Taxon: Eugenia uniflora L. **Family:** Myrtaceae

Common Name(s): Brazil cherry
Surinam cherry

Synonym(s): Eugenia brasiliana (L.) Aubl.
Eugenia michelii Lam.
Eugenia myrtifolia Salisb.
Eugenia strigosa (O. Berg) Arechav.
Myrtus brasiliana L.
Stenocalyx strigosus O. Berg

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 5 Feb 2020

WRA Score: 9.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Fruit Tree, Naturalized, Environmental Weed, Self-Compatible, 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	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	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)	y
305	Congeneric weed		
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	y=1, n=-1	n
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		
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
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		
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/m2)	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	y=1, n=-1	y
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] "Pitanga is indigenous to the Amazon rainforest in south America. The plant is native from Surinam, Guyana and French Guiana to eastern and southern Brazil and to northern, eastern and central Uruguay. It is naturalized in Argentina, Venezuela and Colombia, along the Atlantic coast of Central America, in the Caribbean islands and also in Florida. It is cultivated in all tropical and subtropical regions as fruit and ornamental tree. It has become invasive in Bermuda and some parts of Australia."

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. (2020). 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**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 3 Feb 2020]	"Native Southern America BRAZIL: Brazil [Minas Gerais, Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, São Paulo] WESTERN SOUTH AMERICA: Bolivia [La Paz, Santa Cruz, Tarija] SOUTHERN SOUTH AMERICA: Argentina, [Catamarca, Chaco, Corrientes, Entre Ríos, Formosa, Jujuy, Misiones, Salta, Santa Fe, Tucumán] Paraguay, Uruguay"

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 3 Feb 2020]	

203	**Broad climate suitability (environmental versatility)**	**y**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"Pitanga grows in areas with tropical or subtropical climates from sea level to 1,800 m elevation as found in Guatemala. Young plants are severely damaged by frost but mature established plants are more frost hardy sustaining light damage." [Elevation range exceeds 1000 m, demonstrating environmental versatility]
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed 4 Feb 2020]	"The Surinam cherry is adapted to tropical and subtropical regions. In the Philippines, it thrives from sea-level to 3,300 ft (1,000 m); in Guatemala, up to 6,000 ft (1,800 m). Young plants are damaged by temperatures below 28º F (-2.22º C), but well-established plants have suffered only superficial injury at 22º F (-5.56º C)."

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	Frohlich, D. & Lau, A. 2010. New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	"Eugenia uniflora, or Surinam cherry, has been collected as naturalized on Kaua'i, Moloka'i, Maui (Wagner et al. 1999), Lāna'i (Starr et al. 2010), and now on O'ahu.
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"Pitanga is indigenous to the Amazon rainforest in South America. The plant is native from Surinam, Guyana and French Guiana to eastern and southern Brazil and to northern, eastern and central Uruguay. It is naturalized in Argentina, Venezuela and Colombia, along the Atlantic coast of Central America, in the Caribbean islands and also in Florida."

205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"It is naturalized in Argentina, Venezuela and Colombia, along the Atlantic coast of Central America, in the Caribbean islands and also in Florida. It is cultivated in all tropical and subtropical regions as fruit and ornamental tree."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to Brazil, now widely cultivated; in Hawai'i cultivated on Midway Atoll and all of the main islands except Ni'ihau and Kaho'olawe"

301	**Naturalized beyond native range**	**y**
	Source(s)	**Notes**
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed 3 Feb 2020]	"It is cultivated and naturalized in Argentina, Venezuela and Colombia; also along the Atlantic coast of Central America; and in some islands of the West Indies–the Cayman Islands, Jamaica, St. Thomas, St. Croix, Puerto Rico, Cuba, Haiti, the Dominican Republic, and in the Bahamas and Bermuda."
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"It is naturalized in Argentina, Venezuela and Colombia, along the Atlantic coast of Central America, in the Caribbean islands and also in Florida."

