

<b>Taxon:</b> <i>Eugenia brasiliensis</i> Lam.	<b>Family:</b> Myrtaceae
<b>Common Name(s):</b> Brazil cherry Brazilian cherry cerisier du Brésil grumichama grumixama Spanish cherry	<b>Synonym(s):</b> <i>Eugenia dombeyi</i> (Spreng.) Skeels <i>Myrtus dombeyi</i> Spreng. <i>Stenocalyx brasiliensis</i> O. Berg

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 30 Jun 2021
<b>WRA Score:</b> 3.0	<b>Designation:</b> EVALUATE	<b>Rating:</b> Evaluate

**Keywords:** Tropical Tree, Naturalized, Edible Fruit, Thicket-Forming, Bird-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
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	y
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)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
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		
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	y
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		
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	>3
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	n
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m <sup>2</sup> )	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

**Supporting Data:**

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	[No evidence of domestication] "The grumichama is indigenous to Brazil; it is found wild in eastern and coastal southern Brazil, especially in the states of Parana and Santa Catarina. The crop is cultivated in Brazil and Paraguay."
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	No evidence that <i>Eugenia brasiliensis</i> is highly domesticated

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"The grumichama is indigenous to Brazil; it is found wild in eastern and coastal southern Brazil, especially in the states of Parana and Santa Catarina. The crop is cultivated in Brazil and Paraguay."
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	"The grumichama is native and wild in coastal southern Brazil, especially in the states of Parana and Santa Catarina. It is cultivated in and around Rio de Janeiro, also in Paraguay."

202	Quality of climate match data	High
	Source(s)	Notes
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	"The grumichama is native and wild in coastal southern Brazil, especially in the states of Parana and Santa Catarina. It is cultivated in and around Rio de Janeiro, also in Paraguay." [Native range well known]

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	"Climate: The grumichama is subtropical, surviving temperatures of 26° F (-3.33° C) in Brazil. It is better suited to Palm Beach than to southern Florida. In Hawaii, the tree fruits best from sea-level to an altitude of no more than 300 ft (90 m)."

Qsn #	Question	Answer
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"The grumichama is hardy to most conditions; once established it can survive light frost (-3.33°C) as experienced in Brazil. When young it needs protection from frosts. The tree is quite drought tolerant but crop quality and development deteriorates during long, dry season unless adequate water is provided."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"The grumichama is indigenous to Brazil; it is found wild in eastern and coastal southern Brazil, especially in the states of Parana and Santa Catarina. The crop is cultivated in Brazil and Paraguay. The plant has been introduced into Australia, Florida, California, Hawaii, Honduras, Cuba, Angola and East Malaysia (Sabah)."
	Lau, A. & Frohlich, D. (2013). New plant records for the Hawaiian Islands 2011–2012. Bishop Museum Occasional Papers 114: 5–16	"This species has previously been recorded as naturalized on Maui and Hawai'i islands, establishing in at least wet disturbed sites. it is not common in cultivation on O'ahu, and may not have been planted in forest reserves (not recorded in Skolmen [1980]), yet was found established in what appeared to be one rather extensive population in lowland, mesic to wet, non-native forest in the southern Ko'olau Mountains. Material examined. O'AHU: on ridge between Pauoa and Nu'uuanu Valleys, at about 395 m (1300 ft) elev, mesic to wet lowland non-native forest, 5 Apr 2012, T. Marsh 20120405Misspe."
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	native to southern coastal Brazil, especially in the states of Parana and Santa Catarina

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	"A specimen was growing in Hope Gardens, Jamaica, in 1880 and a tree was planted in the Botanical Gardens, Singapore, in 1888, fruited in 1903. It has long since vanished from both of these locations. An attempt to grow it in the Philippines in the early 1920's did not meet with success. Neither did a trial in Israel. An early introduction, perhaps by Don Francisco de Paula Marin in 1791, was made in Hawaii and the tree was adopted into numerous local gardens. The United States Department of Agriculture received seeds from Mauritius in 1911 (S.P.I. #30040); plants and seeds from Bahia, Brazil, in 1914 (S.P.I. #36968), and more seeds from Mauritius in 1922 (S.P.I. #54797). Plants were set out at the Plant Introduction Station in Miami and prospered. Other plantings were made in California where it seemed even better adapted but has apparently disappeared. The United States Department of Agriculture raised seedlings at Puerto Arturo, Honduras, and transferred some plants to the Lancetilla Experimental Garden at Tela in 1926. They flourished there and flowered and fruited well."
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"It has been introduced widely to many tropical and subtropical countries."

