Keywords: Evaluate; Tree; Medicinal; Ornamental; Edible Fruit; Bird and Ant dispersed; Fire Tolerant

Family: ***Malpighiaceae***

Taxon: ***Byrsonima crassifolia***

Synonym: *Malpighia crassifolia L. (basionym)*

Common Name: craboo
golden-spoon

Questionaire : current 20090513
Status: Assessor Approved

Assessor: Patti Clifford
Data Entry Person: Patti Clifford

Designation: EVALUATE
WRA Score 5

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**	**y**
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**	**n**
301	**Naturalized beyond native range**	**y = 1*multiplier (see Appendix 2), n= question 205**	**n**
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**	
403	**Parasitic**	**y=1, n=0**	**n**
404	**Unpalatable to grazing animals**	**y=1, n=-1**	
405	**Toxic to animals**	**y=1, n=0**	**n**
406	**Host for recognized pests and pathogens**	**y=1, n=0**	**n**
407	**Causes allergies or is otherwise toxic to humans**	**y=1, n=0**	**n**
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**	
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**	
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**	**n**
604	**Self-compatible or apomictic**	**y=1, n=-1**	**y**
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**	**y**
707	**Propagules dispersed by other animals (externally)**	**y=1, n=-1**	**y**
708	**Propagules survive passage through the gut**	**y=1, n=-1**	**y**
801	**Prolific seed production (>1000/m2)**	**y=1, n=-1**	**n**
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y=1, n=-1**	**y**
803	**Well controlled by herbicides**	**y=-1, n=1**	
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y=1, n=-1**	**y**
805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	**y=-1, n=1**	

Designation: EVALUATE **WRA Score** 5

Supporting Data:

101	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Is the species highly domesticated? No] "In America, the use of this species is quite ancient. Carbonized seeds, residues of the stem, and charcoal originating from 2,000 to 1,000 B.C. have been found in the area of Cuello in northern Belize." [no indication that domestication of species has resulted in redcued invasive traits]
102	2012. WRA Specialist. Personal Communication.	[Has the species become naturalized where grown? NA]
103	2012. WRA Specialist. Personal Communication.	[Does the species have weedy races? NA]
201	2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"? 2 - High] Native distribution: Mexico; Barbados; Cuba; Puerto Rico; Belize; Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua; Panama; French Guiana; Guyana; Suriname; Venezuela; Brazil; Bolivia; Peru; Paraguay.
202	2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Quality of climate match data? 2 - High] Native distribution: Mexico; Barbados; Cuba; Puerto Rico; Belize; Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua; Panama; French Guiana; Guyana; Suriname; Venezuela; Brazil; Bolivia; Peru; Paraguay.
203	1987. Morton, J.. Fruits of warm climates. J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton	[Broad climate suitability (environmental versatility)? Yes] Byrsonima is limited to tropical and subtropical climates. In Central and South America, the tree ranges from sea-level to an altitude of 6,000 ft (1,800 m). It is highly drought-tolerant
203	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Broad climate suitability (environmental versatility)? Yes] Byrsonima crassifolia grows up to elevations of 1500 m.
204	2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Native or naturalized in regions with tropical or subtropical climates? Yes] Native distribution: Mexico; Barbados; Cuba; Puerto Rico; Belize; Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua; Panama; French Guiana; Guyana; Suriname; Venezuela; Brazil; Bolivia; Peru; Paraguay.
205	1987. Morton, J.. Fruits of warm climates. J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton	[Does the species have a history of repeated introductions outside its natural range? No] "Dr. David Fairchild brought seeds from Panama to the United States Department of Agriculture in 1899 (S.P.I. #2944). A few specimens exist in special collections in southern Florida. The species was introduced into the Philippines in 1918."
205	2012. WRA Specialist. Personal Communication.	[Does the species have a history of repeated introductions outside its natural range? No] No evidence of repeated introductions.
301	2007. Randall, R.. Global Compendium of Weeds - Byrsonima crassifolia (Mapighiaceae) [Online Database]. http://www.hear.org/gcw/species/byrsonima_crasifolia/	[Naturalized beyond native range? No] No evidence of naturalization beyond native range.
302	2007. Randall, R.. Global Compendium of Weeds - Byrsonima crassifolia (Mapighiaceae) [Online Database]. http://www.hear.org/gcw/species/byrsonima_crasifolia/	[Garden/amenity/disturbance weed? No] No evidence.
303	2007. Randall, R.. Global Compendium of Weeds - Byrsonima crassifolia (Mapighiaceae) [Online Database]. http://www.hear.org/gcw/species/byrsonima_crasifolia/	[Agricultural/forestry/horticultural weed? No] The Global Compendium of weeds lists Byrsonima crassifolia as an agricultural weed, but there is no data on impacts or control efforts.
304	2007. Randall, R.. Global Compendium of Weeds - Byrsonima crassifolia (Mapighiaceae) [Online Database]. http://www.hear.org/gcw/species/byrsonima_crasifolia/	[Environmental weed? No] No evidence.
305	2007. Randall, R.. Global Compendium of Weeds - Byrsonima crassifolia (Mapighiaceae) [Online Database]. http://www.hear.org/gcw/species/byrsonima_crasifolia/	[Congeneric weed? No] No evidence.

