

Taxon: <i>Rubus sieboldii</i> Blume	Family: Rosaceae
Common Name(s): Molucca raspberry palmleaf dewberry	Synonym(s): <i>Rubus abortivus</i> Kuntze <i>Rubus bracteosus</i> A.Gray ex Kuntze <i>Rubus moluccanus</i> sensu Hawaiian <i>Rubus subramiflorus</i> Kuntze

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 23 Mar 2020
WRA Score: 13.0	Designation: H(Hawai'i)	Rating: High Risk

Keywords: Rhizomatous Shrub, Disturbance Weed, Prickly, Spreads Vegetatively, Fleshy-Fruited

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)		
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	n
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	n=0, y = 1*multiplier (see Appendix 2)	y
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	y=1, n=-1	y
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	y
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
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
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence of domestication] "Native to Japan, southern China, and Okinawa"

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

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2020). Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to Japan, southern China, and Okinawa" [Okinawa's climate is subtropical]

202	Quality of climate match data	High
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to Japan, southern China, and Okinawa."

203	Broad climate suitability (environmental versatility)	
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to Japan, southern China, and Okinawa; in Hawaii cultivated and sparingly naturalized in disturbed areas, ca. 100 m, in Lawai Valley and town of Kilauea, Kauai." [Natural distribution from temperate to subtropical climates, and ability to naturalize in Hawaiian Islands suggests environmental versatility]

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes

Qsn #	Question	Answer
	Parker, J.L. & Parsons, B. 2012. New Plant Records from the Big Island for 2010–2011. Bishop Museum Occasional Papers 113: 65-74	"Molucca raspberry is native to Japan, southern China, and Okinawa and was previously known from large infestations on Kaua'i (Wagner, Herbst et al.1999). Three small naturalized populations of this species were found within a half-mile of each other in mountain View near Pszyk Rd. This species is on the state of Hawaii noxious Weed List and will be recommended to the BIISC plant crew for control. Material examined. HAWAII: Puna Distr. Pszyk Rd, mountain View, 2162495n, 278628e. Large, stiff-leaved, thorny sprawler with white flowers. no fruit observed, naturalized near small drainage, 31 Jan 2011, J. Parker & R. Parsons BIED152."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to Japan, southern China, and Okinawa; in Hawaii cultivated and sparingly naturalized in disturbed areas, ca. 100 m, in Lawai Valley and town of Kilauea, Kauai. First collected in 1970."

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i cultivated and sparingly naturalized in disturbed areas, ca. 100 m, in Uiuwa'i Valley and town of Kilauea, Kaua'i. First collected in 1970 (Herbst & Au s.n., BISH)."
	Parker, J.L. & Parsons, B. 2012. New Plant Records from the Big Island for 2010–2011. Bishop Museum Occasional Papers 113: 65-74	"Three small naturalized populations of this species were found within a half-mile of each other in Mountain View near Pszyk Rd."
	WRA Specialist. (2020). Personal Communication	No evidence of widespread introduction outside native range

301	Naturalized beyond native range	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"...in Hawaii cultivated and sparingly naturalized in disturbed areas, ca. 100 m, in Lawai Valley and town of Kilauea, Kauai. First collected in 1970."
	Parker, J.L. & Parsons, B. 2012. New Plant Records from the Big Island for 2010–2011. Bishop Museum Occasional Papers 113: 65-74	"Molucca raspberry is native to Japan, southern china, and okinawa and was previously known from large infestations on Kaua'i (Wagner, Herbst et al.1999). Three small naturalized populations of this species were found within a half-mile of each other in Mountain View near Pszyk rd. This species is on the State of Hawaii Noxious Weed list and will be recommended to the BIISc plant crew for control. Material examined. HAWAII: Puna distr. Pszyk rd, Mountain View, 2162495N, 278628E. large, stiff-leaved, thorny sprawler with white flowers. No fruit observed, naturalized near small drainage, 31 Jan 2011, J. Parker & R. Parsons BIED152."