Qsn #	Question	Answer
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"The plant has been introduced into Australia, Florida, California, Hawaii, Honduras, Cuba, Angola and East Malaysia (Sabah)."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Pacific Island Ecosystems at Risk (PIER). (2021). <i>Eugenia brasiliensis</i> . <a href="http://www.hear.org/Pier">http://www.hear.org/Pier</a> . [Accessed 28 Jun 2021]	"Lining the side of the Hana Highway at Ulumalu in Haiku, and was also in nearby gulches. Forest and Kim Starr, pers. Comm. 2009.
	Byng, J. W., Barthelat, F., Snow, N., & Bernardini, B. (2016) Revision of <i>Eugenia</i> and <i>Syzygium</i> (Myrtaceae) from the Comoros archipelago. <i>Phytotaxa</i> , 252(3), 163-184	"Notes:—This Brazilian species is cultivated widely in tropical regions for its edible fruits. It is recorded from Mayotte and likely to be cultivated or naturalised on other islands."
	Pacific Island Ecosystems at Risk (PIER). (2021). <i>Eugenia brasiliensis</i> . <a href="http://www.hear.org/Pier">http://www.hear.org/Pier</a> . [Accessed 28 Jun 2021]	"Probablement le seul arbre planté à Tahiti. " [Translation from French: Probably the only tree planted in Tahiti.]
	Starr, F. & Starr, K. (2011). New plant records from midway Atoll, Maui and Kaho'olawe. <i>Bishop Museum Occasional Papers</i> . 110: 23-35	[East Maui] " <i>Eugenia brasiliensis</i> (Spanish cherry, Brazilian plum, grumichama) is native to southern coastal Brazil and has been widely cultivated in the tropics and subtropics for its edible fruit (Staples & Herbst, 2005). introduced in Hawai'i perhaps as early as 1791, it was once a popular ornamental plant and likely persists today in older gardens and collections (Staples & Herbst, 2005). the earliest collection from maui is from 1932 from cultivated specimens at the old Baldwin home in Wailuku (Bishop museum 2010). though long cultivated in Hawai'i, this species has not previously been recorded as naturalized. it was recently found to be naturalized in wet, disturbed lowland secondary forests and gulches in the Ha'ikū vicinity of east maui, representing a new naturalized record for the state of Hawai'i."
	Parker, J.L. & Parsons, B. (2012). New Plant Records from the Big Island for 2010–2011. <i>Bishop Museum Occasional Papers</i> 113: 65-74	[Hawaii island] " <i>Eugenia brasiliensis</i> Lam. New island record. Brazilian cherry can be found in cultivation over many parts of the island, especially from Hilo to Waimea. It has previously been recorded as naturalized from Maui (Starr et al. 2011: 29). although not often seen spreading from cultivation, this shrub was seen colonizing the side of a gulch in the Bond Historic District in north Kohala. Material examined. HAWAII: North Kohala Distr. Bond Historic Distr, Waianaia Gulch, 2236888n, 207681e. small population of naturalized shrubs observed on hillside. orange, flaky bark, with whorled leaves and white 4-petal flowers with persistent bracts, 22 mar 2010, J. Parker & R. Parsons BIED111."
	Lau, A. & Frohlich, D. (2013). New plant records for the Hawaiian Islands 2011–2012. <i>Bishop Museum Occasional Papers</i> 114: 5–16	[Oahu] "This species has previously been recorded as naturalized on Maui and Hawai'i islands, establishing in at least wet disturbed sites. it is not common in cultivation on O'ahu, and may not have been planted in forest reserves (not recorded in Skolmen [1980]), yet was found established in what appeared to be one rather extensive population in lowland, mesic to wet, non-native forest in the southern Ko'olau Mountains. Material examined. O'AHU: on ridge between Pauoa and Nu'uuanu Valleys, at about 395 m (1300 ft) elev, mesic to wet lowland non-native forest, 5 Apr 2012, T. Marsh 20120405Misspe."