Qsn #	Question	Answer
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 3 Feb 2020]	"Naturalized Africa SOUTHERN AFRICA: South Africa Australasia AUSTRALIA: Australia [Queensland] Northern America United States (s.e.) Southern America CARIBBEAN: West Indies"
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	[Kauai, Molokai & other unspecified Hawaiian Islands] "Native to Brazil, now widely cultivated; in Hawai'i cultivated on Midway Atoll and all of the main islands except Ni'ihau and Kaho'olawe, and very sparingly naturalized in low elevation mesic sites, especially valley floors, 30- 730 m, at least on Kaua'i, Moloka'i, and several of the other main islands, but collections are lacking for any naturalized occurrence. Cultivated at least as early as 1871 (Hillebrand, 1888), for its edible fruit."
	Starr, F., Starr, K.& Loope, L.L. (2010). New plant records from the Hawaiian Archipelago. Bishop Museum Occasional Papers 107: 61-68	[Lanai] "Eugenia uniflora (Surinam cherry) is cultivated for its edible fruits and recorded as naturalized on the islands of Kaua‘i, O‘ahu, Moloka‘i, and Maui (Wagner et al. 1999; Oppenheimer 2003; Frohlich & Lau 2010). on Lāna‘i, it was widely cultivated in Lāna‘i City and occasionally naturalized in scrub areas nearby. This collection represents a new island record for Lāna‘i. Material examined. LĀNA‘I: Lāna‘i City, Queens St, on side of road, in association with Olea europaea subsp. cuspidata, Ruellia brevifolia, and Lantana montevidensis, 488 m (1600 ft), 3 Apr 2007, Starr & Starr 070403-04."
	Frohlich, D. & Lau, A. 2010. New plant records from O‘ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	[Oahu] "Eugenia uniflora, or Surinam cherry, has been collected as naturalized on Kaua‘i, Moloka‘i, Maui (Wagner et al. 1999), Lāna‘i (Starr et al. 2010), and now on O‘ahu. This new record comes as little surprise, given the popularity of this plant in cultivation; its juicy, bird-dispersed fruit; and the facility of its propagation by seed (Staples & Herbst 2005). on O‘ahu, it was found making up the greater part of the understory in an Enterolobium/Casuarina forest. Material examined. O‘AHU: Pearl City, Waimalu Valley,2 m tall shrub, 40–50 mature individuals, over 200 seedlings growing among Enterolobium/Casuarina overstory,2 May 2008, A. Lau & D. Frohlich 2008050201."
	Oppenheimer, Hank L. 2003. New plant records from Maui and Hawai‘i Counties. Bishop Museum Occasional Papers. 73: 3-30	[West Maui] "Surinam cherry is very sparingly naturalized at least on Kaua‘i, Moloka‘i, and several other of the main islands, but vouchers are lacking for any naturalized occurrence (Wagner et al., 1990: 961). On West Maui, plantings were made in the 1920s as part of the Maunalei Arboretum project (Maui Pineapple Co., unpubl.). Humans, feral pigs, and stray cattle have been spreading the fruit and seed, and plants are not uncommon in areas within, and adjacent to, the area. On East Maui it is also naturalized in the Ha‘ikü area. It has been recently observed to be forming locally dense thickets at Halawa Valley, Moloka‘i. Material examined: MAUI: West Maui, Lahaina Dist, Honolua, Mokupe‘a Gulch, 366 m, 3 Mar 2001, Oppenheimer H30103; East Maui, Makawao Dist, Ha‘ikü, 122 m, 21 Oct 2001, Oppenheimer H100114 (BISH); in gulch near Ha‘ikü School, 122 m, 25 Oct 2001, Starr & Martz 011025-2 (BISH)."

Qsn #	Question	Answer

302	Garden/amenity/disturbance weed	n
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"very sparingly naturalized in low elevation mesic sites, especially valley floors"
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Where invasive, the tree forms dense thickets crowding out native vegetation and replacing native species." [Environmental weed. See 3.04]

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Environmental weed] "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)."