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"...naturalized in disturbed areas..." [a disturbance weed with environmental impacts. See 3.04]

Qsn #	Question	Answer
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] "References: Global-XW-85, United States of America-N-101, Pacific-E-621, United States of America-N-301, United States of America-E-151, North America-X-790, United States of America-N-839, United States of America-X-229, United States of America-Q-1197, United States of America-N-1292, United States of America-E-1736."

304	Environmental weed	
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i cultivated and sparingly naturalized in disturbed areas, ca. 100 m, in Lawa'i Valley and town of Kilauea, Kaua'i." [Impacts at time of publication apparently not significant. Circumstances may have changed in the ensuing 20 years]
	Parker, J.L. & Parsons, B. 2012. New Plant Records from the Big Island for 2010–2011. Bishop Museum Occasional Papers 113: 65-74	"Three small naturalized populations of this species were found within a half-mile of each other in mountain View near Pszyk Rd. This species is on the state of Hawaii noxious Weed List and will be recommended to the BIISC plant crew for control." [Targeted for potential to have broader negative impacts]
	USDA Natural Resources Conservation Service. 2015. Hawaii State-listed Noxious Weeds. http://plants.usda.gov/java/noxious?rptType=State&statefips=15 . [Accessed 8 Jul 2015]	Listed as a noxious weed for the state of Hawaii, but with no description of impacts in agricultural or natural areas
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Listed as an environmental weed, naturalised, noxious weed, weed [Possible environmental weed, Impacts possibly similar to other invasive <i>Rubus</i> species]

305	Congeneric weed	y
	Source(s)	Notes
	Weber, E. 2017. Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	Several <i>Rubus</i> species are weeds of natural areas in Hawaii and around the world.

401	Produces spines, thorns or burrs	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"stems somewhat scandent, stout, elongate, with scattered prickles with elongate bases and moderately to densely tomentose. Leaves simple, coriaceous, broadly ovate to suborbicular, 6.5-22 cm long, 5-18 cm wide, palmately 5-nerved at base, upper surface with impressed veins, sparsely tomentose when young, glabrate with age, lower surface with conspicuous and somewhat raised veins, densely white to yellowish brown tomentose, also midvein and some lateral veins usually with prickles, margins irregularly sinuate-toothed to somewhat lobed, apex rounded, base subcordate, petioles 2- 6 cm long, covered with prickles and tomentose."

Qsn #	Question	Answer
402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. (2020). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Robust, rhizomatous shrubs" [Rosaceae. Not a parasite]

404	Unpalatable to grazing animals	y
	Source(s)	Notes
	Tsujino, R., & Yumoto, T. 2004. Effects of sika deer on tree seedlings in a warm temperate forest on Yakushima Island, Japan. Ecological Research, 19(3): 291-300	"Table 3 No. individuals (height ≥ 30 cm, d.b.h. < 1 cm) in the study plot (2500 m ²) and ratios of deer preference of each species (= no. herbivored individuals over total no. species)" [Rubus sieboldii listed as 24 "notherbivored" individuals and only 1 as "herbivored", suggesting unpalatability to deer]
	Takei, S., Ohga, K., Hayakawa, H., Yokoyama, J., Ito, K., Tebayashi, S. I., Arakawa, R. & Fukuda, T. (2013). Comparative Analysis of Prickles on Rubus sieboldii (Rosaceae) between Grazed and Ungrazed Areas in Southwestern Shikoku, Japan. Journal of Plant Studies, 2 (1): 152-157	[Prickles deter herbivory] "To examine induced defences of plants against the Sika deer, we conducted morphological analyses of prickles of Rubus sieboldii Blume (Rosaceae) between grazed (Kashima Island) and ungrazed areas (neighbour locations) in southwestern Shikoku. The length and density of prickles on leaves and around stems were measured. The prickles of the plants on Kashima Island were significantly longer and denser than those of the other areas, implying that the increased length and density of prickles were an induced defence of R. sieboldii on Kashima Island." ... "Takatsuki (1982a) performed a cafeteria test, offering 63 species of plants to Sika deer, 36 of which the deer avoided eating. One of these, Rubus sieboldii Blume, which is distributed from the western Honshu to Ryukyu archipelago (Moriyama, 1989), was probably not consumed because of its prickles which served as anti-herbivore defence (Figure 2B) (Takatsuki, 1982a)."

