

Taxon: Bougainvillea spectabilis Willd.	Family: Nyctaginaceae
Common Name(s): bougainvillea great bougainvillea paper flower purple bougainvillea	Synonym(s): Bougainvillea bracteata Pers. Bougainvillea brasiliensis Raeusch. Bougainvillea speciosa Schnizl. Bougainvillea virescens Choisy

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 2 Jun 2021
WRA Score: 2.0	Designation: L(Hawai'i)	Rating: Low Risk

Keywords: Shrubby Climber, Naturalized Elsewhere, Thorny, Rarely Seeds, Spreads Vegetatively

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)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed		
305	Congeneric weed		
401	Produces spines, thorns or burrs	y=1, n=0	y
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals		
406	Host for recognized pests and pathogens	y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n
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	y
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed		
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
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	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)	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. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	[Not domesticated] "B. spectabilis is native to South America from Brazil to Peru and to Southern Argentina (Chubut Province). It has been introduced pantropically and is a popular ornamental plant in the warm areas of Asia, Southeast Asia, Australia, the Pacific Islands, the Mediterranean region, the Caribbean, Mexico, South Africa and the United States in Arizona, California, Florida, Hawaii and Southern Texas."
	CABI. (2021). <i>Bougainvillea spectabilis</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Sterile varieties exist which reduce risk of spread] "Cultivated varieties with multi-whorl bracts are sterile and do not develop any reproductive organs, i.e., perianth, pistil and stamens (Xu et al., 2009)."

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. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	"B. spectabilis is native to South America from Brazil to Peru and to Southern Argentina (Chubut Province)."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 28 May 2021]	"Native Southern America BRAZIL: Brazil"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 28 May 2021]	

203	Broad climate suitability (environmental versatility)	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	"All Bougainvillea species do well in warm to hot climates and are frost sensitive. It does best in areas with night temperature of 18–20 °C and day temperatures of 24–32 °C. It can tolerate temperatures above 37 °C and will grow in areas with more than 600 mm rainfall per annum. Bougainvilleas perform best in a well-drained, fertile, light, acidic soil with pH 5.5–6.in a sunny position. It abhors water-logged conditions. Although drought tolerant, they need plenty of moisture during the flowering season."
	Dave's Garden. (2021). Bougainvillea spectabilis. https://davesgarden.com/guides/pf/go/183/ . [Accessed 1 Jun 2021]	"Hardiness: USDA Zone 10a: to -1.1 °C (30 °F) USDA Zone 10b: to 1.7 °C (35 °F) USDA Zone 11: above 4.5 °C (40 °F)"
	Wu, Z.Y., Raven,P.H. & Hong, D.Y. (eds.). (2003). Flora of China. Vol. 5 (Ulmaceae through Basellaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"This species is used as an ornamental plant. It is adapted to climates with a distinct dry season and does not flower well in perpetually humid conditions."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	"B. spectabilis is native to South America from Brazil to Peru and to Southern Argentina (Chubut Province)."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	"B. spectabilis is native to South America from Brazil to Peru and to Southern Argentina (Chubut Province). It has been introduced pantropically and is a popular ornamental plant in the warm areas of Asia, Southeast Asia, Australia, the Pacific Islands, the Mediterranean region, the Caribbean, Mexico, South Africa and the United States in Arizona, California, Florida, Hawaii and Southern Texas."
	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 Brazil, B. spectabilis was formerly cultivated fairly abundantly in Hawai'i and appears to persist in older gardens and public plantings."

301	Naturalized beyond native range	y
	Source(s)	Notes
	CABI. (2021). Bougainvillea spectabilis. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Bougainvillea spectabilis is native to Brazil (Sá, 2015; USDA-ARS, 2018). It has been extensively introduced as an ornamental and hedge plant across tropical and warm temperate regions of the world. It can be found cultivated and naturalized across Asia, Africa, tropical America, the West Indies, the Mediterranean region, and on many islands in the Pacific and Indian Oceans (Randall, 2017; Flora of China, 2018; India Biodiversity, 2018; GRIIS, 2018; Missouri Botanical Garden, 2018; PIER, 2018; PROTA, 2018)."