304	Environmental weed	y
	Source(s)	**Notes**
	Queensland Government. (2020). Weeds of Australia. Eugenia uniflora L. https://keyserver.lucidcentral.org. [Accessed 4 Feb 2020]	"Brazilian cherry (Eugenia uniflora) is regarded as a relatively important environmental weed in south-eastern Queensland, where it appears on the list of the top 200 environmental weeds. It is also regarded as an environmental weed or potential environmental weed in northern New South Wales and is naturalising in various places in northern Queensland. This introduced garden plant (i.e. ornamental) has escaped cultivation and is readily dispersed into natural areas by fruit-eating (i.e. frugivorous) birds. It is becoming a weed of rainforests, open woodlands, forest margins, urban bushland, gardens, roadsides and riparian vegetation. Brazilian cherry (Eugenia uniflora) can form dense thickets that replace native species, reduce the amount of light that reaches the forest floor, and change the micro-environment of invaded habitats."
	Stricker, K. B., & Stiling, P. (2013). Seedlings of the introduced invasive shrub Eugenia uniflora (Myrtaceae) outperform those of its native and introduced non-invasive congeners in Florida. Biological Invasions, 15(9), 1973-1987	"Since its introduction to Florida, E. uniflora has escaped cultivation, invading hammocks (evergreen broad-leaved forests) and growing in some areas alongside two native congeners, E. axillaris (SW.) Willd. and E. foetida Pers. It is currently classified as a Category I exotic invasive pest by the Florida Exotic Pest Plant Council (2011). E. uniflora is found throughout south Florida, naturalized in eleven distinct natural habitat types within eight counties (Gann et al. 2007). However, although the other three introduced Eugenia species remain in cultivation in many public and private gardens and nurseries throughout Florida, volunteers have not yet been reported outside of cultivation. In fact, only E. uniflora volunteers are found in a parcel of natural hammock habitat adjacent to the cultivated specimens at Plantation Heritage Park (K. Bohl Stricker, pers. obs.)."

Qsn #	Question	Answer
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"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)."

305	Congeneric weed	
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Unclear. Several Eugenia species are reported to be naturalized, and may be weedy in some environments. Several Syzygium species, formerly classified in the genus Eugenia, are invasive.

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence] "Shrubs 2-3 m tall; branches glabrous. Leaves thin, coriaceous, ovate to broadly lanceolate, 4-7 cm long, 2-4 cm wide, with 9-12 pairs of principal lateral veins, 4-7 mm apart, submarginal vein irregular, both surfaces minutely glandular punctate, lower surface glabrous or sparsely puberulent, margins slightly revolute, apex acuminate, base rounded or broadly cuneate, petioles 2-5 mm long."

402	Allelopathic	
	Source(s)	**Notes**
	Boiago, N. P., Fortes, A. M. T., Pilatti, D. M., & da Silva, P. S S. (2018). Allelopathic bioactivity of fresh and infused aqueous extracts of Brazilian cherry (Eugenia uniflora L.) on lettuce and maize. Acta Scientiarum. Biological Sciences, 40, e40972-e40972	[Demonstrated in laboratory conditions. Possibly Yes] "This study aimed to analyse the allelopathic bioactivity of fresh and infused aqueous extracts of Brazilian cherry leaves on the germination of lettuce and the initial development of maize. Brazilian cherry leaves were used to prepare a fresh aqueous extract (200 g L-1) and an infused extract (100 g L-1), which were diluted to concentrations of 0.4, 0.8, 1.2, 1.6 or 2.0% w/v. The variables evaluated in lettuce were the germination rate (GR), germination time index (GTI), germination speed index (GSI) and root length (RL). To determine the effect on the initial development of maize, we measured the shoot (SL) and root (RL) length. The experimental design included a factorial 2 × 5 design (two extracts and five concentrations), in addition to a control treatment (no extract). In general, the allelopathic bioactivity differed between the fresh and infused extracts. The fresh extract was more phytotoxic for the GR and RL of lettuce. Some beneficial results were observed for the infused extract, including an increase in the RL of lettuce and SL of maize. These effects were dependent on the extract concentration. Thus, there is evidence that Brazilian cherry extracts have allelopathic bioactivity."

403	Parasitic	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Shrubs 2-3 m tall" [Myrtaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	**Notes**
	Okoh-Esene, R. U., Husseini, S. J., & Thomas, S. A. (2011). Proximate and phytochemical analysis of leaf, stem and root of Eugenia uniflora (Surinam or Pitanga cherry). J. Nat. Prod. Plant Resour, 1(4), 1-4	"The proximate percentage composition of the leaves, stem and root of E. uniflora are shown in Table 1. Total fatty acid of 1.60 and 1.22 for the leaves and stem are low and consequently heart friendly . The crude fibre content of the leaves makes it adequately good as fodder for animals. The crude protein and carbohydrate content of all parts of this plant makes the plant interesting for compounding of livestock feed."
	Chalukian, S. C., de Bustos, M. S., & Lizarraga, R. L. (2013). Diet of lowland tapir (Tapirus terrestris) in El Rey National Park, Salta, Argentina. Integrative Zoology, 8(1), 48-56	[Browsed by tapirs in Argentina] "Table 2 Plant species recorded as tapir food from feces analysis, direct observations and other researchers, in El Rey National Park, Salta, Argentina" [Eugenia uniflora - Parts eaten = Leaves & stems]

