Taxon: Bauhinia variegata **Family:** Fabaceae

Common Name(s): mountain ebony
orchidtree

Synonym(s): B. variegata var. alboflava de Wit
B. variegata var. candida Voigt
Bauhinia alba hort.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 8 Feb 2017

WRA Score: 8.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Environmental Weed, Ornamental, Fodder, Self-Compatible, Coppices

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		
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	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	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	n
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
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	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	n
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/m2)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	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**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"B. variegata is of great importance as a multipurpose tree, particularly as a source of fodder in rural economies. Its wood is used for agricultural implements and the bark for tanning. The tree is very handsome when in flower and is widely planted as an ornamental (Watt, 1972)." [No evidence of domestication]

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. 2017. 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**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"B. variegata is naturally found in the sub-Himalayan tract and outer hills and valleys from the river Indus in Pakistan eastwards to Assam and Myanmar, ascending to altitudes of 1500 to 1830 m (Troup, 1921; Luna, 1996)."
	Lim, T.K. 2014. Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"The plant is indigenous to southern China, the Indian sub-continent (i.e. Bhutan, India, Nepal and Pakistan) and Southeast Asia (i.e. Laos, Myanmar, Vietnam and Thailand)"

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	

Qsn #	Question	Answer
203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Climatic amplitude (estimates) - Altitude range: 0 - 1830 m - Mean annual rainfall: 500 - 2550 mm - Rainfall regime: summer; winter; bimodal - Dry season duration: 3 - 4 months - Mean annual temperature: 0 - 48ºC - Mean maximum temperature of hottest month: 30 - 42ºC - Mean minimum temperature of coldest month: 7 - 14ºC - Absolute minimum temperature: 0 - 17ºC" [Elevation range exceeds 1000 m, demonstrating environmental versatility]

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"B. variegata is naturally found in the sub-Himalayan tract and outer hills and valleys from the river Indus in Pakistan eastwards to Assam and Myanmar, ascending to altitudes of 1500 to 1830 m (Troup, 1921; Luna, 1996)."
	Lim, T.K. 2014. Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"The plant is indigenous to southern China, the Indian sub-continent (i.e. Bhutan, India, Nepal and Pakistan) and Southeast Asia (i.e. Laos, Myanmar, Vietnam and Thailand). It is now widely cultivated elsewhere in subtropical and tropical regions of the world. It has naturalized elsewhere in the tropics in Queensland and southern United States."

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 7, Flowers. Springer, Dordrecht	"It is now widely cultivated elsewhere in subtropical and tropical regions of the world. It has naturalized elsewhere in the tropics in Queensland and southern United States."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The tree is very handsome when in flower and is widely planted as an ornamental (Watt, 1972)."

301	**Naturalized beyond native range**	**y**
	Source(s)	**Notes**
	Vozzo, J.A. 2002. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	"A popular planting in Florida and Hawaii, the species has escaped and naturalized in the southern foothills of Puerto Rico and throughout the West Indies."

