Family: ***Euphorbiaceae***

Taxon: ***Joannesia princeps***

Synonym: *Joannesia insolita Pittier*

Common Name: arara nut-tree
andá-açu
coco de purga
Boleira

Questionaire : current 20090513 **Assessor:** Chuck Chimera **Designation:** L

Status: Assessor Approved **Data Entry Person:** Chuck Chimera **WRA Score 0**

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**	**n**
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**	
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)**	**n**
305	**Congeneric weed**	**n=0, y = 1*multiplier (see Appendix 2)**	**n**
401	**Produces spines, thorns or burrs**	**y=1, n=0**	**n**
402	**Allelopathic**	**y=1, n=0**	**n**
403	**Parasitic**	**y=1, n=0**	**n**
404	**Unpalatable to grazing animals**	**y=1, n=-1**	
405	**Toxic to animals**	**y=1, n=0**	
406	**Host for recognized pests and pathogens**	**y=1, n=0**	
407	**Causes allergies or is otherwise toxic to humans**	**y=1, n=0**	**y**
408	**Creates a fire hazard in natural ecosystems**	**y=1, n=0**	**n**
409	**Is a shade tolerant plant at some stage of its life cycle**	**y=1, n=0**	**y**
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**	
604	**Self-compatible or apomictic**	**y=1, n=-1**	
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**	
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**	**n**
705	**Propagules water dispersed**	**y=1, n=-1**	
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**	
801	**Prolific seed production (>1000/m2)**	**y=1, n=-1**	
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y=1, n=-1**	
803	**Well controlled by herbicides**	**y=-1, n=1**	
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y=1, n=-1**	
805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	**y=-1, n=1**	

Designation: L **WRA Score** **0**

Supporting Data:

101	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	No evidence
102	2011. WRA Specialist. Personal Communication.	NA
103	2011. WRA Specialist. Personal Communication.	NA
201	2011. Floracafe. Plant Database - Botany Search - Joannesia princeps Vell.. http://www.floracafe.com/Search_PhotoDetails.aspx?Photo=Top&Id=1474	"Tropical regions of the world. "
202	2011. Floracafe. Plant Database - Botany Search - Joannesia princeps Vell.. http://www.floracafe.com/Search_PhotoDetails.aspx?Photo=Top&Id=1474	"Tropical regions of the world. "
203	2011. Floracafe. Plant Database - Botany Search - Joannesia princeps Vell.. http://www.floracafe.com/Search_PhotoDetails.aspx?Photo=Top&Id=1474	"Climatic conditions: Temperature (°C): 05-10, 20-25, 20-25. Altitude (m): 000 - 1000. Rainfall (mm): 900 - 1500. Climate: Hot Climate, Humid Climate. Sunlight: Full Sun."
204	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	""Zona da Mata", eastern region of the state of Ninas Gerals; valley of Rio Docej and from the northern part of Espirlto Santo to the south of the state of Bahia." [native to Brazil]
205	2001. Hanelt, P. (ed.). Mansfeld's encyclopedia of agricultural and horticultural crops, Volume 3. Springer-Verlag, Berlin, Heidelberg, New York	"Cultivated in many tropical countries, especially in Asia, also in Africa."
301	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No records of naturalization in GCW
301	2010. Lau, J-W.. Botanical Survey of unmaintained areas surrounding McBryde Garden, National Tropical Botanical Garden, Kaua'i. Kaua'i Community College, Lihue, HI	"Distribution: A group of three immature seedlings of J. princeps were found ten yards from the accessioned tree, inside the drainage ditch that runs through Four House Canyon . It is likely that these seedlings arose from pile of fallen J. princeps seeds under the accessioned parent, possibly transported into the ditch area by human activity. Stage: The naturalized J. princeps seedlings were immature, between one foot and three feet. At the time of the survey, the accessioned J. princeps tree had dropped over one hundred attractive round seeds directly under the tree and none have germinated."
302	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No evidence
303	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No evidence
304	2011. WRA Specialist. Personal Communication.	No evidence
305	1993. Webster, G.L.. Synopsis of the Genera and Suprageneric Taxa of Euphorbiaceae. Annals of the Missouri Botanical Garden. 81(1): 33-144.	"A neotropical genus of two South American species."
305	2007. Randall, R.P.. Global Compendium of Weeds [Online Database]. http://www.hear.org/gcw/	No Joannesia species listed as weeds
401	2011. Floracafe. Plant Database - Botany Search - Joannesia princeps Vell.. http://www.floracafe.com/Search_PhotoDetails.aspx?Photo=Top&Id=1474	"A moderate-sized tree with a spreading canopy and large tufted leaves and coarse branches. The flowers are inconspicuous." [no spines, thorns, or burrs]