405	Toxic to animals	n
	Source(s)	**Notes**
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Leaves decoction astringent, febrifuge, bitter tonic, for dysentery, chest colds, coughs, bronchitis, influenza." [No evidence]
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed]	"The seeds are extremely resinous and should not be eaten. Diarrhea has occurred in dogs that have been fed the whole fruits by children. The strong, spicy emanation from bushes being pruned irritates the respiratory passages of sensitive persons." [No evidence of specific cases reported]

406	Host for recognized pests and pathogens	y
	Source(s)	**Notes**
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed 3 Feb 2020]	"Surinam cherries are highly attractive to Caribbean and Mediterranean fruit flies, but the incidence of infestation was found to vary greatly in Israel from location to location, some plants being unmolested. The foliage is occasionally attacked by scale insects and caterpillars. A large, extensive hedge along a canal in Dade County blew down in September 1982. Examination showed that the roots had been chewed off and there were about a dozen white grubs up to 2 in (5 cm) long under each plant. These were identified as the larvae of a sugar cane pest that is common in Haiti. Among diseases encountered in Florida are leaf spot caused by Cercospora eugeniae, Helminthosporium sp., and Phyllostica eugeniae; thread blight from infection by Corticium stevensii; anthracnose from Colletotrichum gloeosporioides; twig dieback and root rot caused by Rhizoctonia solani; and mushroom root rot, Armillariella (Clitocybe) tabescens."

Qsn #	Question	Answer
	Mendonça Jr, M. D. S., & Romanowski, H. P. (2002). Life history of the gall-maker Eugeniamyia dispar Maia, Mendonça-Jr. & Romanowski, 1996 (Diptera, Cecidomyiidae). Brazilian Journal of Biology, 62(2), 277-283	"The development of the galls of the midge Eugeniamyia dispar Maia, Mendonça-Jr. & Romanowski, 1996 (Diptera: Cecidomyiidae) was monitored weekly on its host plant, Eugenia uniflora (Myrtaceae). The work was carried out in the urban area of Porto Alegre, RS, Brazil, from October 1993 to September 1995. Galls were collected from the field and raised in the laboratory to obtain adults. The females oviposit on young leaves of the host plant, with the first instar larvae inducing the gall, which is unilocular. The last instar larvae drop to the soil to pupate and later emerge as adults. The galls occur from late August to early June, when young leaves of the host can be found, with populations peaking during the summer. So far this species is only known from the two southernmost states of Brazil (RS and SC)."
	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	"The ripe fruit is attacked by fruit flies, which is a deterrent to their use as a food."
	Rayachhetry, M. B., Van, T. K., Center, T. D., & Elliott, M. L. (2001). Host range of Puccinia psidii, a potential biological control agent of Melaleuca quinquenervia in Florida. Biological Control, 22(1), 38-45	[Not affected by two isolates of Puccinia psidii] "The rust fungus Puccinia psidii infects the foliage and causes dieback of actively growing tips on several myrtaceous plants in South and Central America. It has recently been discovered in south Florida causing a similar disease on Melaleuca quinquenervia. We therefore evaluated P. psidii as a potential biological control agent of this invasive tree." … "The remaining seven species (Calyptranthes pallens, Eugenia confusa, Eugenia foetida, Eugenia uniflora, Feijoa sellowiana, Psidium cattleianum, and S. jambos) exhibited no symptoms and were considered immune to both isolates."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Leaves decoction astringent, febrifuge, bitter tonic, for dysentery, chest colds, coughs, bronchitis, influenza." [No evidence]
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed 4 Feb 2020]	"The seeds are extremely resinous and should not be eaten. Diarrhea has occurred in dogs that have been fed the whole fruits by children. The strong, spicy emanation from bushes being pruned irritates the respiratory passages of sensitive persons." [No evidence of specific cases reported]

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[No evidence. Not listed among impacts] "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)."

409	Is a shade tolerant plant at some stage of its life cycle	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"Pitanga thrives in full sun or partial shade and requires moderate rainfall and is drought tolerant as it has a deep root system."
	Duarte, O., & Paull, R. (2015). Exotic fruits and nuts of the New World. CABI, Wallingford, UK	"The plant grows better under full sun and apparently there is not much photoperiodic influence."
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed 4 Feb 2020]	"The plant revels in full sun."