Qsn #	Question	Answer
	Langeland, K.A., Cherry, H.M., McCormick, C.M. & Craddock Burks, K.A. 2008. Identification & Biology of Non-Native Plants in Florida's Natural Areas. Second Edition. IFAS Publications, Gainesville, FL	"Ecological Significance: Introduced into Florida before 1900 (Ledin 1956). Noted as a common escape, abundantly invading disturbed areas in particular (Morton 1976). Noted as occasional across south Florida (Lakela and Wunderlin 1980, Tomlinson 1980, Wunderlin 1982). Naturalized in the Caribbean and elsewhere in the Neotropics as well (Morton 1976, Correll and Correll 1982, Little et al. 1974). Spreading from sites where previously planted in Big Cypress National Preserve (T. Pernas, National Park Service, 1996 personal communication). Found in 10 conservation areas in Dade County; displacing native vegetation in hammock margins and occasionally in globally imperiled pine rocklands (R. Hammer, Miami-Dade Parks Department, 1996 personal communication). Reported now from natural areas in four counties: Pinellas, Lee, Dade, and Palm Beach, including the Loxahatchee National Wildlife Refuge and Everglades National Park (EPPC 1996)."
	Lim, T.K. 2014. Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"It is now widely cultivated elsewhere in subtropical and tropical regions of the world. It has naturalized elsewhere in the tropics in Queensland and southern United States."
	Francis, J.K. & Liogier, H.A. 1991. Naturalized Exotic Tree Species in Puerto Rico. General Technical Report SO-82. United States Department of Agriculture Forest Service, New Orleans, LA	"Table 1 -Naturalized and escaped exotic trees in Puerto Rico" [Bauhinia variegata - Location of reproduction; number of plants or area covered = Moist and dry areas; more than 1000 plants]
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. 2017. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/. [Accessed 8 Feb 2017]	No evidence to date

302	Garden/amenity/disturbance weed	
	Source(s)	**Notes**
	Morton, J.F. 1976. Pestiferous spread of many ornamental and fruit species in South Florida. Proceedings of the Florida State Horticultural Society 89: 348-353	"Bauhinia variegata L. ORCHID TREE (spring-blooming). India. Common as an escape, abundantly invading neglected lots, hedges. Runs wild also in Puerto Rico." [Started out invading disturbed areas]

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

304	Environmental weed	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	CABI, 2017. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"B. variegata is a fast-growing tree often planted as an ornamental in many tropical and subtropical regions of the world (Connor, 2002). This species has wind-dispersed seeds which easily escaped from cultivation and have successfully established in a wide variety of habitats (Connor, 2002; Queensland Department of Primary Industries and Fisheries, 2011; PIER, 2014). Once established, B. variegata often become weedy and it has the potential to displace native vegetation. It is also difficult to manage because its seeds can remain viable for more than a year (Langeland et al., 2008; Smith, 2010; Oviedo Prieto et al., 2012). B. variegata is considered an environmental weed and invasive species in Cuba, the Bahamas, Australia, New Caledonia and the USA (MacKee, 1994; Langeland et al., 2008; Smith, 2010; Oviedo Prieto et al., 2012; PIER, 2014; USDA-NRCS, 2014). "
	FLIP. 2017. Florida Invasive Plant species mobile field guide. http://www.plantatlas.usf.edu/flip/. [Accessed 8 Feb 2017]	"Displaces native vegetation in hammock margins and occasionally in globally imperiled pine rocklands. Reported now from natural areas in four counties: Pinellas, Lee, Dade, and Palm Beach, including the Loxahatchee National Wildlife Refuge and Everglades National Park (EPPC 1996). Listed as a category I invasive species by Florida Exotic Pest Plant Council."
	Queensland Government. (2016). Weeds of Australia. Bauhinia variegata. https://keyserver.lucidcentral.org/. [Accessed 8 Feb 2017]	"Naturalised in some parts of south-eastern and northern Queensland." ... "This species is regarded as an environmental weed, or potential environmental weed, on a local level in some parts of south-eastern (e.g. Redland Shire and Caboolture Shire) and northern (i.e. Thuringowa City) Queensland. It is widely cultivated in urban areas in northern and eastern Australia, particularly as a street tree, and readily escapes cultivation into waterways in Brisbane."

