

Taxon: *Breynia vitis-idaea* (Burm. f.) C. E. C. Fisch.

Family: Phyllanthaceae

Common Name(s): Indian snowberry
mountain coffee bush

Synonym(s): *Rhamnus vitis-idaea* Burm. f.

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 10 Aug 2016

WRA Score: 2.0

Designation: EVALUATE

Rating: Evaluate

Keywords: Naturalizing, Tropical, Shrub, Bird-Dispersed, Recalcitrant Seeds

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	?
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans		
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		

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
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	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	y
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people		
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		
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)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[No evidence of domestication] "Montane slopes, scrub; 100-1000 m. Guangdong, Guizhou, Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam]."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2016. 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
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Montane slopes, scrub; 100-1000 m. Guangdong, Guizhou, Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam]."
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 8 Aug 2016]	"Native: Asia-Temperate China: China - Guangdong, - Guizhou, - Yunnan Asia-Tropical Indian Subcontinent: Bangladesh; India - Andhra Pradesh, - Kerala, - Tamil Nadu, - Uttar Pradesh, - West Bengal, - Karnataka, - Goa; Nepal; Pakistan; Sri Lanka Indo-China: Cambodia; Laos; Myanmar; Thailand; Vietnam Malesia: Indonesia - Sumatra; Malaysia; Philippines North Indian Ocean: India - Andaman and Nicobar"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 8 Aug 2016]	

203	Broad climate suitability (environmental versatility)	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Elevation range <1000 m] "Montane slopes, scrub; 100-1000 m. Guangdong, Guizhou, Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam]."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Montane slopes, scrub; 100-1000 m. Guangdong, Guizhou, Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam]."

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	Imada, C.T., Staples, G.W. & Herbst, D.R. 2005. Annotated Checklist of Cultivated Plants of Hawai'i. http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/ . [Accessed 9 Aug 2016]	" <i>Breynia vitis-idaea</i> (N. L. Burman) C.E.C. Fischer (Confirmed) First Collected: 1986 Locations: Foster Botanical Garden (Confirmed) Ho'omaluhia Botanical Garden"
	Useful Tropical Plants Database. 2016. <i>Breynia vitis-idaea</i> . http://tropical.theferns.info/viewtropical.php?id=Breynia+vitis-idaea . [Accessed 9 Aug 2016]	"Range E. Asia - southern China, Indian subcontinent through tropical Asia to Indonesia." [Widespread native range, but limited evidence of cultivation elsewhere]

301	Naturalized beyond native range	y
	Source(s)	Notes
	Sand, J. 2016. Honolulu Botanical Gardens. Pers. Comm. 04 Aug.	"staff is reporting as abundantly spreading at least adjacent to its planting location and sometimes pretty far away. It may just be localized"

302	Garden/amenity/disturbance 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

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

Qsn #	Question	Answer
304	Environmental 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

305	Congeneric weed	y
	Source(s)	Notes
	Cheek, M., Challen, G., Merklinger, F., & Molmou, D. (2014). <i>Breynia disticha</i> , a new invasive alien for tropical Africa. <i>Aliens</i> 33 : 31-34	"It is clear that <i>Breynia disticha</i> , in its non-variegated state, has become invasive in Tropical Africa in several habitats. From the pattern of its occurrence in Guinea, it appears to be spreading not by suckers, but by seed, since it can occur in sites remote from human settlement, where there is no evidence of former cultivation. It was recorded in fruit from the original site in July 2012 by one of us (Molmou 486). The threat of <i>Breynia disticha</i> is its ability to colonise and persist in secondary forest is of great concern since potentially it could further threaten already rare native species by out-competing and displacing them. Only 200m distant from the site of the first discovery of <i>Breynia disticha</i> in Guinea is a small patch of intact forest containing what is thought to be the last surviving global location for the forest understorey shrub <i>Tarenna hutchinsonii</i> (Rubiaceae) and several other threatened species. There is a high risk that the all-green, invasive form of <i>Breynia disticha</i> will spread eastwards into nearby Sierra Leone, and beyond, colonising Tropical Africa. Equally, the species may initially have become established as an invasive in Sierra Leone (or further eastwards) before spreading west to Guinea-Conakry where we detected it."
	Kubitzki, K. (ed.). 2014. <i>The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales</i> . Springer, New York	[May be reclassified in the genus <i>Phyllanthus</i> , which includes several invasive species] "Over 800 spp., pantropical, and also entering warm temperate regions. Molecular systematic studies (Kathriarachchi et al. 2005, 2006) found three of the eight subgenera of <i>Phyllanthus</i> to be polyphyletic, and the genus in its traditional circumscription to be paraphyletic. <i>Sauropus</i> , <i>Breynia</i> and <i>Glochidion</i> are deeply embedded within <i>Phyllanthus</i> s. str., and ultimately may be included into an expanded generic concept that would comprise over 1,250 species. At present, however, the nomenclatural changes conforming to the molecular results hardly have been initiated, and the non-monophyletic subtaxa of <i>Phyllanthus</i> s. str. and the genera deeply embedded in it will require careful taxonomic revision of the different elements before being amalgamated in the expanded generic concept"