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Global Invasive Species Database (2021). <a href="http://www.iucngisd.org/gisd/">http://www.iucngisd.org/gisd/</a> . [Accessed 29 Jun 2021]	No evidence
	CABI. (2021). <i>Eugenia brasiliensis</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	No evidence.

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	CABI. (2021). <i>Eugenia brasiliensis</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	No evidence
	Global Invasive Species Database (2021). <a href="http://www.iucngisd.org/gisd/">http://www.iucngisd.org/gisd/</a> . [Accessed 29 Jun 2021]	No evidence

304	Environmental weed	n
	Source(s)	Notes
	CABI. (2021). <i>Eugenia brasiliensis</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	No evidence
	Global Invasive Species Database (2021). <a href="http://www.iucngisd.org/gisd/">http://www.iucngisd.org/gisd/</a> . [Accessed 29 Jun 2021]	No evidence
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No listed as an environmental weed

305	Congeneric weed	y
	Source(s)	Notes
	Weber, E. (2017). Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[ <i>Eugenia uniflora</i> ] "Where invasive, the tree forms dense thickets crowding out native vegetation and replacing native species. The dense foliage reduces considerably the amount of light reaching the forest floor, thus altering microclimatic conditions and preventing native species' growth (Langeland and Craddock Burks, 1998; State of Queensland, 2014)."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	[No evidence] "The highly ornamental tree is slender, erect, usually to 25 or 35 ft (7.5-10.5 m) high, short trunked and heavily foliated with opposite, oblong-oval leaves 3 1/2 to 5 in (9-16 cm) long, 2 3/8 in (5-6 cm) wide, with recurved margin; glossy, thick, leathery, and minutely pitted on both surfaces." \

402	Allelopathic	

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2021). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"A slender, erect, evergreen tree reaching 7–10 m high with a short trunk and dense crown." [Myrtaceae. No evidence]

404	Unpalatable to grazing animals	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2021). Personal Communication	Unknown. No information found on palatability of foliage, only fruit.

405	Toxic to animals	n
	<b>Source(s)</b>	<b>Notes</b>
	Plants for a Future. (2021). <i>Eugenia brasiliensis</i> . <a href="https://pfaf.org">https://pfaf.org</a> . [Accessed 30 Jun 2021]	"Known Hazards: None known"
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	No evidence of toxic properties for animals or humans

406	Host for recognized pests and pathogens	y
	<b>Source(s)</b>	<b>Notes</b>
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	"In Hawaii, the fruits are heavily attacked by the Mediterranean fruit fly."
	CABI. (2021). <i>Eugenia brasiliensis</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	"Major host of: <i>Anastrepha fraterculus</i> (South American fruit fly); <i>Anastrepha suspensa</i> (Caribbean fruit fly) Minor host of: <i>Bactrocera neohumeralis</i> ; <i>Bactrocera tryoni</i> (Queensland fruit fly); <i>Ceratitis capitata</i> (Mediterranean fruit fly); <i>Eudocima fullonia</i> (fruit-piercing moth) Host of (source - data mining): <i>Anastrepha obliqua</i> (West Indian fruit fly); <i>Anastrepha sororcula</i> ; <i>Bactrocera kirki</i> "
	Rayachhetry, M. B., Van, T. K., Center, T. D., & Elliott, M. L. (2001). Host range of <i>Puccinia psidii</i> , a potential biological control agent of <i>Melaleuca quinquenervia</i> in Florida. <i>Biological Control</i> , 22(1), 38-45	Host of <i>Puccinia psidii</i>

407	Causes allergies or is otherwise toxic to humans	n
	<b>Source(s)</b>	<b>Notes</b>
	Plants for a Future. (2021). <i>Eugenia brasiliensis</i> . <a href="https://pfaf.org">https://pfaf.org</a> . [Accessed 30 Jun 2021]	"Known Hazards: None known"