401	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Produces spines, thorns or burrs? No] "The tree has a fissured bark, gray to dark chocolate in color, with lenticels. The interior part has pink or dark red grooves and a bitter taste. The stems have prominent foliar scars, and young leaves are tomentose. The leaves are opposite, obovate to elliptic or ovate, scantily acuminate, 4 to 15 cm long and 2 to 9 cm wide with an acute to obtuse base and whole margin.
402	2012. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Parasitic? No] Malpighiaceae.
403	2010. Nickrent, D.. The parasitic plant connection. Department of Plant Biology, Southern Illinois University, Carbondale http://www.parasiticplants.siu.edu/index.html	[Parasitic? No] Malpighiaceae.
404	2012. WRA Specialist. Personal Communication.	[Unpalatable to grazing animals? Unknown]
405	2012. National Center for Biotechnology Information. PubMed. http://www.ncbi.nlm.nih.gov/sites/entrez	[Toxic to animals? No] No evidence.
405	2012. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/	[Toxic to animals? No] No evidence.
406	2008. Janick, J./Paull, R.E.. The encyclopedia of fruit & nuts. Cabi Publishing, Wallingford, UK	[Host for recognized pests and pathogens? No] No serious pests or diseases are associated with Byrsonima crassifolia.
407	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Causes allergies or is otherwise toxic to humans? No] "Throughout its range, B. crassifolia serves in a variety of ways. It provides heat and sustenance and is used to treat a number of human illnesses."
407	2012. National Center for Biotechnology Information. PubMed. http://www.ncbi.nlm.nih.gov/sites/entrez	[Causes allergies or is otherwise toxic to humans? No]
407	2012. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/	[Causes allergies or is otherwise toxic to humans? No]
408	2008. Janick, J./Paull, R.E.. The encyclopedia of fruit & nuts. Cabi Publishing, Wallingford, UK	[Creates a fire hazard in natural ecosystems? No] No evidence of biomass accumulation.
409	2004. Hooper, E.R./Legendre, P./Condit, R.. Factors affecting community composition of forest regeneration in deforested, abandoned land in Panama. Ecology. 85: 3313-3326.	[Is a shade tolerant plant at some stage of its life cycle?] Shade tolerance: pioneer species with a light index > 3.0. Light indices are from Condit et al. (1996) and Hooper et al. (2002).
409	2008. Janick, J./Paull, R.E.. The encyclopedia of fruit & nuts. Cabi Publishing, Wallingford, UK	[Is a shade tolerant plant at some stage of its life cycle?] " The trees or shrubs do not require elaborate care. Initial shade, mulch and cover crop are beneficial.
410	1987. Morton, J.. Fruits of warm climates. J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes] In Mexico, the tree is often found on rocky ground. It grows well in sandy and alkaline-sandy soils. It is well suited for restoration of infertile and burned-over land.
410	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes] Byrsonima crassifolia grows in acidic and poor soils.
411	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Climbing or smothering growth habit? No] Small evergreen tree, 4-10 m in height.
412	2012. WRA Specialist. Personal Communication.	[Forms dense thickets? Unknown]
501	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Aquatic? No] Terrestrial; tree.
502	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Grass? No] Malpighiaceae.
503	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Nitrogen fixing woody plant? No] Malpighiaceae.
504	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] Tree; woody.