305	Congeneric weed	y
	Source(s)	**Notes**
	CABI, 2017. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"B. purpurea is a fast-growing tree that has a wide natural distribution range and has been introduced worldwide. This species has escaped from cultivation and has successfully established in a wide variety of habitats (Connor, 2001; PIER 2015). Once established, it grows displacing native vegetation (Oviedo Prieto et al., 2012). In this species, seeds form very rapidly and mature trees may show numerous pods (Orwa et al., 2009). Additionally, high germination rates (~ 99%) have been recorded for this species when seeds were placed in moist conditions (Connor, 2001). Currently, B. purpurea is listed as invasive in Cuba, Fiji, New Caledonia and Western Samoa (MacKee, 1994; Space & Flynn, 2002; Smith, 1985; Oviedo Prieto et al., 2012; PIER, 2015). According to the IFAS Assessment of Non-Native Plants in Florida's Natural Areas (Fox et al., 2008), B. purpurea is invasive and not recommended in Florida."
	Gilman, E.F. & Watson, D.G. 1993, Bauhinia purpurea: Purple Orchid-Tree. Fact Sheet ENH249. Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL. http://hort.ifas.ufl.edu/. [Accessed 7 Feb 2017]	"Invasive potential: According to the IFAS Assessment of Non-Native Plants in Florida's Natural Areas (IFAS Invasive Plant Working Group 2008), Bauhinia purpurea is invasive and not recommended in Florida"

401	Produces spines, thorns or burrs	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[No evidence] "B. variegata is a small to moderate-size deciduous tree 10-15 m tall and 0.5 m dbh. The bole is straight, erect and single-stemmed with a narrow elongated to spreading crown. The bark is brown to dark grey with longitudinal cracks when old and fibrous and pale pink inside. Its primary root is moderately long and thick, terete, tapering, whitish or light brown (Parker, 1956; Hocking, 1993; Luna, 1996)."

402	Allelopathic	
	Source(s)	**Notes**
	Kaletha, M. S., Bhatt, B. P., & Todaria, N. P. (1996). Tree-crop interactions in traditional agroforestry systems of Garhwal Himalaya. 1. Phytotoxic effects of farm trees on food crops. Allelopathy Journal, 3(2), 247-250	"Abstract : In the traditional agroforestry systems of the Garhwal Himalaya, Uttar Pradesh, fuel, fodder and small timber (multipurpose) trees are cultivated in or around agricultural fields. Some of the tree species used have allelopathic effects on crops so are not grown on a large scale. A comprehensive study of interactions between trees, crops and weeds in these systems is underway, and this paper reports on the toxic activity of the leaves and bark of some major species (Grewia oppositifolia, Ficus roxburghii, Bauhinia variegata, Kydia calycina) on germination and seedling growth of some important food crops (Japanese barnyard millet, Echinochloa frumentacea; finger millet, Eleusine coracana; maize, Zea mays; cowpeas, Vigna unguiculata; soyabeans, Glycine max). In general bark extract of K. calycina and G. oppositifolia significantly reduced germination of all crops, followed by leaf and bark extracts of B. variegata. Radicle growth of all crops except finger millet was suppressed by bark extracts, and leaf extracts reduced radicle growth of all crops. Soyabeans were the most susceptible and barnyard millet most resistant to the toxic action of the tree extracts."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Although little information is available on use of B. variegata in arable fields, it has been noted that leaf leachate of this species has an inhibiting effect on the germination of rice seeds (Koul et al., 1991)." [Lab only]
	Dhawan, S. R., Dhawan, P., & Gupta, S. K. 1998. Allelopathic potential of leguminous plant species towards Parthenium hysterophorus L. Flora and Fauna (Jhansi), 4 (1): 9-12	"Fourteen crop and tree species, and wild bushes were tested for allelopathy towards Parthenium hysterophorus: chickpea cv. C-235, Trifolium alexandrinum cv. Mescavi, Trigonella foenum graecum cv. Kasuri, Acacia nilotica, Albizia procera, Bauhinia variegata, Delonix regia, Moringa indica, Parkinsonia aculeata, Pithecellobium dulce, Prosopis cineraria, Tamarindus indica, Cassia occidentalis and Tephrosia purpurea. Aqueous leachates (100%) from leaves of all tested species, except that of Pithecellobium dulce, decreased seed germination and vigour index of Parthenium hysterophorus."