Qsn #	Question	Answer
401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[No evidence] "Erect shrubs to 3 m tall, glabrous throughout, much branched; branches terete, slender. Stipules ovate-triangular, ca. 1.5-2 mm; petiole 2-3 mm; leaf blade elliptic (rarely ovate or broadly ovate), 2-5 × 1.5-3 cm, membranous, distichous, abaxially pruinose-green or glaucous, adaxially green, base obtuse, apex acute; midvein and 5-7 pairs lateral veins flattened adaxially, elevated abaxially."
402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown
403	Parasitic	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Erect shrubs to 3 m tall, glabrous throughout, much branched; branches terete, slender." [Phyllanthaceae. No evidence]
404	Unpalatable to grazing animals	
	Source(s)	Notes
	Parthasarathy, K. A. N. (2016). Leaf traits and foliar herbivory in tropical dry evergreen forest of India. Tropical Plant Research 3(1): 52-66	[Foliage eaten by beetles. Palatability to browsing mammals unknown] "Appendix I. Leaf traits, foliar herbivores and per cent leaf damage of 110 plant species of tropical dry evergreen forest on the Coromandel Coast of India" [Breynia vitis-idaea - FH = Bt2; FH (Foliar herbivores): B = Beetle]
	Misra, S., & Misra, M. K. (2013). Leafy vegetable plants of south Odisha, India. International Journal of Agricultural and Food Science, 3(4), 131-137	[Leaves and shoots palatable to humans after cooking] "Breynia vitis-idaea (Burm.f.) C.E.C. Fisch. (Euphorbiaceae) O: Jajan, Jhanjika Shrub. Tender leaves and young shoots are collected, roasted then eaten."
405	Toxic to animals	
	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	"Roots used as a fish poison." [Toxicity to other animals unknown. Consumption of roots may be unlikely by terrestrial animals]
406	Host for recognized pests and pathogens	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown
407	Causes allergies or is otherwise toxic to humans	