601	1987. Morton, J.. Fruits of warm climates. J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton	[Evidence of substantial reproductive failure in native habitat? No] "The tree is native and abundant in the wild, sometimes in extensive stands, in open pine forests and grassy savannas, from southern Mexico, through the Pacific side of Central America, to Peru and Brazil; also occurs in Trinidad, Barbados, Curacao, St. Martin, Dominica, Guadeloupe, Puerto Rico, Haiti, the Dominican Republic and throughout Cuba and the Isle of Pines."
601	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Evidence of substantial reproductive failure in native habitat? No] Byrsonima crassifolia is amply distributed and ecologically variable in its native region.
602	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Produces viable seed? Yes] The species primarily reproduces through seed.
603	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Hybridizes naturally? No] No hybrids or geographic races have been reported.
604	1974. Bawa, K.S.. Breeding systems of tree species of a lowland tropical community. Evolution. 28: 85-92.	[Self-compatible or apomictic? Yes] According to Bawa's (1974) work on the breeding systems of tree species of lowland tropical forest communities, Byrsonima crassifolia is self-compatible.
605	1997. Vinson, S.B./Williams, H.J./Frankie, G.W./Shrum, G.. Floral lipid chemistry of Byrsonima crassifolia (Malpigheaceae) and use of floral lipids by Centris bees (Hymenoptera: Apidae). Biotropica. 29: 76-83.	[Requires specialist pollinators? No] "These oil-producing flowers are visited and pol- linated by oil-collecting bees found in two families (Melittidae and Apidae). Within the family Apidae they occur in five tribes that includes the Centridini"
606	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Reproduction by vegetative fragmentation? No] The species primarily reproduces through seed.
607	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Minimum generative time (years)? 2-3] Trees begin to bear fruit in 1 1/2 years and maximum yield begins at 4 years.
607	2008. Janick, J./Paull, R.E.. The encyclopedia of fruit & nuts. Cabi Publishing, Wallingford, UK	[Minimum generative time (years)?] The juvenile period is 3-4 years after seed germination.
701	2001. Garcia-Nunez,C./Azocar, A./Silva, J.F.. Seed production and soil seed bank in three evergreen woody species from a neotropical savanna. Journal of Tropical Ecology. 17: 563-576.http://www.saber.ula.ve/bitstream/123456789/16889/1/silva_seed_productio	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] No evidence of accidental dispersal.
702	1987. Morton, J.. Fruits of warm climates. J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton	[Propagules dispersed intentionally by people? Yes] Widely used in its native range, Byrsonima has been introduced to south Florida and the Philippines.
702	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Propagules dispersed intentionally by people? Yes] Byrsonima crassifolia has been introduced to Florida and is often used as an ornamental.
703	2012. WRA Specialist. Personal Communication.	[Propagules likely to disperse as a produce contaminant? No] No evidence of produce contamination.
704	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Propagules adapted to wind dispersal? No] Bird-dispersed drupe.
705	2012. WRA Specialist. Personal Communication.	[Propagules water dispersed? Unknown]
706	2001. Garcia-Nunez,C./Azocar, A./Silva, J.F.. Seed production and soil seed bank in three evergreen woody species from a neotropical savanna. Journal of Tropical Ecology. 17: 563-576.http://www.saber.ula.ve/bitstream/123456789/16889/1/silva_seed_productio	[Propagules bird dispersed? Yes] The drupes are dispersed by birds.
706	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Propagules bird dispersed? Yes] The drupes are dispersed by birds.
707	1987. Morton, J.. Fruits of warm climates. J.F. Morton, Miami, FL http://www.hort.purdue.edu/newcrop/morton	[Propagules dispersed by other animals (externally)?] In Magdalena, Colombia, an edible fat is extracted from the fruits with boiling water.
707	2001. Garcia-Nunez,C./Azocar, A./Silva, J.F.. Seed production and soil seed bank in three evergreen woody species from a neotropical savanna. Journal of Tropical Ecology. 17: 563-576.http://www.saber.ula.ve/bitstream/123456789/16889/1/silva_seed_productio	[Propagules dispersed by other animals (externally)? Yes] "It has been documented (Farji & Silva 1995) that cutting ants (Atta laevigata) remove huge amounts of fruits from the base of stems in B. crassifolia and transport them, through relatively long distances (around 100 m), to their nests."
707	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Propagules dispersed by other animals (externally)?] Bird-dispersed drupe.