Qsn #	Question	Answer
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"The cherry like fruits are eaten fresh, candied or stewed. They are also utilised for the production of jelly, jam and pies." [No evidence]
	Fischer, D. C., Limberger, R. P., Henriques, A. T., & Moreno P. R. (2005). Essential oils from leaves of two <i>Eugenia brasiliensis</i> specimens from southeastern Brazil. Journal of Essential Oil Research, 17(5), 499-500	"The essential oils from leaves of two specimens of <i>Eugenia brasiliensis</i> collected at two locations in the southeastern Brazilian cerrado were analyzed by GC and GC/MS. The main constituents found in the leaf oil from both specimens were $\alpha$ - and $\beta$ -selinene and 13 caryophyllene. The specimen collected at Jaboticabal contained $\beta$ -selinene (17.3%) as the major component, while the specimen from Martinho Prado contained a selinene (14.8%) as the major compound. Additionally, the specimen from Martinho Prado produced relatively high amounts of $\alpha$ - and 13-pinene (6.6% and 3.6 %, respectively)." [No evidence of toxicity]
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	"The grumichama is native and wild in coastal southern Brazil, especially in the states of Parana and Santa Catarina. It is cultivated in and around Rio de Janeiro, also in Paraguay." [No evidence that tree is a fire hazard or prone to burning]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Rauch, F.D. & Weissich, P.R. (2009). Small Trees for the Tropical Landscape. University of Hawaii Press, Honolulu, HI	"Although performing best in full sun, it will tolerate light shade."
	Plants for a Future. (2021). <i>Eugenia brasiliensis</i> . <a href="https://pfaf.org">https://pfaf.org</a> . [Accessed 29 Jun 2021]	"It can grow in semi-shade (light woodland) or no shade. It prefers moist soil."
	Desert Tropicals. (2021). Grumichama. <a href="https://www.desert-tropicals.com/Plants/Myrtaceae/Eugenia_brasiliensis.html">https://www.desert-tropicals.com/Plants/Myrtaceae/Eugenia_brasiliensis.html</a> . [Accessed 29 Jun 2021]	"Sun Exposure: Full sun to light shade"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Plants for a Future. (2021). <i>Eugenia brasiliensis</i> . <a href="https://pfaf.org">https://pfaf.org</a> . [Accessed 30 Jun 2021]	"Adaptable to a range of soil types, but intolerant of alkaline soils[ 200 ]. Prefers high levels of organic matter in the soil[ 200 ], especially when grown on light soils[ 303 ]."
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"It thrives on acid soils such as deep fertile, sandy loams but will also grow on rich clays."
	Rare Fruit Club WA. (2021). Grumichama, also called Brazil Cherry <i>Eugenia brasiliensis</i> (dombeyi). <a href="https://www.rarefruitclub.org.au">https://www.rarefruitclub.org.au</a> . [Accessed 30 Jun 2021]	"Largely undemanding of soil types provided they are well-drained, with a preference for deep, slightly acid, sandy loams."



Qsn #	Question	Answer
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	"The grumichama does better on acid sand in Central Florida than it does on limestone in the south. It is reported to prefer deep, fertile, sandy loam. Sturrock says it grows well in rich clay in Cuba but is adversely affected by the long, dry season."
<b>411</b>	<b>Climbing or smothering growth habit</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Slender tree 25 to 35 feet tall"
<b>412</b>	<b>Forms dense thickets</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Norton, T. H. (1918). Tanning Materials of Latin America. Special Agents Series-No. 165. Government Printing Office, Washington, D.C.	[ <i>Eugenia brasiliensis</i> ] "The fruit-bearing tree is well known and very abundant. In certain low places it forms dense thickets. It attains a height of 33 feet and a diameter of 18 inches."
<b>501</b>	<b>Aquatic</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	Terrestrial tree
<b>502</b>	<b>Grass</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/">https://npgsweb.ars-grin.gov/</a> . [Accessed 30 Jun 2021]	Family: Myrtaceae Subfamily: Myrtoideae Tribe: Myrteae
<b>503</b>	<b>Nitrogen fixing woody plant</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. <a href="https://npgsweb.ars-grin.gov/">https://npgsweb.ars-grin.gov/</a> . [Accessed 30 Jun 2021]	Family: Myrtaceae Subfamily: Myrtoideae Tribe: Myrteae