Qsn #	Question	Answer
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	CABI. (2021). <i>Bougainvillea spectabilis</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[A potential environmental weed] " <i>Bougainvillea spectabilis</i> is an aggressive climbing vine or shrub growing >10 m high. Native to Brazil, this species has been extensively introduced into tropical, subtropical and warm temperate regions of the world. It is reported to be invasive on the Chilean island of Rapa Nui (Easter Island/Isla de Pasqua) and on Diego Garcia Island in the Indian Ocean. It is often planted as an ornamental and hedge plant in gardens, parks and along roadsides; it can support itself on other plants by means of thorns carried in the leaf axils. It reproduces sexually by seed and vegetatively by cuttings and stem fragments. Fruits are winged achenes, which can be easily dispersed by wind or water. Once established, <i>B. spectabilis</i> can climb trees or shrubs suffocating them and out-competing understorey plants."
	Dave's Garden. (2021). <i>Bougainvillea spectabilis</i> . https://davesgarden.com/guides/pf/go/183/ . [Accessed 1 Jun 2021]	[Can become a landscaping nuisance or hazard] "On Jan 21, 2003, Lavanda from Mcallen, TX (Zone 8a) wrote: When grown in tropical and subtropical climates, this plant can become huge, and developes long, sharp thorns. Care should be taken to site it where it will not be a danger to children or pets."

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

304	Environmental weed	
	Source(s)	Notes
	CABI. (2021). <i>Bougainvillea spectabilis</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	" <i>Bougainvillea spectabilis</i> is an aggressive climbing plant. It climbs over trees or shrubs suffocating them and out-competing native plant species in the understorey (Smith, 1991; McMullen, 1999; Fern, 2014; Oviedo Prieto and Gonzalez-Oliva, 2015; Randall, 2017; GRIIS, 2018; PIER, 2018)."
	Senterre, B. (2009) Invasion risk from climbing and creeping plant species in Seychelles. Consultancy report, Ministry of Environment-UNDP-GEF project	"Table 2. Invasiveness and concern ranking for the 56 listed invasive creepers." [<i>Bougainvillea spectabilis</i> - Concern = 1 (very low)]
	Smith, A.C. (1981). Flora Vitiensis Nova - A New Flora of Fiji (Spermatophytes Only). Volume 2. Pacific Tropical Botanical Garden, Lawai, HI	"The ornamental scrambling <i>Bougainvillea</i> with predominantly purplish bracts is often grown in gardens near sea level." [No evidence of invasive impacts, although cited in CABI Invasive Species Compendium]
	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	[Cultivated and persisting in Hawaii, but not reported as naturalized, and negative impacts not documented] "Native to Brazil, <i>B. spectabilis</i> was formerly cultivated fairly abundantly in Hawai'i and appears to persist in older gardens and public plantings."

Qsn #	Question	Answer
	Guézou, A., Trueman, M., Buddenhagen, C. E., Chamorro, S., Guerrero, A. M., Pozo, P., & Atkinson, R. (2010). An extensive alien plant inventory from the inhabited areas of Galapagos. PLoS One, 5(4), e10276	[In contrast to McMullen (1999) cited in CABI, this publication does not record <i>Bougainvillea spectabilis</i> as naturalized in Galapagos] "Table S1. Complete list of the alien vascular plant taxa encountered in the inhabited areas of Galapagos." [<i>Bougainvillea spectabilis</i> - Cu) Cultivated (introduced for cultivation, not naturalized)]
	Oviedo Prieto, R.& Gonzalez-Oliva, L. (2015). Lista nacional de plantas invasoras y potencialmente invasoras en la Republica de Cuba - 2015. Bissea 9 (numero especial 2): 1-88	Cited in CABI, but no negative impacts described in this publication
	Tropical Plants Database, Ken Fern. (2021). <i>Bougainvillea spectabilis</i> . http://tropical.theferns.info . [Accessed 1 Jun 2021]	This webpage, cited by CABI, does not report any evidence of naturalization or invasiveness
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Two references list <i>Bougainvillea spectabilis</i> as an environmental weed, but a subsequent search of the citations found no evidence of detrimental impacts.