402	2004. Dias, L. A. S. (ed).. Genetic improvement of cacao. FAO and Ecoport, http://ecoport.org/ep?SearchType=earticleViewandearticleId=197andpage=-1andcheckRequired=Y	"Forest essences such as 'boleira' (Joannesia princeps), yellow mombin (Spondias lutea) and Gmelina (Gmelina arborea) are most promising for top-shading of Cacao plantations in the State (Souza et al., 1990; Souza and Augusto, 1991 and Souza et al., 1995). Spacing varies, in this case, from 12 to 15m between shade trees." [used to shade Cacao trees. No evidence of allelopathy]
402	2010. Souza, H.N./Cardoso, I.M./Fernandes, J.M./Garcia, F.C.P./Bonfim, V.R./Santos, A.C./Carvalho, A.F./Mendonca, E.S.. Selection of native trees for intercropping with coffee in the Atlantic Rainforest biome. Agroforestry Systems. 80: 1–16.	"Table 2 Family, species and common Portuguese names of native and exotic trees used in agroforestry systems, Zona da Mata, Minas Gerais, Atlantic Coastal Rainforest, Brazil" [List includes Joannesia princeps. Unlikely to be allelopathic if used in coffee cultivation]
403	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	[Not parasitic]
404	2011. WRA Specialist. Personal Communication.	Palatability to animals unknown [but chemical properties & possible toxicity may make plant unpalatable]
405	1997. Achenbach, H./Benirschke, G.. Joannesia lactone and other compounds from Joannesia princeps. Phytochemistry. 45(1): 149 157.	"Both the seed oil and the root bark are used as a laxative in folk medicine [5], and extracts of the seedlings exhibit strong anthelmintic activity [6]. Furthermore, the Brazilian Indians are reported to apply the stem bark and leaves to narcotize fish [5]." [toxic, but no evidence of poisoning of animals through ingestion of plant]
406	2011. WRA Specialist. Personal Communication.	Unknown
407	1997. Nishioka, S.A/Escalante, R.D.. Poisoning by the ingestion of seeds of the fruit of the "cotieira" (Joannesia princeps). São Paulo Medicai Journal. 115(1): 1366-1367.	"A 15-year-old boy ingested the core of two seeds of a fruit of Joannesia princeps, a large tree sometimes found planted in sidewalks on streets in Brazilian towns. Four hours after the ingestion, he had several episodes of vomiting and diarrhea, but recovered spontaneously the same day. Poisoning by the ingestion of seeds of Joannesia princeps is possibly not rare, considering that the tree gives plenty of fruit and the seeds have an agreeable flavor, but is probably underestimated as mild cases are unlikely to be reported. Ingestion by small children, that could lead to potentially more severe cases, is in part probably prevented by the hardness of the shells covering the seeds...In Uberlândia, around 300 trees of this species were once planted, because of their rapid growth and large shadow, but most were cut years later after the realization that they represented a hazard because of falling branches due to their soft heartwood, and also because some cases ofmild poisoning were reported...Even if not life threatening, ingestion of the seeds can be a hazard, particularly to children, due to possible dehydration and electrolyte disturbances."
408	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	"It prefers the more humid areas of the tropical rain forest." [unlikely to create a fire hazard, although seed oil is flammable]
409	2011. Floracafe. Plant Database - Botany Search - Joannesia princeps Vell.. http://www.floracafe.com/Search_PhotoDetails.aspx?Photo=Top&Id=1474	"Sunlight: Full Sun."
410	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	"It tolerates several soil and climate types. However, It does not withstand extremely dry conditions such as those of the arid and semi arid regions. It withstands pronounced dry seasons and grows best In deep soil."
410	2011. Floracafe. Plant Database - Botany Search - Joannesia princeps Vell.. http://www.floracafe.com/Search_PhotoDetails.aspx?Photo=Top&Id=1474	"Soil Type: Alluvial Soil, Peaty Soil. Soil Depth (m): 0.5 - 1.0. Drainage: Well Drained…Soil reaction (pH): Slightly Acidic to Neutral (6.3 - 7.3)"
411	2011. Floracafe. Plant Database - Botany Search - Joannesia princeps Vell.. http://www.floracafe.com/Search_PhotoDetails.aspx?Photo=Top&Id=1474	"A moderate-sized tree with a spreading canopy and large tufted leaves and coarse branches. " [not climbing or smothering]
412	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	"May be found Isolated, as well as In association with other species In the forests. It prefers the more humid areas of the tropical rain forest." [no evidence of thicket formation in native range]