Qsn #	Question	Answer
504	<b>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Slender tree 25 to 35 feet tall"

601	<b>Evidence of substantial reproductive failure in native habitat</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	[No evidence] "The grumichama is indigenous to Brazil; it is found wild in eastern and coastal southern Brazil, especially in the states of Parana and Santa Catarina. The crop is cultivated in Brazil and Paraguay. The plant has been introduced into Australia, Florida, California, Hawaii, Honduras, Cuba, Angola and East Malaysia (Sabah)."
	Galetti, M., Martuscelli, P., Olmos, F., & Aleixo, A. (1997). Ecology and conservation of the jacutinga <i>Pipile jacutinga</i> in the Atlantic forest of Brazil. <i>Biological Conservation</i> , 82 (1), 31-39	No evidence of substantial reproductive failure in native habitat

602	<b>Produces viable seed</b>	y
	<b>Source(s)</b>	<b>Notes</b>
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Grumichama is usually propagated by seed, but cuttings, air layers, and grafts have all proved successful."
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	"Wilson Popenoe stated that propagation in Brazil is entirely by seeds which remain viable for several weeks and germinate in about a month. Fenzi says that seeds, cuttings and air layers are employed, and Sturrock has mentioned that grafting is easy."

603	<b>Hybridizes naturally</b>	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2021). Personal Communication	Unknown. No evidence found

604	<b>Self-compatible or apomictic</b>	y
	<b>Source(s)</b>	<b>Notes</b>
	Lughadha, E. N., & Proença, C. (1996). A survey of the reproductive biology of the Myrtoideae (Myrtaceae). <i>Annals of the Missouri Botanical Garden</i> , 83(4): 480-503	"Complete self-sterility has also been reported in <i>Eugenia</i> sp. in secondary deciduous forest in Venezuela (Ruiz & Arroyo, 1978), in <i>Eugenia</i> sp. (presumably different) in montane cloud forest in Venezuela (Sobrevila & Arroyo, 1982), and in <i>Syzygium lineatum</i> in Sulawesi, Indonesia (Lack & Kevan, 1984). Bullock (1985) reported almost complete self-incompatibility in Mexican <i>Psidium sartorianum</i> Nied. (ISI 0.02). However, in none of these cases is any indication given of the timing or nature of the reproductive barriers operating after self-pollination."

Qsn #	Question	Answer
	Rare Fruit Club WA. (2021). Grumichama, also called Brazil Cherry <i>Eugenia brasiliensis</i> (dombeyi). <a href="https://www.rarefruitclub.org.au">https://www.rarefruitclub.org.au</a> . [Accessed 30 Jun 2021]	"Little is recorded on pollination in this species, but they are self-fertile, and if similar to other <i>Eugenias</i> , bees and sometimes moths would be the pollinators."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Roubik, D.W. (1995). Pollination of cultivated plants in the tropics. <i>FAO Services Bulletin</i> 118. FAO, Rome, Italy	" <i>Eugenia brasiliensis</i> - Pollinators - bee"
	Paz, F. S., Pinto, C. E., de Brito, R. M., Imperatriz-Fonseca, V. L., & Giannini, T. C. (2021). Edible Fruit Plant Species in the Amazon Forest Rely Mostly on Bees and Beetles as Pollinators. <i>Journal of Economic Entomology</i> , 114(2), 710-722	"Table 2. Pollination syndrome of edible plants from Brazilian Amazon" [ <i>Eugenia brasiliensis</i> - Syndrome = Mellitophily]
	Lughadha, E. N., & Proença, C. (1996). A survey of the reproductive biology of the Myrtoideae (Myrtaceae). <i>Annals of the Missouri Botanical Garden</i> , 83(4): 480-503	Most <i>Eugenia</i> species are pollinated by species of Apidae [bees]

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. (2005). <i>A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places</i> . Bishop Museum Press, Honolulu, HI	"usually propagated by seed, but cuttings, air layers, and grafts have all proved successful" [No evidence of natural vegetative spread]
	Rare Fruit Club WA. (2021). Grumichama, also called Brazil Cherry <i>Eugenia brasiliensis</i> (dombeyi). <a href="https://www.rarefruitclub.org.au">https://www.rarefruitclub.org.au</a> . [Accessed 30 Jun 2021]	[Suggests suckering occurs when promoted by artificial propagation methods] "Seed is usually used, with use of cuttings for selected superior plants. Grafts may promote suckering."