305	Congeneric weed	
	Source(s)	Notes
	Brisbane City Council. (2021). Weed identification Tool - <i>Bougainvillea glabra</i> . https://weeds.brisbane.qld.gov.au/ . [Accessed 1 Jun 2021]	"A minor weed of riparian vegetation, open woodlands, coastal environs, old habitations and gardens, roadsides, railway lines, disturbed sites and waste areas." ... " <i>Bougainvillea</i> (<i>Bougainvillea glabra</i>) only reproduces vegetatively in Australia, either by suckering or layering (i.e. its stems produce roots when they come into contact with the soil). Plants spread laterally over time, eventually forming large and dense thickets. They also become established in bushland after being dispersed in dumped garden waste."

401	Produces spines, thorns or burrs	y
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	"A woody, evergreen rambling vine; stems and branches pubescent with stout, recurved spines."
	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	"Stems and lvs densely villous-hairy; thorns stout, to 1.5" long."

402	Allelopathic	
	Source(s)	Notes
	Morikawa, C. I. O., Miyaura, R., Tapia Y Figueroa, M. D. L., Rengifo Salgado, E. L., & Fujii, Y. (2012). Screening of 170 Peruvian plant species for allelopathic activity by using the Sandwich Method. Weed Biology and Management, 12 (1): 1-11	"Table 2. Allelopathic activity of the 176 samples (170 species) of Peruvian plants by the Sandwich Method" [<i>Bougainvillea spectabilis</i> inhibition of the radicle of lettuce (<i>Lactuca sativa</i>) seedlings was not statistically significant in this study]

Qsn #	Question	Answer
	Ali, K. W., Shinwari, M. I., & Khan, S. (2019). Screening of 196 medicinal plant species leaf litter for allelopathic potential. <i>Pak. J. Bot</i> , 51(6), 2169-2177	[Inhibition from <i>Bougainvillea spectabilis</i> was not significant in this study] "The taxonomic richness of medicinal plants in Pakistan can foster reasonable economic contributions through medicinal, industrial and environmental applications. The current study aims to explore allelopathic effect of medicinal plants on the germination and seedling growth of lettuce using sandwich method. In total 196 plant species had been tested using sandwich method to assess allelopathic effect of leaves leachates of different plants on <i>Lactuca sativa</i> L. (lettuce) seeds. The results of this study identified 4 plants having strong inhibitory effect, 14 plants with medium inhibitory and 13 plants of low inhibitory effect on the lettuce seeds. <i>Boerhavia procumbens</i> exhibited the strongest inhibitory allelopathic effect and <i>Viburnum grandiflorum</i> showed strong stimulatory effect on the growth of lettuce seeds. The diversified allelopathic effects of plants have the potential to improve weed management, sustainable agriculture, food production as well as medicinal, industrial and environmental applications."
	Pawar, K. B., & Rawal, A. V. (2016). Allelopathic potential of bract leachates of <i>Bougainvillea spectabilis</i> against <i>Cosmos bipinnatus</i> and <i>Ipomoea marginata</i> . <i>Tunisian Journal of Plant Protection</i> , 11(1), 13-23	[Leachates of both red and white bracts inhibit seed germination]"Abstract : <i>Bougainvillea spectabilis</i> is a common ornamental plant. It is planted in home gardens, for fencing purpose and along road sides. There is frequent shedding of floral bracts of this plant. An attempt has been made to study the influence of leachates of both red and white bracts on seed germination, seedling growth and pigment content of common flowering plant <i>Cosmos bipinnatus</i> . In Petri plate bioassays, complete inhibition of seed germination and seedling growth with respect to root and shoot lengths, was observed due to leachate (20%) of both red and white bracts. In soil bioassays, seed germination and seedling growth of <i>C. bipinnatus</i> were also reduced due to leachate (diluted at 2%) of red and white bracts. Leachate from white bracts caused more inhibitory effects than red ones. Thus, the influence of leachate of white bract was also assessed for its effect on germination and seedling growth of bindweed <i>Ipomoea marginata</i> . Seed germination and seedling growth, as estimated by root and shoot lengths, were reduced due to leachate of white bracts (20%) in both Petri plate and soil bioassays. Pigment content in both <i>C. bipinnatus</i> and <i>I. marginata</i> had increased due to treatments based on leachates of red and white bracts. This study has been continued to carry out phytochemical analysis of leachates to find out which compounds are responsible for such alterations and whether these compounds can be exploited for the management of weeds. Inhibition in germination potential and seedling growth of both <i>C. bipinnatus</i> and <i>I. marginata</i> may be due to synergistic effect of phytochemicals present in leachates of red and white bracts of <i>B. spectabilis</i> ."