708	2001. Garcia-Nunez,C./Azocar, A./Silva, J.F.. Seed production and soil seed bank in three evergreen woody species from a neotropical savanna. Journal of Tropical Ecology. 17: 563-576.http://www.saber.ula.ve/bitstream/123456789/16889/1/silva_seed_productio	[Propagules survive passage through the gut? Yes] Bird dispersed drupes.
708	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Propagules survive passage through the gut? Yes] Bird dispersed drupes.
801	2001. Garcia-Nunez,C./Azocar, A./Silva, J.F.. Seed production and soil seed bank in three evergreen woody species from a neotropical savanna. Journal of Tropical Ecology. 17: 563-576.http://www.saber.ula.ve/bitstream/123456789/16889/1/silva_seed_productio	[Prolific seed production (>1000/m2)? No] The authors studied the seed production and seed bank longevity of B. crassifolia in a savannah in Venezuela. The mean of the sample of individuals was 85,497 seeds per individual, with 43593 seed viable per individual. "Total density of seeds per area sampled found in the soil was 38 (2.5 viable seeds m−2) and 54 (3.3 viable seeds m−2) viable seeds in 1994 and 1995 respectively, for B. crassifolia."
801	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Prolific seed production (>1000/m2)?] "Each tree produces 15 to 20 kilos of fruit during a harvest of 4-6 months."
802	2001. Garcia-Nunez,C./Azocar, A./Silva, J.F.. Seed production and soil seed bank in three evergreen woody species from a neotropical savanna. Journal of Tropical Ecology. 17: 563-576.http://www.saber.ula.ve/bitstream/123456789/16889/1/silva_seed_productio	[Evidence that a persistent propagule bank is formed (>1 yr)? Yes] "B. crassifolia showed two germination peaks between 1993 and 1994: a small one in November (6%) and a larger peak in March (17%) after the beginning of the rains. In the same experiment, between 1994 and 1995, B. crassifolia showed an early small burst of germination, followed by little or no germination (1 to 6%). After a year, only 24% of the seeds of this species remained viable."
802	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Evidence that a persistent propagule bank is formed (>1 yr)?] Seeds can be stored for several months in plastic bags that are stored in agave fiber sacks. Seeds do not need pretreatment for germination.
803	2012. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown]
804	2001. Garcia-Nunez,C./Azocar, A./Silva, J.F.. Seed production and soil seed bank in three evergreen woody species from a neotropical savanna. Journal of Tropical Ecology. 17: 563-576.http://www.saber.ula.ve/bitstream/123456789/16889/1/silva_seed_productio	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Even though the plots burned every year, B. crassifolia and P. rigida successfully reproduced sexually during the study period, but B. virgiliodes flowered only the first year."
804	2002. Vozzo, J.A.. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] Fire resistant species.
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]

Summary of Risk Traits:

High Risk Traits:

- Tolerates wide variety of soil types.
- Self compatible (only needs one plant to reproduce.
- Dispersed by birds and ants (long and short distances).
- Seed bank viable for longer than one year.
- Tolerates fire (resprouts after fires).

Low Risk Traits:

- Not weedy elsewhere (although may be naturalizing in native range).
- Not known to be toxic to humans or animals.
- Doesn't reproduce vegetatively.
- Not a prolific seed producer.