607	Minimum generative time (years)	>3
	Source(s)	Notes
	Rare Fruit Club WA. (2021). Grumichama, also called Brazil Cherry <i>Eugenia brasiliensis</i> (dombeyi). <a href="https://www.rarefruitclub.org.au">https://www.rarefruitclub.org.au</a> . [Accessed 30 Jun 2021]	"Fruit production may commence 4-5 years after planting seedlings. There could be more than one crop per year but the first is usually the biggest."
	Desert Tropicals. (2021). Grumichama. <a href="https://www.desert-tropicals.com/Plants/Myrtaceae/Eugenia_brasiliensis.html">https://www.desert-tropicals.com/Plants/Myrtaceae/Eugenia_brasiliensis.html</a> . [Accessed 30 Jun 2021]	"Propagation: Easy from seeds fruiting after 3 years, but with unreliable quality, cuttings" [Potentially 3 years]
	Morton, J.F. (1987). <i>Fruits of Warm Climates</i> . J.F. Morton, Miami, FL	"The grumichama is of slow growth when young unless raised in a mixture of peat moss and sand and then given a thick layer of peat moss around the roots when setting out, and kept heavily fertilized. In Hawaii, it has taken 7 years to reach 7 ft. Fruiting begins when the plants are 4 to 5 years old."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes

Qsn #	Question	Answer
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Fruit flattened-globose, 0.5-0.75", red turning dark purple-black when ripe, flesh juicy, apex capped by persistent sepal. Seeds 1-3, to 0.5" wide, pale tan to greenish gray" [No means of external attachment, and fairly large seeds unlikely to be dispersed unintentionally]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Grumichama was introduced to Hawaii perhaps as early as 1791 by Don Francisco de Paula Marin and was certainly present prior to 1821. Once widely grown in gardens around the state, it probably persists today mostly in research collections, older gardens, and the collections of tropical fruit fanciers."
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"The grumichama is indigenous to Brazil; it is found wild in eastern and coastal southern Brazil, especially in the states of Parana and Santa Catarina. The crop is cultivated in Brazil and Paraguay. The plant has been introduced into Australia, Florida, California, Hawaii, Honduras, Cuba, Angola and East Malaysia (Sabah)."
	Morton, J.F. (1987). Fruits of Warm Climates. J.F. Morton, Miami, FL	The tree is regarded as remarkable for the short period from flowering to fruiting. In Florida, it has been in full bloom in late April and loaded with fruits 30 days later. The crop ripens quickly over just a few days. In Hawaii, the trees bloom and fruit from July to December, with the main crop in the fall. Trees in Brazil vary considerably in time of flowering and fruiting so that the overall season extends from November to February. [ornamental and fruit tree]

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Fruit flattened-globose, 0.5-0.75", red turning dark purple-black when ripe, flesh juicy, apex capped by persistent sepal. Seeds 1-3, to 0.5" wide, pale tan to greenish gray" [No evidence, and fairly large seeds unlikely to become a contaminant of produce]

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Gagetti, B. L., Piratelli, A. J., & Piña-Rodrigues, F. C. M. (2016). Fruit color preference by birds and applications to ecological restoration. Brazilian Journal of Biology, 76, 955-966	"Appendix A. Plant species available in the nursery or planted in the Centro de Experimentos Florestais, in the region of Itu, state of São Paulo, with colors of fruits/diasporas and dispersal syndrome (biotic or abiotic)." [Eugenia brasiliensis - Seed dispersal = Biotic]
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Fruit flattened-globose, 0.5-0.75", red turning dark purple-black when ripe, flesh juicy, apex capped by persistent sepal. Seeds 1-3, to 0.5" wide, pale tan to greenish gray" [No adaptations for wind dispersal]

