidence of toxicity]
4.08		
4.09	1. Figueiredo, E (2007) <i>The Rubiaceae of Cabinda (Angola)</i> . <i>Botanical Journal of the Linnean Society</i> 154: 455-495. 2. Aluka (http://www.aluka.org/action/showMetadata?doi=10.5555/AL.AP.UPWTA.4_925&pgs=&cookieSet=1). 3. Burkill, HM (1997) <i>The Useful Plants of West Tropical Africa</i> . Edition 2. Volume 4, Families M-R. Royal Botanic Gardens Kew, London.	1. "Forest". 2. "Of the understorey of the closed-forest". 3. "Of the understorey of the closed-forest".
4.1	USDA, National Resources Conservation Services (NRCS), Soil Survey Division, <i>World Soil Resources</i> (http://soils.usda.gov/use/worldsoils/mapindex/order.html).	Equatorial Guinea: primarily oxisols with a small amount of entisols on the east coast; Cameroon: primarily oxisols with some ultisols and alfisols and small amounts of inceptisols and entisols (and

		also a small amount of andisols); Liberia: primarily oxisols with some ultisols; Guinea: mostly inceptisols and ultisols (with a small amount of oxisols in the southern region); Zaire (now called Democratic Republic of Congo): almost entirely oxisols and ultisols, with some entisols and inceptisols; Gabon: entisols, inceptisols, and oxisols, with a small amount of ultisols; Congo: mostly entisols and inceptisols with some ultisols and oxisols; Nigeria: mostly alfisols with some inceptisols, entisols, and ultisols (and a very small amount of oxisols); Sierra Leone: mostly oxisols with some inceptisols and a very small amount of ultisols and entisols along the coast; Guinea-Bissau: mostly alfisols with a small amount of inceptisols (and a small amount of oxisols); Togo: mostly alfisols with a small amount of inceptisols and a very small amount of ultisols; Benin: mostly alfisols with small amounts of inceptisols and ultisols.
4.11	1. Figueiredo, E (2007) The Rubiaceae of Cabinda (Angola). Botanical Journal of the Linnean Society 154: 455-495. 2. Aluka (http://www.aluka.org/action/showMetadata?doi=10.5555/AL.AP.UPWTA.4_925&pgs=&cookieSet=1). 3. Davis, AP and Figueiredo, E (2007) A checklist of the Rubiaceae (coffee family) of Bioko and Annobon (Equatorial Guinea, Gulf of Guinea). Systematics and Biodiversity 5(2): 159-186. 4. Burkill, HM (1997) The Useful Plants of West Tropical Africa. Edition 2. Volume 4, Families M-R. Royal Botanic Gardens Kew, London.	1. "Shrub or small tree up to 10 m high". 2. "A shrub or small tree to 9 m high". 3. "Shrub". 4. "A shrub or small tree to 9 m high".
4.12		
5.01		terrestrial
5.02		Rubiaceae
5.03		Rubiaceae
5.04	1. Figueiredo, E (2007) The Rubiaceae of Cabinda (Angola). Botanical Journal of the Linnean Society 154: 455-495. 2. Aluka	1. "Shrub or small tree up to 10 m high". 2. "A shrub or small tree to 9 m high". 3. "Shrub". 4. "A shrub or small tree to 9 m

	(http://www.aluka.org/action/showMetadata?doi=10.5555/AL.AP.UPWTA.4_925&pgs=&cookieSet=1). 3. Davis, AP and Figueiredo, E (2007) A checklist of the Rubiaceae (coffee family) of Bioko and Annobon (Equatorial Guinea, Gulf of Guinea). <i>Systematics and Biodiversity</i> 5(2): 159-186. 4. Burkill, HM (1997) <i>The Useful Plants of West Tropical Africa</i> . Edition 2. Volume 4, Families M-R. Royal Botanic Gardens Kew, London.	high".
6.01		no evidence
6.02		
6.03		
6.04		
6.05		
6.06		
6.07		
7.01		Large fruit/seed, no means of attachment, not growing in pastures, etc.
7.02	1. Spearson Limited (http://spearson.en.ec21.com/). 2. United Nations Environment Programme World Conservation Monitoring Centre (2002) Conservation and cultivation of medicinal plants in Ghana (http://www.unep-wcmc.org/species/plants/ghana/pdfs/aburi_data.pdf). [Accessed 27 May 2008].	1. Seeds sold internationally from Ghana. 2. Cultivated at Aburi Botanic Garden, Ghana.
7.03		no evidence
7.04	Keay, RWJ (1958) <i>Randia and Gardenia in West Africa</i> . <i>Bulletin du jardin botanique de l'Etat a Bruxelles</i> . Volume 28, Fasc. 1, pp. 15-72. National Botanic Garden Belgium, Meise.	"Fruits ovoid, beaked, 5-9 cm long" [genus description].
7.05		
7.06		
7.07	1. Yamagiwa, J (2008) Phenology of fruits consumed by a sympatric population of gorillas and chimpanzees in Kahuzibiega National Park, Democratic Republic of Congo. <i>African Study Monographs, Supplement</i> 39: 3-22. 2. Keay, RWJ (1958) <i>Randia and Gardenia in West Africa</i> . <i>Bulletin du jardin botanique de l'Etat a Bruxelles</i> . Volume 28, Fasc. 1, pp. 15-72. National Botanic Garden Belgium, Meise.	1. Seed dispersal is zoochorous. 2. "Fruits ovoid, beaked, 5-9 cm long" [genus description].

7.08	Yamagiwa, J (2008) Phenology of fruits consumed by a sympatric population of gorillas and chimpanzees in Kahuzibiega National Park, Democratic Republic of Congo. African Study Monographs, Supplement 39: 3-22.	Seed dispersal is zoochorous.
8.01		
8.02		
8.03		
8.04		
8.05		