410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y**
	Source(s)	**Notes**
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"It is adaptable on a wide range of soil types – sand, sandy loam, stiff clay, soft limestone but is intolerant of saline soil and can withstand waterlogged conditions."
	Duarte, O., & Paull, R. (2015). Exotic fruits and nuts of the New World. CABI, Wallingford, UK	"Pitanga is well adapted to most soil types including heavy clay, soft limestone, sand and sandy loam. It does better if the soils are well drained, although it can stand waterlogging for some time. It does not tolerate saline soils or waters."

411	**Climbing or smothering growth habit**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Shrubs 2-3 m tall"

412	**Forms dense thickets**	**y**
	Source(s)	**Notes**
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed 3 Feb 2020]	"It grows wild in thickets on the banks of the Pilcomayo River in Paraguay."
	Oppenheimer, Hank L. 2003. New plant records from Maui and Hawai'i Counties. Bishop Museum Occasional Papers. 73: 3-30	"It has been recently observed to be forming locally dense thickets at Halawa Valley, Moloka'i."
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"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)."

Qsn #	Question	Answer
501	**Aquatic**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Terrestrial] "Shrubs 2-3 m tall ... naturalized in low elevation mesic sites, especially valley floors"

502	**Grass**	**n**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 4 Feb 2020]	Family: Myrtaceae Subfamily: Myrtoideae Tribe: Myrteae

503	**Nitrogen fixing woody plant**	**n**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 4 Feb 2020]	Family: Myrtaceae Subfamily: Myrtoideae Tribe: Myrteae

504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Shrubs 2-3 m tall"

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	[No evidence] "Pitanga is indigenous to the Amazon rainforest in south America. The plant is native from Surinam, Guyana and French Guiana to eastern and southern Brazil and to northern, eastern and central Uruguay. It is naturalized in Argentina, Venezuela and Colombia, along the Atlantic coast of Central America, in the Caribbean islands and also in Florida. It is cultivated in all tropical and subtropical regions as fruit and ornamental tree. It has become invasive in Bermuda and some parts of Australia."

602	**Produces viable seed**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed 4 Feb 2020]	"Seeds are the usual means of propagation. They remain viable for not much longer than a month and germinate in 3 to 4 weeks. Volunteer seedlings can be taken up and successfully transplanted. Layering has been successful in India. The seedlings can be topworked to superior selections by side- or cleft-grafting but they tend to sucker below the graft."
	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	"Surinam-cherry is usually propagated by seeds or cuttings; selected cultivars are grafted."

603	Hybridizes naturally	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	y
	Source(s)	**Notes**
	Silva, A. L. G. D., & Pinheiro, M. C. B. (2009). Reproductive success of four species of Eugenia L. (Myrtaceae). Acta Botanica Brasilica, 23(2), 526-534	"An assessment of the breeding systems showed that only E. uniflora and E. punicifolia are self-compatible."

605	Requires specialist pollinators	n
	Source(s)	**Notes**
	Silva, A. L. G. D., & Pinheiro, M. C. B. (2009). Reproductive success of four species of Eugenia L. (Myrtaceae). Acta Botanica Brasilica, 23(2), 526-534	"Eugenia uniflora, E. punicifolia, E. neonitida and E. rotundifolia have hermaphrodite, polystemonous, Papaver-type pollen-flowers and generalist characteristics. They are visited by a range of insects, including species of Hymenoptera, Coleoptera and Diptera. Considering the foraging behavior and intra flower movements of the visiting insects, bees are the main pollinators of these plants and of these Apis mellifera L. is the most frequent and abundant pollinator (Silva & Pinheiro 2007)."

606	Reproduction by vegetative fragmentation	
	Source(s)	**Notes**
	Duarte, O., & Paull, R. (2015). Exotic fruits and nuts of the New World. CABI, Wallingford, UK	[May spread by suckers, but suckering may be infrequent in naturally occurring populations] "Cuttings and suckers can be rooted and air layering is also successful (Vargas et al., 1999). Veneer or cleft grafting onto pitanga seedlings has also been used, as well as patch budding (Villachica et al., 1996)."