Qsn #	Question	Answer
	Source(s)	Notes
	Misra, S., & Misra, M. K. (2013). Leafy vegetable plants of south Odisha, India. <i>International Journal of Agricultural and Food Science</i> , 3(4), 131-137	" <i>Breynia vitis-idaea</i> (Burm.f.) C.E.C. Fisch. (Euphorbiaceae) O: Jajan, Jhanjika Shrub. Tender leaves and young shoots are collected, roasted then eaten."
	Lin, T. J., Su, C. C., Lan, C. K., Jiang, D. D., Tsai, J. L., & Tsai, M. S. (2003). Acute poisonings with <i>Breynia officinalis</i> —an outbreak of hepatotoxicity. <i>Journal of Toxicology: Clinical Toxicology</i> , 41(5), 591-594	[Related taxon may be toxic if consumed] "The consumption of a soup containing <i>B. officinalis</i> Hemsley resulted in dose-related toxic effects. Clinical toxicity consisted primarily of gastrointestinal symptoms and signs and hepatotoxicity. Hepatocellular liver injury rather than cholestatic liver injury was observed. Marked jaundice did not develop."
	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	[Used medicinally] "Used in Ayurveda. All parts used for the asthma, sore throat, eczema, diarrhea; bark astringent, antiinflammatory, for rheumatism and to stop the bleeding. Leaf juice given after childbirth, a postpartum remedy; leaf paste for boils and skin diseases."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	van Welzen, P.C., 2001. <i>Breynia vitis-idaea</i> (Burm.f.) C.E.C. Fische [Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed]	[Unlikely. Does not occur in fire prone habitats] " <i>Breynia vitis-idaea</i> is usually found scattered, in forest edges and clearings in evergreen forest, mangrove, swamp forest, bamboo thickets, along rivers and roads and near the beach, from sea level up to 800 m altitude."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Ashton, M. S., Gunatilleke, S., de Zoysa, N., Dassanayake, M.D., Gunatilleke, N., and Wijesundera, S. 1997. <i>A Field Guide to the Common Trees and Shrubs of Sri Lanka</i> . WHT Publications (Pvt.) Limited, Colombo, Sri Lanka	" <i>Breynia vitis-idaea</i> " ... "Site: rain forest understory" [Occurrence in rain forest understory suggests shade tolerance]
	van Welzen, P.C., 2001. <i>Breynia vitis-idaea</i> (Burm.f.) C.E.C. Fische [Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed]	[Occurs in openings & clearing, suggesting preference for high light environments] "usually found scattered, in forest edges and clearings in evergreen forest, mangrove, swamp forest, bamboo thickets, along rivers and roads and near the beach"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	India Biodiversity Portal. (2016). <i>Breynia vitis-idaea</i> (Burm.f.) C.E.C.Fisch.. http://indiabiodiversity.org/observation/show/348006 . [Accessed 10 Aug 2016]	"Coastal Alluvial Soils"

Qsn #	Question	Answer
	van Welzen, P.C., 2001. <i>Breynia</i> J.R. Forster & J.G. Forste [Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 10 Aug 2016]	"The soils are usually sand, sandstone or alluvial soils."
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Widespread distribution. Soil preferences unspecified] "Montane slopes, scrub; 100-1000 m. Guangdong, Guizhou, Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam]."

411	Climbing or smothering growth habit	y
	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	"A shrub or treelet, woody climber"
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Erect shrubs to 3 m tall, glabrous throughout, much branched; branches terete, slender."

412	Forms dense thickets	n
	Source(s)	Notes
	van Welzen, P.C., 2001. <i>Breynia vitis-idaea</i> (Burm.f.) C.E.C. Fische [Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed]	" <i>Breynia vitis-idaea</i> is usually found scattered, in forest edges and clearings in evergreen forest, mangrove, swamp forest, bamboo thickets, along rivers and roads and near the beach" [No evidence]
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Montane slopes, scrub; 100-1000 m." [No evidence]

501	Aquatic	n
	Source(s)	Notes
	van Welzen, P.C., 2001. <i>Breynia vitis-idaea</i> (Burm.f.) C.E.C. Fische [Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 8 Aug 2016]	[Terrestrial shrub or treelet] " <i>Breynia vitis-idaea</i> is usually found scattered, in forest edges and clearings in evergreen forest, mangrove, swamp forest, bamboo thickets, along rivers and roads and near the beach, from sea-level up to 800 m altitude."