405	Toxic to animals	n
	Source(s)	Notes
	Hill, D. A. (1997). Seasonal variation in the feeding behavior and diet of Japanese macaques (<i>Macaca fuscata yakui</i>) in lowland forest of Yakushima. American Journal of Primatology, 43(4): 305-320	"APPENDIX. Plant Foods Eaten During Focal Animal Sampling ... fb, flower bud; fl, flower; ft, fruit; pi, pith" [several fruit & plant parts eaten by Japanese Macaques with no evidence of toxicity]
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

Qsn #	Question	Answer
406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Yun, H.Y. 2015. Systematic Mycology and Microbiology Laboratory, ARS, USDA. . Invasive Fungi. Tropical Asian Rubus rust-Hamaspora rubi-sieboldii. http://nt.ars-grin.gov/taxadescriptions/factsheets/index.cfm?thisapp=Hamasporarubi-sieboldii . [Accessed 9 Jul 2015]	"A number of rust fungi in the genus Hamaspora occur on Rubus in Asia, none of which appear to cause serious diseases. They are all characterized by having very long teliospores with an acute apex and are differentiated by teliospore length, septation, and apical characteristics. Most have hyaline paraphyses but H. rubi-sieboldii has brown paraphyses." ... "Host range: Rubus alceifolius Poir. (giant bramble), R. columellaris Tutcher, R. ellipticus Sm. (yellow raspberry), R. formosensis Kuntze, R. macgregorii F. Muell., R. multibracteatus H. Lévl. & Vaniot, R. pectinellus Maxim., R. phoenicolasius Maxim. (winberry), R. pinfaensis H. Lévl. & Vaniot, R. reflexus Ker Gawl., R. sieboldii Blume, Rubus spp."
	Plants for a Future. (2020). Rubus sieboldii. https://pfaf.org . [Accessed 23 Mar 2020]	"Plants in this genus are notably susceptible to honey fungus[200]."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Plants for a Future. (2020). Rubus sieboldii. https://pfaf.org . [Accessed 23 Mar 2020]	"Known Hazards: None known"
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence of toxicity to humans, and Rubus genus widely used with no evidence of toxicity

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	WRA Specialist. (2020). Personal Communication	Unknown. No evidence

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Plants for a Future. (2020). Rubus sieboldii. https://pfaf.org . [Accessed 23 Mar 2020]	"It can grow in semi-shade (light woodland) or no shade." [potentially shade tolerant]

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Plants for a Future. (2020). Rubus sieboldii. https://pfaf.org . [Accessed 23 Mar 2020]	"Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: acid, neutral and basic (alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil."