607	Minimum generative time (years)	2
	Source(s)	**Notes**
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed 4 Feb 2020]	"Surinam cherry seedlings grow slowly; some begin to fruit when 2 years old; some may delay fruiting for 5 or 6 years, or even 10 if in unfavorable situations."

Qsn #	Question	Answer
701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	**n**
	Source(s)	**Notes**
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"The edible fruits are consumed by frugivorous birds and small mammals, dispersing the seeds (Blendinger and Villegas, 2011; Colussi and Prestes, 2011; State of Queensland, 2014). Seeds are short-lived and usually germinate within 3– 4 weeks (Salgueiro et al., 2004)." [Seeds may be discarded, and dispersed accidentally, after humans consume the pulp, but otherwise lack means of external attachment]

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	"In Hawaii, Surinam-cherry is common as a hedge plant, particularly around older homes, schools, and other buildings. It is also grown as a shade tree, especially in Chinese- or Japanese-style gardens, where its trunk and branching patter are highly esteemed, and as a container plant or bonsai."
	Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants. Volume 3, Fruits. Springer, New York	"It is cultivated in all tropical and subtropical regions as fruit and ornamental tree."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to Brazil, now widely cultivated; in Hawai'i cultivated on Midway Atoll and all of the main islands except Ni'ihau and Kaho'olawe"

703	**Propagules likely to disperse as a produce contaminant**	
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 4 Feb 2020]	"Weed: potential seed contaminant" [Possibly. Seeds relatively large, and probably rarely dispersed as a contaminant]

704	**Propagules adapted to wind dispersal**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Fruit red, subglobose, conspicuously longitudinally 8-ribbed, 1-2 cm long, pericarp fleshy, 2-3 mm thick. Seed 1, subglobose, 8-15 mm in diameter, seed coat loosely coherent to pericarp and cotyledons, the latter connate." [Fleshy-fruited and vertebrate dispersed]

705	**Propagules water dispersed**	**n**
	Source(s)	**Notes**
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"The edible fruits are consumed by frugivorous birds and small mammals, dispersing the seeds (Blendinger and Villegas, 2011; Colussi and Prestes, 2011; State of Queensland, 2014)."

Qsn #	Question	Answer
706	**Propagules bird dispersed**	**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	"Fruits are berries, orange-red to dark red when ripe, globose, with eight conspicuous ribs, 10– 20 mm in diameter. Seeds one to two per fruit (Langeland and Craddock Burks, 1998; FOC, 2014). … "The edible fruits are consumed by frugivorous birds and small mammals, dispersing the seeds (Blendinger and Villegas, 2011; Colussi and Prestes, 2011; State of Queensland, 2014)."

707	**Propagules dispersed by other animals (externally)**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Fruit red, subglobose, conspicuously longitudinally 8-ribbed, 1-2 cm long, pericarp fleshy, 2-3 mm thick. Seed 1, subglobose, 8-15 mm in diameter, seed coat loosely coherent to pericarp and cotyledons, the latter connate." [No means of external attachment]

708	**Propagules survive passage through the gut**	**y**
	Source(s)	**Notes**
	Duarte, O., & Paull, R. (2015). Exotic fruits and nuts of the New World. CABI, Wallingford, UK	"Birds and mammals disperse the seeds."
	Oppenheimer, Hank L. 2003. New plant records from Maui and Hawai'i Counties. Bishop Museum Occasional Papers. 73: 3-30	"Humans, feral pigs, and stray cattle have been spreading the fruit and seed, and plants are not uncommon in areas within, and adjacent to, the area."

801	**Prolific seed production (>1000/m2)**	**n**
	Source(s)	**Notes**
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed 4 Feb 2020]	[Relatively large, few-seeded fruit] "The 7- to 8-ribbed fruit, oblate, 3/4 to 1 1/2 in (2-4 cm) wide, turns from green to orange as it develops and, when mature, bright-red to deep-scarlet or dark, purplish maroon ("black") when fully ripe. The skin is thin, the flesh orange-red, melting and very juicy; acid to sweet, with a touch of resin and slight bitterness. There may be 1 fairly large, round seed or 2 or 3 smaller seeds each with a flattened side, more or less attached to the flesh by a few slender fibers."

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**n**
	Source(s)	**Notes**
	Duarte, O., & Paull, R. (2015). Exotic fruits and nuts of the New World. CABI, Wallingford, UK	"Seeds are recalcitrant and will remain viable for a month or less depending on the rate of dehydration; they will not germinate when their moisture content drops below 18% (Villachica et al., 1996)."
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed 4 Feb 2020]	"Seeds are the usual means of propagation. They remain viable for not much longer than a month and germinate in 3 to 4 weeks."