502	Grass	n
	Source(s)	Notes

Qsn #	Question	Answer
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 8 Aug 2016]	Family: Phyllanthaceae Subfamily: Phyllanthoideae Tribe: Phyllantheae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 8 Aug 2016]	Family: Phyllanthaceae Subfamily: Phyllanthoideae Tribe: Phyllantheae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Erect shrubs to 3 m tall, glabrous throughout, much branched; branches terete, slender."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 8 Aug 2016]	[No evidence. Widespread native distribution] "Native: Asia-Temperate China: China - Guangdong, - Guizhou, - Yunnan Asia-Tropical Indian Subcontinent: Bangladesh; India - Andhra Pradesh, - Kerala, - Tamil Nadu, - Uttar Pradesh, - West Bengal, - Karnataka, - Goa; Nepal; Pakistan; Sri Lanka Indo-China: Cambodia; Laos; Myanmar; Thailand; Vietnam Malesia: Indonesia - Sumatra; Malaysia; Philippines North Indian Ocean: India - Andaman and Nicobar"

602	Produces viable seed	y
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Fruiting pedicel 3-4 mm; fruits ovoid, compressed at apex, 3.5-5 × 4-5 mm, apex sometimes obscurely beaked, without apical rim, red and turning black-purple when fully mature, drying shiny brown. Seeds 3-4.5 × 1.8-2.5 × 1.7-2.5 mm, yellow-brown.
	Useful Tropical Plants Database. 2016. <i>Breynia vitis-idaea</i> . http://tropical.theferns.info/viewtropical.php?id=Breynia+vitis-idaea . [Accessed 8 Aug 2016]	"Propagation: Seed"

Qsn #	Question	Answer
603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

604	Self-compatible or apomictic	
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Unknown] "Flowers small, green, solitary or several in axillary racemes. Male flowers: pedicels slender, 2.5-4 mm; sepals 6, broadly ovate, ca. 2 mm, subtruncate at apex; stamens 3, connate into capitate column. Female flowers solitary; pedicels 3-4 mm, not lengthening in fruit; sepals as in male, but shorter, 1-2 mm, not enlarged in fruit; ovary ovoid; stigmas short, ca. 0.25 mm, free, undivided."

605	Requires specialist pollinators	y
	Source(s)	Notes
	Svensson, G. P., Okamoto, T., Kawakita, A., Goto, R., & Kato, M. (2010). Chemical ecology of obligate pollination mutualisms: testing the 'private channel' hypothesis in the <i>Breynia</i> - <i>Epicephala</i> association. <i>New Phytologist</i> , 186(4), 995-1004	"Male flowers (Fig. 1c) have fused calyx lobes with a small opening at the tip, and female flowers (Fig. 1d) have three styles, which are more or less fused at the upper part of the ovary, so the floral architecture in <i>B. vitis-idaea</i> makes pollen removal and deposition by floral visitors other than <i>Epicephala</i> females very unlikely." ... "An <i>Epicephala</i> species (Fig. 1e), yet to be formally described, is the only documented pollinator of <i>B. vitis-idaea</i> (Kawakita & Kato, 2004b). Because of the small size of host flowers, visual cues may be of less importance for the nocturnally active moths in search for mating and oviposition sites. By contrast, flowers of <i>B. vitis-idaea</i> are fragrant to the human nose only at night, suggesting that floral scent may be crucial for pollinator attraction."
	Kawakita, A. (2010). Evolution of obligate pollination mutualism in the tribe Phyllanthaeae (Phyllanthaceae). <i>Plant Species Biology</i> , 25(1), 3-19	"Male flowers are bell-shaped or urceolate (Fig. 4b), consisting of completely fused sepals and connate stamens. The styles of female flowers are either separate and bilobed or reduced to crescent-shaped projections that are fused centrally (Fig. 4f; Chakrabarty & Gangopadhyay 1996a; van Welzen 2000; Radcliffe-Smith 2001). Flowers are nectariferous at least in <i>B. vitis-idaea</i> (Kawakita & Kato 2004b). Most <i>Breynia</i> species are likely to be pollinated by <i>Epicephala</i> moths..."
	Sand, J. 2016. Honolulu Botanical Gardens. Pers. Comm. 04 Aug.	[Spreading locally in Hawaii. Some unidentified pollination agent is apparently visiting the flowers] "We have a plant here at Hō'o – <i>Breynia vitis-idaea</i> - that staff is reporting as abundantly spreading at least adjacent to its planting location and sometimes pretty far away."