Qsn #	Question	Answer
411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Big Island Invasive Species Committee (BIISC). 2014. Early Detection Target - Molucca Raspberry. <i>Rubus sieboldii</i> . www.biisc.org/wp-content/uploads/BigIsland_RubSie.pdf	"Molucca raspberry grows and spreads very rapidly, smothering native vegetation." [May climb and overtop other vegetation]
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Robust, rhizomatous shrubs;" [Rhizomes may climb other vegetation]
412	Forms dense thickets	y
	Source(s)	Notes
	Skelton, A. 2015. Plant Pono & WRA Liaison. Pers. Comm. 30 June	"it indeed forms dense thickets... I cant remember offhand but when I did stems/ft^2 and I recall it was >100." [Stem densities >100 per sq. ft]
501	Aquatic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Terrestrial] "in Hawai'i cultivated and sparingly naturalized in disturbed areas, ca. 100 m"
502	Grass	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 23 Mar 2020]	Genus: <i>Rubus</i> Subgenus: <i>Malachobatus</i> Family: Rosaceae Subfamily: Rosoideae Tribe: Rubeae
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 23 Mar 2020]	"Genus: <i>Rubus</i> subgenus: <i>Malachobatus</i> " [Of 122 genera in the Rosaceae, only 4 genera are capable of fixing nitrogen: <i>Cercocarpus</i> (mountain mahoganies), <i>Chamaebatia</i> (mountain miseries), <i>Dryas</i> , <i>Purshia/Cowania</i> (bitterbrushes/cliffroses)]
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Robust, rhizomatous shrubs" [not a geophyte]

Qsn #	Question	Answer
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Kominami, Y., Sato, T., Takeshita, K., Manabe, T., Endo, A., & Noma, N. (2003). Classification of bird-dispersed plants by fruiting phenology, fruit size, and growth form in a primary lucidophyllous forest: an analysis, with implications for the conservation of fruit-bird interactions. <i>Ornithological Science</i> , 2(1): 3-23	No evidence of substantial reproductive failure in native habitat

602	Produces viable seed	y
	Source(s)	Notes
	Skelton, A. 2015. Plant Pono & WRA Liaison. Pers. Comm. 30 June	"we have never seen it produce seed" [Possibly limited seed set in Hawaiian Islands]
	Kominami, Y., Sato, T., Takeshita, K., Manabe, T., Endo, A., & Noma, N. (2003). Classification of bird-dispersed plants by fruiting phenology, fruit size, and growth form in a primary lucidophyllous forest: an analysis, with implications for the conservation of fruit-bird interactions. <i>Ornithological Science</i> , 2(1): 3-23	"Appendix 2. Traits and abundance of 111 endozoochorous plant species in the Aya Research Site." [Rubus sieboldii - Seed size = 1.2]
	Plants for a Future. (2020). <i>Rubus sieboldii</i> . https://pfaf.org . [Accessed 23 Mar 2020]	"Seed - requires stratification and is best sown in early autumn in a cold frame. Stored seed requires one month stratification at about 3°C and is best sown as early as possible in the year. Prick out the seedlings when they are large enough to handle and grow on in a cold frame. Plant them out into their permanent positions in late spring of the following year. "

603	Hybridizes naturally	y
	Source(s)	Notes
	Iwatsubo, Y., & Naruhashi, N. (1993). Cytogenetical study of <i>Rubus</i> × <i>tawadanus</i> (Rosaceae). <i>Cytologia</i> , 58(2), 217-221	" <i>Rubus</i> × <i>tawadanus</i> (2n= 2 l) has been reported to be a hybrid between <i>R. parvifolius</i> (2n= 14) and <i>R. sieboldii</i> (2n=28) (Migo 1970, Hatusima 1971). In this study, karyotypic comparisons among <i>R. x tawadanus</i> , <i>R. parvifolius</i> and <i>R. sieboldii</i> indicated that the 3x chromosome complement of <i>R. X tawadanus</i> was composed of one basic set of <i>R. parvifolius</i> and two from <i>R. sieboldii</i> . Hence the taxonomic treatment of <i>R. x tawadanus</i> was supported by the study."
	Randell, R. A., Howarth, D. G., & Morden, C. W. (2004). Genetic analysis of natural hybrids between endemic and alien <i>Rubus</i> (Rosaceae) species in Hawaii. <i>Conservation Genetics</i> , 5(2): 217- 230	[Hybridization documented in genus] "A population of putative hybrids between the endemic <i>Rubus hawaiiensis</i> and naturalized <i>R. rosifolius</i> was discovered in Kīpahulu Valley, on the island of Maui in the Hawaiian archipelago."