501	1993. Webster, G.L.. Synopsis of the Genera and Suprageneric Taxa of Euphorbiaceae. Annals of the Missouri Botanical Garden. 81(1): 33-144.	Terrestrial
502	1993. Webster, G.L.. Synopsis of the Genera and Suprageneric Taxa of Euphorbiaceae. Annals of the Missouri Botanical Garden. 81(1): 33-144.	Euphorbiaceae
503	1993. Webster, G.L.. Synopsis of the Genera and Suprageneric Taxa of Euphorbiaceae. Annals of the Missouri Botanical Garden. 81(1): 33-144.	Euphorbiaceae [not a nitrogen fixing woody plant]
504	1993. Webster, G.L.. Synopsis of the Genera and Suprageneric Taxa of Euphorbiaceae. Annals of the Missouri Botanical Garden. 81(1): 33-144.	Not a geophyte
601	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	"The regions of natural occurrence of the species are among those that have undergone most severe devastation, due to clearance of the natural vegetation for development of agriculture, and livestock or plantation projects using fast growing species. Presently, the few remaining trees are being gradually cut down as a result of the high demand of this economic valuable species." [habitat loss causing species decline, but otherwise, no evidence of substantial reproductive failure]
602	2011. Floracafe. Plant Database - Botany Search - Joannesia princeps Vell.. http://www.floracafe.com/Search_PhotoDetails.aspx?Photo=Top&Id=1474	"Type Of Fruit: True Fruit. Fruit Classification: Drupe, Fleshy Fruit, Simple Fruit. Seeds: Many"
603	2011. WRA Specialist. Personal Communication.	Ability to hybridize unknown
604	2011. Floracafe. Plant Database - Botany Search - Joannesia princeps Vell.. http://www.floracafe.com/Search_PhotoDetails.aspx?Photo=Top&Id=1474	"Flowers are monoecious." [self-compatibility unknown]
605	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	"Flowers white or purple in colour, monoecious, small, numerous, without petals, with 5 paniculate sepals and 7-10 stamens. Flowering occurs in the months of February, March, July and December." [flowers unspecialized]
605	1994. Zomlefer, W.B.. Guide to Flowering Plant Families. The University of North Carolina Press, Chapel Hill & London	"Most euphorbs easily attract pollinators (mostly flies) with the nectar secreted by the extrastaminal disc or glands…The flowers of a few genera…are anemophilous." [Family description. Joannesia is likely insect pollinated]
606	2011. Floracafe. Plant Database - Botany Search - Joannesia princeps Vell.. http://www.floracafe.com/Search_PhotoDetails.aspx?Photo=Top&Id=1474	"Methods of Propagation: Seed" [no evidence of reproduction by vegetative fragmentation]
607	2003. Pellens, R./Grandcolas, P.. Living in Atlantic forest fragments: life habits, behaviour, and colony structure of the cockroach Monastria biguttata (Dictyoptera, Blaberidae, Blaberinae) in Espirito Santo, Brazil. Canadian Journal of Zoology. 81: 1929	"Fast-growing tree plantations (Eucalyptus grandis, Joannesia princeps, Acacia mangium, Hevea brasiliensis)" [fast-growing, but no information on time to reproductive maturity]
607	2010. Massad, T.J./Chambers, J.Q./Rolim, S.G./Jesus, R.M./Dyer, L.A.. Restoration of Pasture to Forest in Brazil's Mata Atlântica: The Roles of Herbivory, Seedling Defenses, and Plot Design in Reforestation. Restoration Ecology. doi: 10.1111/j.1526-100X.2	"Diversity and block had significant effects on height in 2008 (Table 1). Seedlings grew tallest in low and medium diversity plantings. This was, however, a sampling effect of having a higher density of fast-growing species at low diversity; e.g. Joannesia princeps Vell. (Euphorbiaceae) and Bowdichia virgilioides Kunth (Fabaceae: Faboideae), the fastest growing, non-pioneer species, were at higher densities in the lower diversity plots."
701	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	"A dehiscent capsule, with a thick pericarp; up to 12cm in diameter, with 2-3 seeds. Fructification occurs in January to March." [relatively large fruit & seeds with no means of external attachment]
702	2001. Hanelt, P. (ed.). Mansfeld's encyclopedia of agricultural and horticultural crops, Volume 3. Springer-Verlag, Berlin, Heidelberg, New York	"The root tubers are eaten in times of food shortage. Also cultivated for the wood and ornamental purposes."