403	Parasitic	n
	Source(s)	**Notes**

Qsn #	Question	Answer
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2010. Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Trees, deciduous, to 15 m tall. Bark dark brownish, nearly smooth; branches gray puberulent when young, later glabrous. Petiole 2.5–3.5 cm; leaf blade suborbicular or broadly ovate, 5– 9 × 7–11 cm, subleathery, abaxially almost glabrous, adaxially glabrous, primary veins 9–13, secondary and higher order veins protruding, base shallowly to deeply cordate, apex bifid to 1/3, lobes rounded at apex."

404	Unpalatable to grazing animals	n
	Source(s)	**Notes**
	Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 8 Feb 2017]	"Fodder: Leaves make good fodder and are greedily eaten by sheep, goats and cattle. The average annual fodder yield per tree is 15-20 kg of dry matter."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The leaves, shoots and pods of B. variegata are used as fodder for livestock, including sheep, goats and cattle. Average leaf yield from a mature tree is about 20-22 kg fresh weight per annum (Hocking, 1993; Luna, 1996). Leaves contain 10-16% crude protein and are highly palatable and nutritious. Other studies of chemical composition have reported that dry matter in the leaves varies from 41.4-49.8%, crude protein 5.9-10.7%, ether extract 1.3-3.9, crude fibre 25.3-33.0%, Nitrogen Free Extract (NFE) 40.9-50.8%, total ash content 6.3-12.3%, calcium 1.8-4.1% and phosphate 0.2-0.4% (Gupta, 1993). Very young leaves harvested in late summer tend to contain more tannin and hence have a lower digestibility."

405	Toxic to animals	n
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The leaves, shoots and pods of B. variegata are used as fodder for livestock, including sheep, goats and cattle." [No evidence]
	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] "buds and flowers cooked and pickled, tender fruits cooked as vegetable or pickled, seeds fried and eaten, leaves for fodder"

406	Host for recognized pests and pathogens	n
	Source(s)	**Notes**
	Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 8 Feb 2017]	"PESTS AND DISEASES The larvae of several insects feed on the plant. Adult nymphs of Psylla simlae feed on sap of leaves and young twigs. Leaves and flowers infested by nymphs shrivel and fall."

Qsn #	Question	Answer
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"There are no records of highly important pests and diseases for B. variegate (Hocking, 1993). However, it is susceptible to damage by some insects, rodents, and epiphytic and parasitic organisms. Termites can be a threat to nursery seedlings and young saplings, particularly if the plants have been weakened by drought. Insects also cause defoliation when larvae of several insects feed on the plants. Sucking pests such as Psylla simlae attack plants of this species and adult nymphs feed on sap of leaves and young twigs. The infestation is noticeable when leaves and flowers shrivel and leaves fall or begin to fold, and plant growth is inhibited (Luna, 1996). If the infestation is heavy the leaves turn brown. Chrysomelid beetles are also known to damage foliage during the rainy season and the bruchid Caryedon seratus has been recorded infesting seeds (Nilsson and Johnson, 1992). Defoliators can be controlled by spraying fenitrothion or methyl parathion (Luna, 1996). Larvae of the bark-eating caterpillar Indarbela quadrinotata make tunnels at the fork points of twigs/branches and feed on the bark at night. This inhibits the food supply to the growing points, resulting in the loss of branches."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	Lim, T.K. 2014. Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	[No evidence of acute toxicity] "Young sour leaves are eaten as a side dish with rice; flowers and flower buds are also reported eaten in India, Southeast Asia, Africa and South America (Facciola, Burkill)." ... "Recent studies reported that B. variegate possess chemopreventive, antitumour, cytotoxic, hepatoprotective, antibacterial and anti inflammatory activities."
	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] "buds and flowers cooked and pickled, tender fruits cooked as vegetable or pickled, seeds fried and eaten, leaves for fodder"