403	Parasitic	n
	Source(s)	Notes
	Lim, T.K. (2014). <i>Edible Medicinal And Non-Medicinal Plants</i> . Volume 8, Flowers. Springer, Dordrecht	"A woody, evergreen rambling vine; stems and branches pubescent with stout, recurved spines." [Nyctaginaceae. No evidence]

404	Unpalatable to grazing animals	
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Qsn #	Question	Answer
	Source(s)	Notes
	Dave's Garden. (2021). <i>Bougainvillea spectabilis</i> . https://davesgarden.com/guides/pf/go/183/ . [Accessed 2 Jun 2021]	"This plant is resistant to deer" [Reported to be deer-resistant by this and a number of other horticultural and gardening websites. Suggests plants may be unpalatable, although spines, rather than chemicals in foliage, may be factor that deters browsing]
	Lim, T.K. (2014). <i>Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers</i> . Springer, Dordrecht	[Bracts palatable to humans] "Floral bracts are edible and used in salad and drinks (Kaisoon et al. 2011 ; King 2007)."

405	Toxic to animals	
	Source(s)	Notes
	The Nest. (2021). Is <i>Bougainvillea</i> Poisonous to Dogs? https://pets.thenest.com/spider-plants-hurt-cats-9771.html . [Accessed 2 Jun 2021]	[Generic description. Possibly mildly toxic] " <i>Bougainvillea</i> is classified as mildly toxic to dogs. This means that a dog may or may not experience side effects from eating <i>bougainvillea</i> . The most common side effect of a dog eating <i>bougainvillea</i> are gastrointestinal symptoms including nausea, vomiting or diarrhea. Call a veterinarian if your dog experiences ill effects after eating any plant."
	EveryThingWhat.com (2021). Is <i>Bougainvillea</i> poisonous to humans? https://everythingwhat.com/is-bougainvillea-poisonous-to-humans . [Accessed 2 Jun 2021]	[Generic description. Potentially toxic if ingested] "The sap of the <i>bougainvillea</i> plant is only mildly toxic, but if ingested in large enough quantities, it can lead to illness. <i>Bougainvillea</i> 's leaves are not toxic, but a prick from the plant's sharp thorns can lead to dermatitis, a skin rash typically caused by an allergic reaction."
	Quattrocchi, U. (2012). <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	[No evidence. Used medicinally] "(Used in Sidha. Antiviral, antiinflammatory, antidiabetic, helpful in non-insulin diabetes. Roots boiled to make strength medicine; a decoction of dried stems for hepatitis. Leaves antiinflammatory, expectorant, laxative, hypoglycemic, antimicrobial, febrifuge, for diarrhea, diabetes, cough, sore throat and to reduce stomach acidity; leaves boiled in water and taken as laxative.)"

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	NC State Extension. (2021). <i>Bougainvillea</i> . https://plants.ces.ncsu.edu/plants/bougainvillea/ . [Accessed 2 Jun 2021]	"Insects, Diseases, and Other Plant Problems: Aphids are occasional problems."
	Gilman, E. F. (1999). <i>Bougainvillea</i> spp. Fact Sheet FPS-70. University of Florida IFAS Extension. http://edis.ifas.ufl.edu . [Accessed 2 Jun 2021]	"No pests or diseases are of major concern but occasionally leaf-chewing worms or aphids."