Qsn #	Question	Answer
803	**Well controlled by herbicides**	**y**
	Source(s)	**Notes**
	Enloe, S. F., Langeland, K., Ferrell, J., Sellers, B. and MacDonald, G. (2018). Integrated Management of Non-Native Plants in Natural Areas of Florida. SP 242. Revised. University of Florida, IFAS, Gainesville, FL	"Basal bark: for plants up to 0.5-inch diameter, 10% Garlon 4. Cut stump: 50% Garlon 3A or 10% Garlon 4. Seedlings should be hand pulled."
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Seedlings and saplings may be hand-pulled or dug out. For chemical control treating cut stumps with glyphosate-based herbicides or basal bark applications is efficient."

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y**
	Source(s)	**Notes**
	Duarte, O., & Paull, R. (2015). Exotic fruits and nuts of the New World. CABI, Wallingford, UK	"To reduce the time to reach fruit production, the plants should not be pruned until production begins. When used as a hedge the plant is pruned like a wall, leaving foliage from the ground level to the top. Early topping induces low branching and this is continued until the hedge fills; afterwards periodic light pruning is performed to keep the hedge height and width. As a garden specimen the plant can be pruned as a tree leaving four to five limbs with a single trunk or pruned as a bush with multiple stems (Crane, 2008)."
	Morton, J. (1987). Surinam Cherry. p. 386–388. In: Fruits of warm climates. Julia F. Morton, Miami, FL. https://www.hort.purdue.edu. [Accessed 4 Feb 2020]	[Tolerates severe pruning] "They are most productive if unpruned, but still produce a great many fruits when close-clipped in hedges. "

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	Frohlich, D. & Lau, A. 2010. New plant records from Oʻahu for 2008. Bishop Museum Occasional Papers 107: 3-18	[Limiting factors, if any, apparently not preventing naturalization on all main Hawaiian Islands] "Eugenia uniflora, or Surinam cherry, has been collected as naturalized on Kauaʻi, Molokaʻi, Maui (Wagner et al. 1999), Lānaʻi (Starr et al. 2010), and now on Oʻahu."
	Rayachhetry, M. B., Van, T. K., Center, T. D., & Elliott, M. L. (2001). Host range of Puccinia psidii, a potential biological control agent of Melaleuca quinquenervia in Florida. Biological Control, 22(1), 38-45	[Not affected by two isolates of Puccinia psidii] "The rust fungus Puccinia psidii infects the foliage and causes dieback of actively growing tips on several myrtaceous plants in South and Central America. It has recently been discovered in south Florida causing a similar disease on Melaleuca quinquenervia. We therefore evaluated P. psidii as a potential biological control agent of this invasive tree." … "The remaining seven species (Calyptranthes pallens, Eugenia confusa, Eugenia foetida, Eugenia uniflora, Feijoa sellowiana, Psidium cattleianum, and S. jambos) exhibited no symptoms and were considered immune to both isolates."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Elevation range exceeds 1000 m, demonstrating environmental versatility
• Thrives in tropical climates
• Naturalized on Kauai, Oahu, Molokai, Maui, Lanai and probably Hawaii Island; also naturalized Australia, South Africa, the continental US (Florida) and the West Indies
• An environmental weed in Australia and Florida, reported to form dense stands that reduce native biodiversity
• Host of fruit flies, as well as other fungal pathogens of Myrtaceae Tolerates many soil types (potential to spread not limited by substrate)
• May form thickets within native and introduced range
• Reproduces by seeds, and possibly by suckering
• Self-compatible
• Reaches maturity in as little as two years (although may take longer)
• Seeds dispersed by birds, pigs, other fruit eating animals and intentionally by people
• Tolerates repeated and severe pruning

Low Risk Traits
• Naturalized in the Hawaiian Islands, but no reports to date of impacts to native ecosystems
• Unarmed (no spines, thorns, or burrs)
• Non-toxic
• Palatable to browsing animal and may provide fodder for livestock
• Edible fruit
• Thrives in full sun to partial shade (dense shade may limit spread)
• Seeds lose viability quickly and will not form a persistent seed bank
• Herbicides can provide effective control if needed