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"B. variegata is a moderate light demander. In its natural habitat it is found in forests with a fairly open canopy. It is a gregarious species which is shade tolerant and moderately drought, fire and frost resistant."
	Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 7 Feb 2017]	"The tree is fairly resistant to drought but susceptible to fires." [No evidence that contributes to fire risk]

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"B. variegata is a moderate light demander. In its natural habitat it is found in forests with a fairly open canopy. It is a gregarious species which is shade tolerant and moderately drought, fire and frost resistant."
	Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed]	"It demands plenty of light and requires good drainage."
	Langeland, K.A., Cherry, H.M., McCormick, C.M. & Craddock Burks, K.A. 2008. Identification & Biology of Non-Native Plants in Florida's Natural Areas. Second Edition. IFAS Publications, Gainesville, FL	"Life History: Grows best in full sun or partial shade"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"B. variegata grows on both heavy clayey and light sandy soils with neutral reaction. The best growth is observed on medium-texture deep loamy soils. It prefers well-drained soils, but can withstand seasonal waterlogging and moderately saline soils (von Carlowitz, 1991). Soil descriptors - Soil texture: light; medium; heavy - Soil drainage: free; seasonally waterlogged - Soil reaction: neutral - Special soil tolerances: shallow; saline - Soil types: alluvial soils; arid soils; saline soils; mountain soils; clay soils"
	Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 7 Feb 2017]	"Soil type: Capable of growing on a wide range of soils from gravelly, shallow, rocky soil on hill slopes to sandy loam and loamy soil in the valley."

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**
	Lim, T.K. 2014. Edible Medicinal And Non-Medicinal Plants. Volume 7, Flowers. Springer, Dordrecht	"A small, erect, medium-sized evergreen or deciduous to semi-deciduous tree that reaches 2–8 m in height and up to 20 cm in trunk diameter."

412	Forms dense thickets	n
	Source(s)	**Notes**
	Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 8 Feb 2017]	"B. variegata is a plant of tropical and subtropical climates with hot, dry summers and mild winters. It demands plenty of light and requires good drainage. Severe frost kills the leaves of seedlings and saplings, but they recover during summer. The tree is fairly resistant to drought but susceptible to fires." [No evidence]

Qsn #	Question	Answer
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"It is a gregarious species which is shade tolerant and moderately drought, fire and frost resistant." ... "It cannot compete with weeds under natural conditions." [Gregarious, but no evidence of dense stand formation]

501	Aquatic	n
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Terrestrial tree] "B. variegata is a tree of tropical dry mixed deciduous and moist deciduous forests. On the Indo-Pakistan subcontinent it is limited to the Himalayan foothills and adjoining Siwaliks and recent alluvial deposits. These forests adjoin the dry subtropical and also the subtropical pine forests (Champion et al., 1965; Luna, 1996). In Myanmar it occurs in dry mixed forests up to 900 m altitude (Troup, 1921)."

502	Grass	n
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 7 Feb 2017]	Family: Fabaceae (alt.Leguminosae) Subfamily: Caesalpinioideae Tribe: Cercideae Subtribe: Bauhiniinae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Like many species belonging to Caesalpinioideae, B. variegata is a non-nitrogen fixing species (Hussain and Khalid, 1987; Pokhriyal et al., 1990)."

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 7, Flowers. Springer, Dordrecht	"A small, erect, medium-sized evergreen or deciduous to semi-deciduous tree that reaches 2–8 m in height and up to 20 cm in trunk diameter."

Qsn #	Question	Answer
601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[No evidence] "In India, leaf fall begins November-December and the tree is leafless, or mostly so, until March. New leaves appear from Februrary to April. The large pink, purple or white flowers appear from Februrary to April, chiefly on the upper leafless branches, the lower branches being still in leaf or leafless (Troup, 1921). In the northern parts of India and Pakistan the pods form rapidly, ripening in May and June (Troup, 1921; Parker, 1956; Watt, 1972)."