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	Lim, T.K. (2014). <i>Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers</i> . Springer, Dordrecht	"Floral bracts are edible and used in salad and drinks (Kaisoon et al. 2011 ; King 2007)."
	EveryThingWhat.com (2021). Is <i>Bougainvillea</i> poisonous to humans? https://everythingwhat.com/is-bougainvillea-poisonous-to-humans . [Accessed 2 Jun 2021]	[Generic description. Potentially toxic if ingested] "The sap of the <i>bougainvillea</i> plant is only mildly toxic, but if ingested in large enough quantities, it can lead to illness. <i>Bougainvillea</i> 's leaves are not toxic, but a prick from the plant's sharp thorns can lead to dermatitis, a skin rash typically caused by an allergic reaction."

Qsn #	Question	Answer
	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. Used medicinally] "(Used in Sidha. Antiviral, antiinflammatory, antidiabetic, helpful in non-insulin diabetes. Roots boiled to make strength medicine; a decoction of dried stems for hepatitis. Leaves antiinflammatory, expectorant, laxative, hypoglycemic, antimicrobial, febrifuge, for diarrhea, diabetes, cough, sore throat and to reduce stomach acidity; leaves boiled in water and taken as laxative.)"

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Anaheim Fire & Rescue. (2018). Recommended Acceptable Fire Resistive Plant Species. https://www.anaheim.net/ . [Accessed 2 Jun 2021]	"This plant list was created by various State of California Agencies. Although the plant list was designed specifically for landscape fuel modification zones, the species identified on the list are also a good choice for ornamental vegetation for use around your home in areas subjected to the effects of wildfires." [PLANT SPECIES RECOMMENDED FOR WILDFIRE IN HIGH FIRE POTENTIAL AREAS - Includes <i>Bougainvillea spectabilis</i>]

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Gilman, E. F. (1999). <i>Bougainvillea</i> spp. Fact Sheet FPS-70. University of Florida IFAS Extension. http://edis.ifas.ufl.edu . [Accessed 2 Jun 2021]	"Light requirement: plant grows in full sun"
	NC State Extension. (2021). <i>Bougainvillea</i> . https://plants.ces.ncsu.edu/plants/bougainvillea/ . [Accessed 2 Jun 2021]	"Plant them in full sun in sandy or loamy acidic soils with good drainage."
	Dave's Garden. (2021). <i>Bougainvillea spectabilis</i> . https://davesgarden.com/guides/pf/go/183/ . [Accessed 2 Jun 2021]	"Sun Exposure: Full Sun"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	PlantFileonline. (2021). <i>Bougainvillea spectabilis</i> . https://plantfileonline.net/plants/plant_profile_report/NTM%3D . [Accessed 2 Jun 2021]	"Natural Soil - Well drained fertile moist sandy to clay loams, tolerates most soil types"
	Dave's Garden. (2021). <i>Bougainvillea spectabilis</i> . https://davesgarden.com/guides/pf/go/183/ . [Accessed 2 Jun 2021]	"Soil pH requirements: 5.6 to 6.0 (acidic) 6.1 to 6.5 (mildly acidic)"
	NC State Extension. (2021). <i>Bougainvillea</i> . https://plants.ces.ncsu.edu/plants/bougainvillea/ . [Accessed 2 Jun 2021]	"Soil Texture: Loam (Silt) Sand Soil pH: Acid (<6.0)"