705	Propagules water dispersed	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Fruit flattened-globose, 0.5-0.75", red turning dark purple-black when ripe, flesh juicy, apex capped by persistent sepal. Seeds 1-3, to 0.5" wide, pale tan to greenish gray" [No evidence of or adaptations for water dispersal]

706	Propagules bird dispersed	y
	<b>Source(s)</b>	<b>Notes</b>
	Lughadha, E. N., & Proença, C. (1996). A survey of the reproductive biology of the Myrtoideae (Myrtaceae). Annals of the Missouri Botanical Garden, 83(4): 480-503	"Myrtoid fruits are fleshy berries or drupes, dispersed by birds, bats, and other small mammals."
	Galetti, M., Martuscelli, P., Olmos, F., & Aleixo, A. (1997). Ecology and conservation of the jacutinga <i>Pipile jacutinga</i> in the Atlantic forest of Brazil. Biological Conservation, 82 (1), 31-39	"Table 1. Fruit species consumed by jacutingas, <i>Pipile jacutinga</i> , in southeastern Brazil" [Includes <i>Eugenia brasiliensis</i> ] ..."The jacutinga <i>Pipile jacutinga</i> was formerly one of the most abundant game bird cracids in the Atlantic forest of Brazil."

707	Propagules dispersed by other animals (externally)	n
	<b>Source(s)</b>	<b>Notes</b>
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Fruit flattened-globose, 0.5-0.75", red turning dark purple-black when ripe, flesh juicy, apex capped by persistent sepal. Seeds 1-3, to 0.5" wide, pale tan to greenish gray" [No evidence of external transport by animals, and no means of external attachment]

708	Propagules survive passage through the gut	y
	<b>Source(s)</b>	<b>Notes</b>
	Galetti, M., Martuscelli, P., Olmos, F., & Aleixo, A. (1997). Ecology and conservation of the jacutinga <i>Pipile jacutinga</i> in the Atlantic forest of Brazil. Biological Conservation, 82 (1), 31-39	"Fruit consumed by <i>Pipile jacutinga</i> , a Brazilian game bird" [Seeds presumed to be adapted for gut passage]
	Lughadha, E. N., & Proença, C. (1996). A survey of the reproductive biology of the Myrtoideae (Myrtaceae). Annals of the Missouri Botanical Garden, 83(4): 480-503	"Myrtoid fruits are fleshy berries or drupes, dispersed by birds, bats, and other small mammals."

801	Prolific seed production (>1000/m2)	n
	<b>Source(s)</b>	<b>Notes</b>
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Fruit flattened-globose, 0.5-0.75", red turning dark purple-black when ripe, flesh juicy, apex capped by persistent sepal. Seeds 1-3, to 0.5" wide, pale tan to greenish gray" [Fairly large seeds unlikely to reach densities >1000/m2]

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Kohoma, S., Maluf, A. M., Bilia, D. A. C., & Barbedo, C. J. (2006). Drying and storage of <i>Eugenia brasiliensis</i> Lam. ("Grumixameira") seeds. <i>Revista Brasileira de Sementes</i> , 28, 72-78.	"ABSTRACT - There is an increasing need for investigations of the Brazilian native tree species, mainly the physiological quality of their seeds. To evaluate the desiccation tolerance and storability of <i>Eugenia brasiliensis</i> seeds, mature fruits collected at Mogi-Guaçu, SP, Brazil and their seeds were removed by washing and were dried at 36°C until their water content was reduced from 48.9% (fresh seeds, wet basis) to 23.6% (final drying), totaling five drying levels. Samples of each drying level were stored at 7°C in plastic bags for 270 days. Results showed that water content lower than 43.1% decreased both germinability [germination potential] and storability. Seeds with 48.9% water content showed 60% germination after 180 days and 19% after 270 days of storage inside plastic bags in a cold chamber. We concluded that <i>E. brasiliensis</i> seeds can be stored for 180 days at 7°C and are intolerant to drying at 36°C."
	Royal Botanic Gardens Kew. (2021) Seed Information Database (SID). Version 7.1. <a href="http://data.kew.org/sid/">http://data.kew.org/sid/</a> . [Accessed 30 Jun 2021]	"Storage Behaviour: Recalcitrant Storage Conditions: Seeds are sensitive to desiccation, only 7.5% germinate following 1 month open storage at 15°C and 75% r.h., no seeds germinate following 1 month open storage at 23°C and 45% r.h., whereas 89% germinate following 6 months storage at 15°C with seeds imbibed with 10-4M ABA (Goldbach, 1979b); viability lost within 6 weeks in open storage at room temperature (Verheij & Coronel, 1991)" [Seeds unlikely to persist in soil seed bank]