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Vozzo, J.A. 2002. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	"Athaya (1985) reports that B. variegata seeds have a higher germination percent when stored after cleaning; however, viability is lost within 3 years. This viability loss may be attributable to high moisture content or mechanical damage, because hard-seeded Leguminosae should store well for longer periods of time. Germination studies of B. variegata using excised embryos produced results comparable to experiments using intact seeds (Babeley and Kandya 1986). Francis and Rodríguez (1993) report excellent germination of Bauhinia Part II—Species Descriptions • Bauhinia variegata L. 333 spp. without scarification, and they record a 77 percent germination for B. variegata seeds placed on moist blotting paper."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Seeds germinate readily and show a high germination (up to 95% when fresh), which is retained to some extent for at least one year." ... "B.variegata regenerates easily from seed under natural conditions, provided the seed is buried in the soil, protected from the sun and sufficient moisture is available for its germination. The seeds, which are dispersed before the onset of monsoon rains, germinate readily when the rains begin and may be found in quantity surrounding the trees (Troup, 1921)."

603	**Hybridizes naturally**	
	Source(s)	**Notes**
	Wu, Z. Y., P. H. Raven & D. Y. Hong, eds. 2010. Flora of China. Vol. 10 (Fabaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Bauhinia ×blakeana ... This is a hybrid between Bauhinia purpurea and B. variegata. First collected from a garden in Hong Kong, it is now widely cultivated in the tropics as an ornamental tree."
	Lau, C. P., Ramsden, L., & Saunders, R. M. (2005). Hybrid origin of “Bauhinia blakeana”(Leguminosae: Caesalpinioideae), inferred using morphological, reproductive, and molecular data. American Journal of Botany, 92(3), 525-533	"It is therefore evident that although B. blakeana is a hybrid that has resulted from a cross (probably natural) between B. purpurea and B. variegata, it has only been perpetuated genetically by artificial horticultural practices: it is not capable of reproducing itself independently. It is therefore inappropriate to regard it as a distinct species and is better referred to as an artificially maintained cultivar. A new cultivar name is accordingly formally published here, replacing the previous specific binomial published by Dunn (1908):"

604	**Self-compatible or apomictic**	**y**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Kumar, A., & Srivastava, P. (2014). The study of pollen biology of Bauhinia variegata L. at Agra (UP). Indian Journal of Scientific Research, 5(1), 83-87	"Pollen ovule ratio also indicates that the species is xenogamous, although geitonogamy and autogamy (only induced, not spontaneous) were also recorded. The species is self-compatible."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The species is mainly cross-pollinated (10-21.6%) in nature with a small amount of selfing (Luna, 1996)."

605	Requires specialist pollinators	n
	Source(s)	**Notes**
	Kumar, A., & Srivastava, P. (2014). The study of pollen biology of Bauhinia variegata L. at Agra (UP). Indian Journal of Scientific Research, 5(1), 83-87	"... floral visitors of B. variegate are Honey bees (Apis cerana, Apis mellifera), Mormon butterfly (Papilio polytes) Bamboo carpenter bee (Xylocopa iridipennis), wasps (Polistis orientalis) Macroglossum stellatarum (Hawk moth), Blissus leucopterus (Chinch bug) and Calypte halenae (Humming bird) and Psittacula krameri (parrot)."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The large amount of pollen production, floral polymorphism (shape, size and colour) and fragrance enhance cross-pollination and foraging activities of various pollinators, including bees."

606	Reproduction by vegetative fragmentation	y
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"It can also be propagated by cuttings, stumps (25-30 cm root and 5 cm shoot), root suckers and wildings (von Carlowitz, 1991)."