411	Climbing or smothering growth habit	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	"A woody, evergreen rambling vine; stems and branches pubescent with stout, recurved spines."
412	Forms dense thickets	n
	Source(s)	Notes
	CABI. (2021). <i>Bougainvillea spectabilis</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"Once established, <i>B. spectabilis</i> can climb trees or shrubs suffocating them and out-competing understorey plants."
501	Aquatic	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	[Terrestrial] "A woody, evergreen rambling vine; stems and branches pubescent with stout, recurved spines."
502	Grass	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 1 Jun 2021]	"Family: Nyctaginaceae Tribe: Bougainvilleeae"
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 1 Jun 2021]	"Family: Nyctaginaceae Tribe: Bougainvilleeae"
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	"A woody, evergreen rambling vine; stems and branches pubescent with stout, recurved spines."
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes

Qsn #	Question	Answer
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	[No evidence] "B. spectabilis is native to South America from Brazil to Peru and to Southern Argentina (Chubut Province). It has been introduced pantropically and is a popular ornamental plant in the warm areas of Asia, Southeast Asia, Australia, the Pacific Islands, the Mediterranean region, the Caribbean, Mexico, South Africa and the United States in Arizona, California, Florida, Hawaii and Southern Texas."

602	Produces viable seed	
	Source(s)	Notes
	CABI. (2021). <i>Bougainvillea spectabilis</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	" <i>Bougainvillea spectabilis</i> spreads by seed. The fruits are dispersed by means of the wing-like bracts to which they are attached (McMullen, 1999). In cultivation, it is often propagated from stem fragments and root cuttings (Gilman, 1999)."
	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	"Seed is almost never produce in Hawaii, and seed propagation is practiced only by serious bougainvillea breeders."
	WRA Specialist. (2021). Personal Communication	Seeds rarely, if ever, produced in the Hawaiian Islands. Lack of reported naturalization despite common cultivation of this and other species likely attributed to absence of seed production.

603	Hybridizes naturally	
	Source(s)	Notes
	Jianyong, Y., & Singh, S. (2019). Migration of <i>Bougainvillea</i> and its domestication: A study. <i>The Journal of the Greens and Gardens</i> , 2(2-3), 6-12	[Possibly. Natural hybrids reported in genus] "Initially two species, namely <i>Bougainvillea spectabilis</i> and <i>B. glabra</i> were introduced in the early 19th century from place of origin to Europe. Contemporary to this, there was another important event took place in the history of <i>Bougainvillea</i> . The discovery of crimson <i>Bougainvillea</i> in Cartagea, a Spanish port in the Mediterranean by Mrs. R.V. Butt was another landmark (Anonymous, 1923). It was thought to be a distinct species but later found to be natural hybrid between <i>B. glabra</i> and <i>B. peruviana</i> . That was named after Mrs. R.V. Butt as 'Mrs. Butt'. Thereafter, occurrence of natural hybrids all over world was common. The main basal true species when grown together yielded many hybrids spontaneously in East Africa, Canary Island, Australia, North America, Philippines and India (Iredell. 1990)."

604	Self-compatible or apomictic	n
	Source(s)	Notes
	Nores, M., López, H., Anton, A., & Rudall, P. (2015). Contrasting models of the female reproductive tract in four o'clocks (Nyctaginaceae). <i>American Journal of Botany</i> , 102(7), 1026-1039	"Moreover, <i>Bougainvillea</i> and <i>Pisonia</i> include incompatible or dioecious species, compared with mostly self-compatible systems in other Nyctaginaceae."
	Fryxell, P. (1957). Mode of Reproduction of Higher Plants. <i>Botanical Review</i> , 23(3): 135-233	"VI. Tabulation of Modes of Reproduction" [<i>Bougainvillea spectabilis</i> - Comments - Self-incompatible]