703	1997. Nishioka, S.A/Escalante, R.D.. Poisoning by the ingestion of seeds of the fruit of the "cotieira" (Joannesia princeps). São Paulo Medicai Journal. 115(1): 1366-1367.	"large fruits with 2 or 3 egg-shaped seeds" [unlikely to inadvertently become a produce contaminant]
704	1997. Nishioka, S.A/Escalante, R.D.. Poisoning by the ingestion of seeds of the fruit of the "cotieira" (Joannesia princeps). São Paulo Medicai Journal. 115(1): 1366-1367.	"a tree of the family Euphorbiaceae which reaches a large size, has a straight stem, and gives large fruits with 2 or 3 egg-shaped seeds…" [no adaptations for wind-dispersal]
705	2010. Lau, J-W.. Botanical Survey of unmaintained areas surrounding McBryde Garden, National Tropical Botanical Garden, Kaua'i. Kaua'i Community College, Lihue, HI	"A group of three immature seedlings of J. princeps were found ten yards from the accessioned tree, inside the drainage ditch that runs through Four House Canyon . It is likely that these seedlings arose from pile of fallen J. princeps seeds under the accessioned parent, possibly transported into the ditch area by human activity."
705	2011. WRA Specialist. Personal Communication.	No evidence of water dispersal [although plant's natural distribution does not suggest water dispersal, it may be possible that dehiscent seeds are capable of floating. See Lau pers. comm. Regarding seedlings in drainage ditch]
706	1993. Webster, G.L.. Synopsis of the Genera and Suprageneric Taxa of Euphorbiaceae. Annals of the Missouri Botanical Garden. 81(1): 33-144.	"Staminate calyx cupular, not covering the petals in bud; stamens 7- 10, inner filaments connate; staminate disk dissected; fruit drupaceous. 223. Joannesia" [although drupaceous, no evidence that seeds are bird-dispersed. Most likely gravity]
707	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	"A dehiscent capsule, with a thick pericarp; up to 12cm in diameter, with 2-3 seeds. Fructification occurs in January to March." [no means of external attachment, and no evidence of external animal dispersal]
708	2011. WRA Specialist. Personal Communication.	Unknown [but no evidence that seeds are consumed by animals]
801	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	"Tree with dense, clustered, ramification that reaches a height of 20 m...Fruit A dehiscent capsule, with a thick pericarp; up to 12 cm in diameter, with 2-3 seeds." [unknown if tree is able to produce high seed densities, but not likely given larger seed size]
801	2011. Floracafe. Plant Database - Botany Search - Joannesia princeps Vell.. http://www.floracafe.com/Search_PhotoDetails.aspx?Photo=Top&Id=1474	"Type Of Fruit: True Fruit. Fruit Classification: Drupe, Fleshy Fruit, Simple Fruit. Seeds: Many"
802	1986. FAO. Databook On Endangered Tree And Shrub Species And Provenances. Food And Agriculture Organization Of The United Nations, Rome, Italy	"Seeds oval shaped, large, with a hard texture, presenting coat dormancy. One kg contains 180 to 340 seeds. An 80% germination rate was obtained with mechanical scarification, after 243 days storage In a cold chamber" [soil seed longevity unknown]
802	2008. Royal Botanic Gardens Kew. Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/	"Storage Behaviour: Orthodox? Storage Conditions: 48% germination after 18 months open storage at room temperature (Reis et al., 1980)"
803	2011. WRA Specialist. Personal Communication.	Unknown [no information on control with herbicides found]
804	2011. WRA Specialist. Personal Communication.	Unknown
805	2011. WRA Specialist. Personal Communication.	Unknown