607	Minimum generative time (years)	2
	Source(s)	**Notes**
	Vozzo, J.A. 2002. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	"Bauhinia spp. bloom within 3 to 4 years (Bailey 1941)."
	Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 8 Feb 2017]	"Tree starts flowering at a very early age of 2-3 years."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The pods are 15-30 x 1.7-2.5 cm, initially green and ripening to pale brown or buff, papillose when young and hard and flat when mature. They contain 10-15 seeds and mainly dehisce on the trees, scattering the seed. The seeds are 1.3-1.8 x 1.3-1.7 cm and nearly circular, flat and brown with a somewhat coriaceous testa, with 2500-3500 seeds per kilogram (Troup, 1921; Singh, 1989)." [No evidence, and no means of external attachment]

702	Propagules dispersed intentionally by people	y

Qsn #	Question	Answer
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"B. variegata has been introduced as an ornamental and fodder tree both within and outside its natural range, including in Spain, Egypt, Nepal, Hong Kong and Mexico (Trigo and Garcia, 1990; Nilsson and Johnson, 1992; Karki, 1993)."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The pods are 15-30 x 1.7-2.5 cm, initially green and ripening to pale brown or buff, papillose when young and hard and flat when mature. They contain 10-15 seeds and mainly dehisce on the trees, scattering the seed. The seeds are 1.3-1.8 x 1.3-1.7 cm and nearly circular, flat and brown with a somewhat coriaceous testa, with 2500-3500 seeds per kilogram (Troup, 1921; Singh, 1989)." [Unlikely. Relatively large seeds & pods that are produced after 3-4 years]

704	Propagules adapted to wind dispersal	n
	Source(s)	**Notes**
	Thapliyal, R. C., & Phartyal, S. S. (2005). Dispersal and germination syndromes of tree seeds in a monsoonal forest in northern India. Seed Science Research, 15(01): 29 -42	"Table 1. Fruit type, maturation time, dispersal agent and seed extraction procedure for 77 tree species from Doon Valley and adjoining foothills" [Bauhinia variegata - Dispersal agent = Ballistic] ... "In dry-dehiscent fruits with non-winged seeds, only Bauhinia variegata had high germination (96%),"
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The pods are 15-30 x 1.7-2.5 cm, initially green and ripening to pale brown or buff, papillose when young and hard and flat when mature. They contain 10-15 seeds and mainly dehisce on the trees, scattering the seed."

705	Propagules water dispersed	n
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The pods are 15-30 x 1.7-2.5 cm, initially green and ripening to pale brown or buff, papillose when young and hard and flat when mature. They contain 10-15 seeds and mainly dehisce on the trees, scattering the seed."

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[No evidence] "The pods are 15-30 x 1.7-2.5 cm, initially green and ripening to pale brown or buff, papillose when young and hard and flat when mature. They contain 10-15 seeds and mainly dehisce on the trees, scattering the seed. The seeds are 1.3-1.8 x 1.3-1.7 cm and nearly circular, flat and brown with a somewhat coriaceous testa, with 2500-3500 seeds per kilogram (Troup, 1921; Singh, 1989)."

707	Propagules dispersed by other animals (externally)	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Rodents act as seed predators; may possibly cache seeds] "The pods are 15-30 x 1.7-2.5 cm, initially green and ripening to pale brown or buff, papillose when young and hard and flat when mature. They contain 10-15 seeds and mainly dehisce on the trees, scattering the seed." ... "However, natural regeneration which generally takes place by self-seeding is scanty because of adverse factors such as drought, seed-eating rodents, heavy browsing and trampling pressure (Hocking, 1993)."

708	Propagules survive passage through the gut	n
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Rodents act as seed predators. Otherwise, no evidence of seed consumption] "The pods are 15-30 x 1.7-2.5 cm, initially green and ripening to pale brown or buff, papillose when young and hard and flat when mature. They contain 10-15 seeds and mainly dehisce on the trees, scattering the seed." ... "However, natural regeneration which generally takes place by self-seeding is scanty because of adverse factors such as drought, seed-eating rodents, heavy browsing and trampling pressure (Hocking, 1993)."