605	Requires specialist pollinators	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Aranda, R., Catian, G., Bogiani, P. A., & Inforzato, I. (2011). Effect of nectar pillaging by native stingless bees (Hymenoptera: Apidae) in the abscission of flowers of <i>Bougainvillea spectabilis</i> Willd. (Nyctaginaceae). <i>Acta Scientiarum. Biological Sciences</i> , 33(4), 399-405	" <i>Bougainvillea spectabilis</i> Willd. is a woody bush, native to the Northeast of Brazil, cultivated as an ornamental plant worldwide (Lorenzi; Souza, 2001), presents small flowers of cream color surrounded by bracts, can reach, when adult, 5 to 10 meters in length, has a reproductive cycle at the end of the dry station and is pollinated by night moths, but the availability of nectar in its nectar ducts during the day propitiates a rich alimentary source for other insects (Kobayashi et al., 2007)."
	CABI. (2021). <i>Bougainvillea spectabilis</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	"Flowers of <i>Bougainvillea spectabilis</i> are hermaphroditic. In Brazil, <i>B. spectabilis</i> is reported to be pollinated by night moths, but across tropical areas bees, flies and butterflies are also common visitors (Aranda et al., 2011; Nores et al., 2013). Cultivated varieties with multi-whorl bracts are sterile and do not develop any reproductive organs, i.e., perianth, pistil and stamens (Xu et al., 2009)."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	CABI. (2021). <i>Bougainvillea spectabilis</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	"It reproduces sexually by seed and vegetatively by cuttings and stem fragments."

607	Minimum generative time (years)	2
	Source(s)	Notes
	CABI. (2021). <i>Bougainvillea spectabilis</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	" <i>Bougainvillea spectabilis</i> is a long-lived perennial plant. In cultivation plants apparently start flowering 1 to 3 years after planting (Acevedo-Rodríguez, 2005; Fern, 2014; PROTA, 2018)."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	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	"Seed is almost never produce in Hawaii, and seed propagation is practiced only by serious bougainvillea breeders."
	CABI. (2021). <i>Bougainvillea spectabilis</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. www.cabi.org/isc	"[Seeds, if produced, are wind dispersed] " <i>Bougainvillea spectabilis</i> spreads by seed. The fruits are dispersed by means of the wing-like bracts to which they are attached (McMullen, 1999). In cultivation, it is often propagated from stem fragments and root cuttings (Gilman, 1999)."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes

Qsn #	Question	Answer
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	"It has been introduced pantropically and is a popular ornamental plant in the warm areas of Asia, Southeast Asia, Australia, the Pacific Islands, the Mediterranean region, the Caribbean, Mexico, South Africa and the United States in Arizona, California, Florida, Hawaii and Southern Texas."
	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 Brazil, <i>B. spectabilis</i> was formerly cultivated fairly abundantly in Hawai'i and appears to persist in older gardens and public plantings."

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	"Seed is almost never produce in Hawaii, and seed propagation is practiced only by serious bougainvillea breeders." [Wind-dispersed seeds rarely dispersed, and unlikely to become a produce contaminant]

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	CABI. (2021). <i>Bougainvillea spectabilis</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	" <i>Bougainvillea spectabilis</i> spreads by seed. The fruits are dispersed by means of the wing-like bracts to which they are attached (McMullen, 1999). In cultivation, it is often propagated from stem fragments and root cuttings (Gilman, 1999)."
	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	"Seed is almost never produce in Hawaii, and seed propagation is practiced only by serious bougainvillea breeders."

705	Propagules water dispersed	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	"Seed is almost never produce in Hawaii, and seed propagation is practiced only by serious bougainvillea breeders." [Wind-dispersed seeds rarely produced in Hawaii]

706	Propagules bird dispersed	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	"Seed is almost never produce in Hawaii, and seed propagation is practiced only by serious bougainvillea breeders." [Wind-dispersed seeds rarely produced in Hawaii]

707	Propagules dispersed by other animals (externally)	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	"Seed is almost never produce in Hawaii, and seed propagation is practiced only by serious bougainvillea breeders." [Wind-dispersed seeds rarely produced in Hawaii]

Qsn #	Question	Answer
708	Propagules survive passage through the gut	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	"Seed is almost never produce in Hawaii, and seed propagation is practiced only by serious bougainvillea breeders." [Wind-dispersed seeds rarely produced in Hawaii]

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	CABI. (2021). <i>Bougainvillea spectabilis</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	" <i>Bougainvillea spectabilis</i> spreads by seed. The fruits are dispersed by means of the wing-like bracts to which they are attached (McMullen, 1999). In cultivation, it is often propagated from stem fragments and root cuttings (Gilman, 1999)."
	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	"Seed is almost never produce in Hawaii, and seed propagation is practiced only by serious bougainvillea breeders."