Qsn #	Question	Answer
606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Useful Tropical Plants Database. 2016. <i>Breynia vitis-idaea</i> . http://tropical.theferns.info/viewtropical.php?id=Breynia+vitis-idaea . [Accessed 10 Aug 2016]	"Propagation: Seed"

607	Minimum generative time (years)	
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Erect shrubs to 3 m tall, glabrous throughout, much branched; branches terete, slender." [Probably 2+ years]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Fleshy-fruited. Zoochorous] "Fruiting pedicel 3-4 mm; fruits ovoid, compressed at apex, 3.5-5 × 4-5 mm, apex sometimes obscurely beaked, without apical rim, red and turning black-purple when fully mature, drying shiny brown. Seeds 3-4.5 × 1.8-2.5 × 1.7-2.5 mm, yellow-brown."

702	Propagules dispersed intentionally by people	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Limited evidence of cultivation outside native range

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Puyravaud, J. P., Dufour, C., & Aravajy, S. (2003). Rain forest expansion mediated by successional processes in vegetation thickets in the Western Ghats of India. <i>Journal of Biogeography</i> , 3 (7), 1067-1080	"Table 1 Species characteristics" [<i>Breynia vitis-idaea</i> - Dispersal agent = Birds]

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Fruiting pedicel 3-4 mm; fruits ovoid, compressed at apex, 3.5-5 × 4-5 mm, apex sometimes obscurely beaked, without apical rim, red and turning black-purple when fully mature, drying shiny brown. Seeds 3-4.5 × 1.8-2.5 × 1.7-2.5 mm, yellow-brown."

705	Propagules water dispersed	
	Source(s)	Notes

Qsn #	Question	Answer
	Keystone Foundation. (2015). Forest Plants of the Nilgiris: Southern Nilgiri Biosphere Reserve A Pictorial Field Guide. Keystone Foundation, Kotagiri, India	[Distribution in riparian areas suggests possible dispersal by water] "Common along the river and stream banks and scrub jungles from plains to 750m."
	van Welzen, P.C., 2001. <i>Breynia vitis-idaea</i> (Burm.f.) C.E.C. Fische [Internet] Record from Proseabase. van Valkenburg, J.L.C.H. and Bunyapraphatsara, N. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 8 Aug 2016]	Distribution occurs along rivers & other riparian areas. Possibly water dispersed in these locations] " <i>Breynia vitis-idaea</i> is usually found scattered, in forest edges and clearings in evergreen forest, mangrove, swamp forest, bamboo thickets, along rivers and roads and near the beach, from sea level up to 800 m altitude."

706	Propagules bird dispersed	y
	Source(s)	Notes
	David, J. P., Manakadan, R., & Ganesh, T. 2015. Frugivory and seed dispersal by birds and mammals in the coastal tropical dry evergreen forests of southern India: A review. <i>Tropical Ecology</i> , 5 (1): 41-55	"Appendix Table 1. Fruit traits and dispersal mode." ... "Species dispersed both by birds and mammals" [Includes <i>Breynia vitis idaea</i>]
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Fruiting pedicel 3-4 mm; fruits ovoid, compressed at apex, 3.5-5 × 4-5 mm, apex sometimes obscurely beaked, without apical rim, red and turning black-purple when fully mature, drying shiny brown. Seeds 3-4.5 × 1.8-2.5 × 1.7-2.5 mm, yellow-brown."
	Puyravaud, J. P., Dufour, C., & Aravajy, S. (2003). Rain forest expansion mediated by successional processes in vegetation thickets in the Western Ghats of India. <i>Journal of Biogeography</i> , 3 (7), 1067-1080	"Table 1 Species characteristics" [<i>Breynia vitis-idaea</i> - Dispersal agent = Birds]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2008. Flora of China. Vol. 11 (Oxalidaceae through Aceraceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	"Fruiting pedicel 3-4 mm; fruits ovoid, compressed at apex, 3.5-5 × 4-5 mm, apex sometimes obscurely beaked, without apical rim, red and turning black-purple when fully mature, drying shiny brown. Seeds 3-4.5 × 1.8-2.5 × 1.7-2.5 mm, yellow-brown. " [No means of external attachment]
	Puyravaud, J. P., Dufour, C., & Aravajy, S. (2003). Rain forest expansion mediated by successional processes in vegetation thickets in the Western Ghats of India. <i>Journal of Biogeography</i> , 3 (7), 1067-1080	"Table 1 Species characteristics" [<i>Breynia vitis-idaea</i> - Dispersal agent = Birds]