803	Well controlled by herbicides	y
	Source(s)	Notes
	Langeland, K.A. & Stocker, R.K. 2001. Control of Non-native Plants in Natural Areas of Florida. SP 242. Institute of Food & Agricultural Sciences, University of Florida, Gainesville, FL	"For seedlings and small plants up to 1/2 inch diameter, use a basal bark treatment with 10% Garlon 4. This species takes a long time to die, and may require a subsequent herbicide application. For larger stems, use a cut-stump treatment with either 50% Garlon 3A or 10% Garlon 4" [Information is for control of the invasive <i>Eugenia uniflora</i> , and should therefore work on <i>E. brasiliensis</i> ]

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	Rare Fruit Club WA. (2021). Grumichama, also called Brazil Cherry <i>Eugenia brasiliensis</i> (dombeyi). <a href="https://www.rarefruitclub.org.au">https://www.rarefruitclub.org.au</a> . [Accessed 30 Jun 2021]	[Tolerates pruning. Vigorous pruning reduces fruit yield] "Pruning: Minimal to control shape, remove any dead wood and maintain at no more than 3m height. Fruit yield may be decreased if this is too vigorous."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Starr, F. & Starr, K. (2011). New plant records from midway Atoll, Maui and Kaho'olawe. <i>Bishop Museum Occasional Papers</i> . 110: 23-35	"Though recorded as a host of the rust fungus <i>Puccinia psidii</i> as early as 1918 in its native Brazil (simpson et al., 2006), we did not observe <i>E. brasiliensis</i> to be infected with the rust, though <i>Syzygium jambos</i> nearby in Ha'iku was infected."

Qsn #	Question	Answer
	Rayachhetry, M. B., Van, T. K., Center, T. D., & Elliott, M. L. (2001). Host range of <i>Puccinia psidii</i> , a potential biological control agent of <i>Melaleuca quinquenervia</i> in Florida. <i>Biological Control</i> , 22(1), 38-45	Host of <i>Puccinia psidii</i> [ <i>P. psidii</i> widespread in Hawaii, but impacts on <i>E. brasiliensis</i> unknown]

**Summary of Risk Traits:**

## High Risk / Undesirable Traits

- Thrives, and capable of spreading, in regions with tropical climates.
- Naturalized on Oahu, Maui, and Hawaii (Hawaiian Islands) and possibly elsewhere where introduced.
- Other *Eugenia* species are invasive.
- Alternate host of several fruit flies and other fruit crop pests
- Tolerates many soil types (substrate unlikely to limit potential spread)
- Reported to form dense thickets in native range.
- Reproduces by seeds.
- Reported to be self-fertile.
- Seeds dispersed by birds, other frugivorous animals, and intentionally by people.
- May be able to resprout after cutting.

## Low Risk Traits

- No reports of negative impacts where naturalized
- Unarmed (no spines, thorns, or burrs)
- Non-toxic
- Grows best in full sun to light shade. Dense shade may limit ability to establish or spread.
- Not reported to spread vegetatively.
- Reaches maturity in 4-5 years from seed.
- Seeds recalcitrant, and unlikely to form a persistent seed bank.
- Herbicides used to control other invasive members of the genus should be effective if needed.

## Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> Yes. Reported to form dense stands in native range.

(B) Bird or clearly wind-dispersed?> Yes. Dispersed by birds.

(C) Life cycle <4 years? No. Reaches maturity in 4-5 years.

Outcome = Evaluate