802	Evidence that a persistent propagule bank is formed (>1 yr)	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	"Seed is almost never produce in Hawaii, and seed propagation is practiced only by serious bougainvillea breeders." [Unknown, but seed bank would be absent in the Hawaiian Islands]
	Royal Botanic Gardens Kew. (2021) Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/ . [Accessed 2 Jun 2021]	"Storage Behaviour: No data available for species or genus. Of 23 known taxa of family NYCTAGINACEAE, 100.00% Orthodox(p/?)"

803	Well controlled by herbicides	y
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Lewis, M. (2021). How to Remove a Bougainvillea. https://homeguides.sfgate.com/remove-bougainvillea-30368.html. [Accessed 2 Jun 2021]</p>	<p>"1. Cut your bougainvillea down, leaving stumps that stand 2 to 3 inches above ground. Start near the top and work your way down the vine, discarding branches onto a tarp or wheel barrel for easy collection. As you get closer to the base of the plant, you will probably need loppers or a pruning saw. Ideally, do this cutting during active growth, typically in the spring, summer and fall months.</p> <p>2. Apply a post-emergent herbicide directly on the cut stumps. The stumps must be freshly cut -- within 5 to 10 minutes -- for the herbicide to be effective. Choose a ready-to-use herbicide, such as an 8 to 10 percent concentrate of triclopyr or glyphosate, available at most garden centers. Herbicides labeled as brush killers that contain glyphosate also work well. Paint the herbicide directly on the stumps with a paintbrush, being careful not to touch nearby growth of desirable plants.</p> <p>3. Reapply the herbicide if the bougainvillea resprouts. Wait until the leaves of the new growth grow to full size, then spray the same herbicide you used on the stumps directly onto the leaves. You can also recut the stumps and paint on another application of the herbicide when new growth occurs. You know your bougainvillea is dead if it does not put forth new growth the next growing season."</p>
	<p>SWCA Environmental Consultants. (2011). Highway Manual for Sustainable Landscape Maintenance. State of Hawaii Department of Transportation Highways Division, Honolulu, Hawaii. http://www.hawaii.gov/dot. [Accessed 2 Jun 2021]</p>	<p>"Bougainvillea (<i>Bougainvillea spectabilis</i>) Apply glyphosate to cut stems. Repetition of treatment is likely necessary."</p>

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	<p>Lewis, M. (2021). How to Remove a Bougainvillea. https://homeguides.sfgate.com/remove-bougainvillea-30368.html. [Accessed 2 Jun 2021]</p>	<p>"The easiest way to remove a vine such as bougainvillea is to kill it first. Otherwise, you could deal with regrowth for years to come." [Tolerates and regrows after cutting unless treated with herbicides]</p>

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	<p>WRA Specialist. (2021). Personal Communication</p>	<p>Unknown</p>

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates.
- Reported to be naturalized, or persisting, in several introduced locations (but no evidence in the Hawaiian Islands)
- Reported to be aggressive and invasive where cultivated.
- Other species are invasive.
- Stems and branches pubescent with stout, recurved spines
- May have allelopathic properties.
- May be mildly toxic to animals and people if ingested.
- Tolerates many soil types.
- Climbing, smothering growth habit
- Reproduces by wind-dispersed seeds (but seeds rarely, or never, produced in the Hawaiian Islands)
- Able to spread vegetatively.
- Reaches maturity in 1-3 years.
- Able to resprout after cutting.

Low Risk Traits

- Reports of invasiveness have not been corroborated, and there are no reports of naturalization or invasiveness in the Hawaiian Islands, despite widespread cultivation.
- Self-incompatible
- Herbicides may be effective at provide control.

Second Screening Results for Vines

(A) Shade tolerant or known to form dense stands?> No. A climber requiring full sun.

(B) Reported as a weed of cultivated lands? No

Outcome = Accept (Low Risk)