Qsn #	Question	Answer
708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Swapna, N., Radhakrishna, S., Gupta, A. K., & Kumar, A. (2010). Exudativory in the Bengal slow loris (<i>Nycticebus bengalensis</i>) in Trishna Wildlife Sanctuary, Tripura, northeast India. <i>American Journal of Primatology</i> , 72(2), 113-121	"Fruits formed only a small part of the diet (<1% of the feeding time) in both seasons. In fact only two episodes of frugivory were recorded; ripe berries of the tree <i>Breynia vitis-idaea</i> were consumed whole in January" [Seeds presumably survive gut passage]
	David, J. P., Manakadan, R., & Ganesh, T. 2015. Frugivory and seed dispersal by birds and mammals in the coastal tropical dry evergreen forests of southern India: A review. <i>Tropical Ecology</i> , 5 (1): 41-55	[Presumably Yes] "Appendix Table 1. Fruit traits and dispersal mode." ... "Species dispersed both by birds and mammals" [Includes <i>Breynia vitis idaea</i>]

801	Prolific seed production (>1000/m ²)	
	Source(s)	Notes
	Dayan, M., Reaviles, R. S., & Bandian, D. B. (2006). Indigenous forest tree species in Laguna province. DENR Recommends, 15a. Ecosystems Research and Development Bureau, Department of Environment and Natural Resources, Laguna	[Seed densities in wild unknown] "An erect, monoecious, slender, smooth shrub, this speice stands 1.5-4 m tall. Its leaves are distichous, elliptic to elliptic-ovate, 1-3 cm long (Fig. 7). The flower is very small, greenish and axillary, 1 mm in diameter. The fruit, somewhat fleshy, is pink to red which turns black when ripe and measures 2-3 mm in diameter. The seeds is black and has a very hard seed coat." ... "Seed count 200,000/kg"

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes
	Dayan, M., Reaviles, R. S., & Bandian, D. B. (2006). Indigenous forest tree species in Laguna province. DENR Recommends, 15a. Ecosystems Research and Development Bureau, Department of Environment and Natural Resources, Laguna	"Seed type With 49.55% initial MC, probably recalcitrant" ... "Seeds can be placed in bottles and stored at room temperature for three months only. After three months, the seeds will no longer be viable."

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	Lorence, D.H., Flynn, T.W. & Wagner, W.L. 1995. Contributions to the flora of Hawai'i. III. New additions, range extensions, and rediscoveries of flowering plants. <i>Bishop Museum Occasional Papers</i> 41: 19-58	[Unknown. Related taxon able to sucker & potentially resprout] " <i>Breynia disticha</i> ... It has become naturalized by spreading vegetatively via root suckers where formerly planted around abandoned homesites on Maui and Kauai"

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	

Qsn #	Question	Answer
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Possibly naturalizing on Oahu, Hawaiian Islands (confirmation needed)
- Other *Breynia* species are invasive
- Used as a fish poison, & potentially toxic to humans if ingested
- A shrub to small tree that can become a climber
- Reproduces by seeds
- Seeds dispersed by birds & other frugivorous animals
- Possibly water dispersed
- Limited ecological information reduces accuracy of risk prediction

Low Risk Traits

- No reports of invasiveness or naturalization (with the possible exception of Oahu), but no evidence of widespread introduction outside native range
- Unarmed (no spines, thorns or burrs)
- Ornamental & medicinal uses
- Not reported to spread vegetatively
- Seeds recalcitrant; lose viability after 3 months

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> No. Not known to form dense stands. Possibly shade tolerant

(B) Bird-dispersed?> Dispersed by birds

(C) Life cycle <4 years? Unknown

Outcome = Evaluate