

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>Voacanga thouarsii</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)	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	1	
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	y	1
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)		
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	n	-1
7.05	Propagules water dispersed		
7.06	Propagules bird dispersed	y	1
7.07	Propagules dispersed by other animals (externally)	n	-1
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	y	1
8.05	Effective natural enemies present in U.S.		
Total Score			0

Outcome	Accept
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section	# questions answered	satisfy minimum?
A	9	Yes
B	6	Yes
C	12	Yes
total	27	yes

Data collected 2008

Question number	Reference	Source data
1.01		cultivated, but no evidence of significant modification
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%20gnd.tif). 2. The Botanical Source (http://www.thebotanicalsource.com/id370.htm).	1. Global hardiness zones 9-13. 2. " <i>Voacanga thouarsii</i> occurs throughout tropical Africa, from Senegal eastwards through the forest zone to Sudan and Kenya, and south to Mozambique and the east coast of South Africa. It also occurs in Madagascar."
2.02		
2.03	1. Köppen-Geiger climate map (http://www.hydro-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf). 2. The Botanical Source (http://www.thebotanicalsource.com/id370.htm).	1. Possibly 3 climatic regions, but distribution range is too uncertain to determine. 2. " <i>Voacanga thouarsii</i> occurs throughout tropical Africa, from Senegal eastwards through the forest zone to Sudan and Kenya, and south to Mozambique and the east coast of South Africa. It also occurs in Madagascar."
2.04	1. Kenya: Atlapedia Online (http://www.atlapedia.com/online/countries/kenya.htm). 2. Sudan: Atlapedia Online (http://www.atlapedia.com/online/countries/sudan.htm). 3. Tanzania: Atlapedia Online (http://www.atlapedia.com/online/countries/tanzania.htm). 4. Uganda: Atlapedia Online (http://www.atlapedia.com/online/countries/uganda.htm). 5. Cameroon: Atlapedia Online (http://www.atlapedia.com/online/countries/cameroon.htm). 6. Zaire: Atlapedia Online (http://www.atlapedia.com/online/countries/DemRepCongo.htm). 7. Benin: Atlapedia Online (http://www.atlapedia.com/online/countries/benin.htm). 8. Côte d'Ivoire: Food and Agriculture Organization of the United Nations, Aquastat Global Information System on Water and Agriculture (http://www.fao.org/nr/water/aquastat/data/factsheets/aquastat_fact_sheet_civ.pdf). 9. Gambia: Atlapedia Online	1. For Kenya: "Over 70% of the country is arid receiving less than 510 mm (20 inches) of annual precipitation while rainfall is greatest in the highlands." 2. Average annual precipitation varies from 160 mm (6.3 inches) to around 1,000 mm (39 inches) in Khartoum with most rainfall occurring between April and October. 3. For Tanzania: "Around 50% of the country receives an annual precipitation of 760 mm (30 inches) with the maximum being 2,540 mm (100 inches) at Lake Nyasa and the minimum, 510 mm (20 inches) on the Central Plateau." 4. For Uganda: "The areas of Lake Victoria as well as the west and southwest mountains receive the highest amount of rainfall with an annual average precipitation exceeding 1,500 mm (60 inches)