801	Prolific seed production (>1000/m2)	n
	Source(s)	**Notes**
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The pods are 15-30 x 1.7-2.5 cm, initially green and ripening to pale brown or buff, papillose when young and hard and flat when mature. They contain 10-15 seeds and mainly dehisce on the trees, scattering the seed. The seeds are 1.3-1.8 x 1.3-1.7 cm and nearly circular, flat and brown with a somewhat coriaceous testa, with 2500-3500 seeds per kilogram (Troup, 1921; Singh, 1989). Seeds germinate readily and show a high germination (up to 95% when fresh), which is retained to some extent for at least one year." ... "However, natural regeneration which generally takes place by self-seeding is scanty because of adverse factors such as drought, seed-eating rodents, heavy browsing and trampling pressure (Hocking, 1993)." [Unlikely. Seeds relatively large & suffer from seed predation]

Qsn #	Question	Answer
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y**
	Source(s)	**Notes**
	Langeland, K.A., Cherry, H.M., McCormick, C.M. & Craddock Burks, K.A. 2008. Identification & Biology of Non-Native Plants in Florida's Natural Areas. Second Edition. IFAS Publications, Gainesville, FL	"A fast-growing tree with seeds that remain viable for more than a year (Morton 1971a)."
	Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 8 Feb 2017]	"Seed storage behaviour is orthodox; no loss in viability in hermetic storage at room temperature for at least 2 years; viability maintainec for more than 3 years in hermetic storage at room temperature with 13 ± 2% mc. Seeds stored in tins give germination rates of up to 95% after a few months of storage. There are 2 800-3 500 seeds/kg."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Seeds germinate readily and show a high germination (up to 95% when fresh), which is retained to some extent for at least one year."

803	**Well controlled by herbicides**	**y**
	Source(s)	**Notes**
	FLIP. 2017. Florida Invasive Plant species mobile field guide. http://www.plantatlas.usf.edu/flip/. [Accessed 8 Feb 2017]	"Do not plant. Remove plant and root system. Herbicide treatment, basal bark: 10% Garlon® 4. Herbicide treatment, cut stump: 50% Garlon® 3A."

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y**
	Source(s)	**Notes**
	Orwa C,, Mutua, A., Kindt R., Jamnadass, R, & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org. [Accessed 8 Feb 2017]	"The tree coppices well and can stand heavy lopping fairly well."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"This species is naturally found in scrub forests where a silvicultural system of selection is practised, with regeneration by coppice. The trees are pollarded, lopped and pruned for fodder and fuelwood production (von Carlowitz, 1991)."

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	CABI, 2017. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"Trees of B. variegata host larvae of several insects. These insects feed on the plant. Adult nymphs of the Psylla simlae (Hemiptera) feed on sap of leaves and young twigs. Leaves and flowers infested by nymphs shrivel and fall" [Unknown in Hawaiian Islands]

Summary of Risk Traits:

High Risk / Undesirable Traits
• Elevation range exceeds 1000 m, demonstrating environmental versatility
• Thrives in tropical climates
• Naturalized in Florida, Puerto Rico, & Australia
• Regarded as an environmental weed in Australia and Florida
• Other Bauhinia species have become invasive
• Possibly allelopathic
• Shade tolerant
• Tolerates many soil types
• Reproduces by seeds and vegetatively by suckering
• Self-compatible
• Reaches maturity in 2-3 years
• Seeds dispersed by dehiscent pods & intentionally by people
• Seeds remain viable for 1-2 years (and capable of forming a seed bank)
• Able to coppice & resprout after cutting

Low Risk Traits
• No reports of invasiveness or naturalization in the Hawaiian Islands, despite use as an ornamental
• Unarmed (no spines, thorns, or burrs)
• Provides fodder for livestock
• Non-toxic
• Herbicides reported to provide effective control