	<p>(http://www.atlapedia.com/online/countries/gambia.htm). 10. Guinea: Atlapedia Online (http://www.atlapedia.com/online/countries/guinea.htm). 11. Atlapedia Online (http://www.atlapedia.com/online/countries/liberia.htm). 12. Mali: Atlapedia Online (http://www.atlapedia.com/online/countries/mali.htm). 13. Atlapedia Online (http://www.atlapedia.com/online/countries/nigeria.htm). 14. Atlapedia Online (http://www.atlapedia.com/online/countries/sierrale.htm). 15. Atlapedia Online (http://www.atlapedia.com/online/countries/malawi.htm). 16. Atlapedia Online (http://www.atlapedia.com/online/countries/mozambique.htm). 17. Atlapedia Online (http://www.atlapedia.com/online/countries/zambia.htm). 18. Zimbabwe: Atlapedia Online (http://www.atlapedia.com/online/countries/zimbabwe.htm). 19. Atlapedia Online (http://www.atlapedia.com/online/countries/southafrica.htm). 20. Madagascar: Atlapedia Online (http://www.atlapedia.com/online/countries/madagascar.htm).</p>	<p>whereas the areas in the center or northeast receive less than 1,000 mm (39 inches) annually." 5. For Cameroon: Average temperature ranges in Yaounde are from 18 to 29 degrees Celsius (64 to 84 degrees Fahrenheit) with an average annual precipitation of 4,030 mm (159 inches). 6. 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). 7. Average annual precipitation varies between 960 mm (38 inches) in the north and 1,340 mm (53 inches) in the south. 8. For Côte d'Ivoire: Long-term average annual precipitation is 1348 mm/year (53.1 in./year). 9. For Gambia: average annual precipitation in Banjul is 1,295 mm (51 inches). 10. Average annual precipitation at Conakry is 4,923 mm (193 inches). 11. For Liberia: Liberia has a tropical climate with two wet seasons in the southeast 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). 12. Mali has three climatic zones. (1.) The Sudanic zone which receives 700 to 1,000 mm (28 to 39 inches) of annual precipitation. (2.) The Sahelian zone which receives 200 to 400 mm (8 to 16 inches) of precipitation and (3.) the Saharan zone which accounts for 40% of the land area and receives little or no rain. 13. 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</p>
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		<p>inches) in the central areas. 14. Average annual precipitation varies from 5,080 mm (200 inches) along the coast and decreases inland towards the north to 2,160 mm (86 inches).</p> <p>15. For Malawi: "Average annual precipitation is 740 mm (29 inches)."</p> <p>16. For Mozambique: "Annual precipitation varies from 500 to 900 mm (20 to 35 inches) depending on the region with an average of 590 mm (23 inches)."</p> <p>17. For Zambia: "Average annual precipitation varies between 1,000 mm and 1,400 mm (40 and 50 inches) in the north decreasing to 510 mm (21 inches) in the south."</p> <p>18. Rainfall is highest on the High Veld with an average annual precipitation of up to 1,020 mm (40 inches) while the Middle Veld receives 410 mm to 610 mm (16 to 24 inches) and the Low Veld receives less than 400 mm (12 inches).</p> <p>19. For South Africa: "Average annual precipitation varies from 400 mm (16 inches) in the east to less than 50 mm (2 inches) in the northwest coastal regions. Average annual precipitation in Cape Town is 510 mm (20 inches)."</p> <p>20. The coastal region has a tropical climate with no completely dry season. The heaviest rainfall occurs on the coastal region between May and September with average annual precipitation varying from 2,030 mm to 3,250 mm (80 to 120 inches).</p>
2.05	<p>1. The Botanical Source (http://www.thebotanicalsource.com/id370.htm). 2. Hawaiian Tropical Plant Nursery (http://www.hawaiiantropicalplants.com/treeshrub.html).</p>	<p>1. "In France and Germany tabersonine is extracted from the seed...Seeds are also exported to be used in medicines to treat heart diseases, to lower blood pressure and to treat cancer." 2. In the nursery trade in Hawaii.</p>
3.01		no evidence

3.02		no evidence
3.03		no evidence
3.04		no evidence
3.05		no evidence
4.01	Coates Palgrave, K (2002) Trees of Southern Africa. Cape Town: Struik Publishers.	no description of these traits
4.02		
4.03	Coates Palgrave, K (2002) Trees of Southern Africa. Cape Town: Struik Publishers.	no description of this
4.04		
4.05	Gordon, T (1982) Indigenous trees of Zimbabwe. The Zimbabwe Science News 16: 124.	"The fruit is eaten by monkeys and birds." [and no evidence of toxicity]
4.06		
4.07	Hawaiian Tropical Plant Nursery (http://www.hawaiiantropicalplants.com/treeshrub.html).	"the fruit is reported to be edible" [and no evidence of toxicity or allergenicity]
4.08		
4.09	Coates Palgrave, K (2002) Trees of Southern Africa. Cape Town: Struik Publishers.	"At the margins of evergreen forest and in swamp forest".
4.1	USDA, National Resources Conservation Services (NRCS), Soil Survey Division, World Soil Resources (http://soils.usda.gov/use/worldsoils/mapindex/order.html).	Sudan: mostly aridisols and entisols in the north, with some ultisols. The south has entisols and ultisols with some alfisols and inceptisols (and also some oxisols and shifting sands); Kenya: mostly entisols and aridisols with some ultisols and inceptisols, and a small amount of alfisols (also with a small amount of oxisols and andisols); Tanzania: mostly ultisols with some alfisols and inceptisols and a small amount of entisols (also with a small amount of oxisols and andisols); Uganda: almost entirely oxisols and inceptisols with very small amounts of alfisols and ultisols; Cameroon: primarily oxisols with some ultisols and alfisols and small amounts of inceptisols and entisols (and also a small amount of andisols); Zaire (now called Democratic Republic of Congo): almost entirely oxisols and

		<p>ultisols, with some entisols and inceptisols; Benin: mostly alfisols with small amounts of inceptisols and ultisols; Côte d'Ivoire: primarily ultisols with a small amount of alfisols and very small amounts of inceptisols and gelisols (and also a very small amount of oxisols); Gambia: alfisols, entisols, and ultisols; Guinea: mostly Inceptisols and ultisols (with a small amount of oxisols in the southern region); Guinea-Bissau: mostly alfisols with a small amount of inceptisols (and a small amount of oxisols); Liberia: primarily oxisols with some ultisols; Mali: the northern part is comprised of aridisols, entisols, and shifting sands and the south is mostly alfisols with some entisols and inceptisols and a small amount of ultisols; 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; Malawi: mostly oxisols and alfisols with a small amount of inceptisols and ultisols; Mozambique: mostly alfisols with some entisols and oxisols, a small amount of inceptisols and aridisols, and a very small amount of ultisols (also a small amount of the "shifting sands" soil order type); Zambia: mostly oxisols with some alfisols, entisols, inceptisols, and ultisols (also a small amount of the shifting sands soil order type); Zimbabwe: almost entirely alfisols with some aridisols, entisols, and inceptisols, and a very small amount of ultisols (also with a very small amount of oxisols); South Africa (approximation of soil order type by state): Cape Province (E): mostly alfisols with some aridisols and entisols and a very small amount of oxisols; Natal (Kwazulu-Natal): mostly</p>
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		alfisols with some oxisols and ultisols and a very small amount of inceptisols; Madagascar: West Madagascar is primarily entisols with some alfisols, inceptisols, and ultisols, while East Madagascar is primarily oxisols (and the southern tip is comprised of shifting sands).
4.11	Coates Palgrave, K (2002) Trees of Southern Africa. Cape Town: Struik Publishers.	"A small to medium sized, well rounded tree, 5 to 15 m in height"
4.12		
5.01		terrestrial
5.02	Coates Palgrave, K (2002) Trees of Southern Africa. Cape Town: Struik Publishers.	Apocynaceae
5.03	Coates Palgrave, K (2002) Trees of Southern Africa. Cape Town: Struik Publishers.	Apocynaceae
5.04	Coates Palgrave, K (2002) Trees of Southern Africa. Cape Town: Struik Publishers.	woody (small to medium tree)
6.01		no evidence
6.02	1. The Botanical Source (http://www.thebotanicalsource.com/id370.htm). 2. Gordon, T (1982) Indigenous trees of Zimbabwe. The Zimbabwe Science News 16: 124.	1. "Seedling with epigeal germination...Seeds can be sown directly". 2. "Propagation is by seed or cutting."
6.03		
6.04		
6.05		
6.06		
6.07		
7.01		
7.02	1. The Botanical Source (http://www.thebotanicalsource.com/id370.htm). 2. Hawaiian Tropical Plant Nursery (http://www.hawaiiantropicalplants.com/treeshrub.html).	1. " <i>Voacanga thouarsii</i> is planted along watercourses for soil and water conservation...In France and Germany tabersonine is extracted from the seed...Seeds are also exported to be used in medicines to treat heart diseases, to lower blood pressure and to treat cancer." 2. In the nursery trade in Hawaii.
7.03		no evidence

7.04	Coates Palgrave, K (2002) Trees of Southern Africa. Cape Town: Struik Publishers.	fruits ovoid to almost spherical, each mericarp about 7 to 9 cm in diameter; "finally splitting to reveal numerous seeds embedded in a fleshy pulp"
7.05		
7.06	1. Gordon, T (1982) Indigenous trees of Zimbabwe. The Zimbabwe Science News 16: 124. 2. Coates Palgrave, K (2002) Trees of Southern Africa. Cape Town: Struik Publishers.	1. "The fruit is eaten by monkeys and birds." 2. fruits ovoid to almost spherical, each mericarp about 7 to 9 cm in diameter; "finally splitting to reveal numerous seeds embedded in a fleshy pulp"
7.07	Coates Palgrave, K (2002) Trees of Southern Africa. Cape Town: Struik Publishers.	fruits ovoid to almost spherical, each mericarp about 7 to 9 cm in diameter; "finally splitting to reveal numerous seeds embedded in a fleshy pulp"
7.08	1. Gordon, T (1982) Indigenous trees of Zimbabwe. The Zimbabwe Science News 16: 124. 2. Coates Palgrave, K (2002) Trees of Southern Africa. Cape Town: Struik Publishers.	1. "The fruit is eaten by monkeys and birds." 2. fruits ovoid to almost spherical, each mericarp about 7 to 9 cm in diameter; "finally splitting to reveal numerous seeds embedded in a fleshy pulp"
8.01		
8.02		
8.03		
8.04	The Botanical Source (http://www.thebotanicalsource.com/id370.htm).	" <i>Voacanga thouarsii</i> regrows well when coppiced or pollarded."
8.05		