604	Self-compatible or apomictic	
	Source(s)	Notes

Qsn #	Question	Answer
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Flowers subsessile, 1 to several in very short, dense, corymbose inflorescences; sepals ovate to elliptic, ca. 12 mm long, densely tomentose, margins toothed or lacinate; petals white, suborbicular, ca. 15 mm long." [self-compatibility unknown]
	Keep, E. (1968). Incompatibility in <i>Rubus</i> with special reference to <i>R. idaeus</i> L. Canadian Journal of Genetics and Cytology, 10(2): 253-262	[Self-compatibility & self-incompatibility documented in genus] "Self-incompatibility is demonstrated in 11 out of 23 <i>Rubus</i> species, including wild raspberry <i>R. idaeus</i> , in which stylar inhibition of self-pollen-tubes occurs. In contrast, nearly all raspberry cultivars are fully self-fertile, probably, as is demonstrated for a derivative of Burnetholm, through mutation of S alleles to the St condition. Unilateral interspecific incompatibility in crosses with the self-compatible <i>R. occidentalis</i> occurs equally with self-incompatible wild raspberry or self-compatible raspberry cultivars as seed parents, showing that the latter retain their stylar activity. This suggests recent acquisition of self-fertility, cultivars being in the 'Sc' condition of Lewis and Crowe. It is suggested that vegetative propagation in <i>R. idaeus</i> provides many of the advantages of inbreeding and this, together with intense selection for vigour, ensures the maintenance of obligate outbreeding in the wild."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Plants for a Future. (2020). <i>Rubus sieboldii</i> . https://pfaf.org . [Accessed 23 Mar 2020]	"A deciduous Shrub. The flowers are hermaphrodite (have both male and female organs) and are pollinated by Insects."
	Kato, M. (2000). Anthophilous insect community and plant-pollinator interactions on Amami Islands in the Ryukyu Archipelago, Japan. Contributions from the Biological Laboratory, Kyoto University 29(2): 157-254	<i>Rubus sieboldii</i> - number of flower visitors observed = 3; Pollinating agents include <i>Tetralonia okinawae okinawae</i> (Hymenoptera, Apidae) and an unidentified species in the family Tipulidae (crane flies) [Entomophilous]

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Robust, rhizomatous shrubs" [Rhizomatous growth habit allows vegetative spread]
	Koike, F. 2007. Plant Trait Database in east and south-east Asia. Yokohama National University, Yokohama, Japan. vege1.kan.ynu.ac.jp/traits/PlantTraitAsia.pdf	<i>Rubus sieboldii</i> - Vegetative spread distance (m) = 10; Vegetative reproduction = Rooting from vine

607	Minimum generative time (years)	
	Source(s)	Notes
	WRA Specialist. (2020). Personal Communication	Unknown. May be able to spread vegetatively before flowering and fruiting

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	

Qsn #	Question	Answer
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"...sparingly naturalized in disturbed areas..." [possibly spread inadvertently]
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"cultivated and sparingly naturalized..."
703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	WRA Specialist. (2020). Personal Communication	No evidence that this plant is cultivated with commercial produce. Seed production in Hawaiian Islands may be limited
704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Kominami, Y., Sato, T., Takeshita, K., Manabe, T., Endo, A., & Noma, N. (2003). Classification of bird-dispersed plants by fruiting phenology, fruit size, and growth form in a primary lucidophyllous forest: an analysis, with implications for the conservation of fruit-bird interactions. <i>Ornithological Science</i> , 2(1): 3-23	"Appendix 2. Traits and abundance of 111 endozoochorous plant species in the Aya Research Site." [Rubus sieboldii adapted for bird & mammal dispersal, not wind]
705	Propagules water dispersed	n
	Source(s)	Notes
	Yamashiro, A., & Yamashiro, T. 2006. Seed Dispersal by Kerama Deer (<i>Cervus nippon keramae</i>) on Aka Island, the Ryukyu Archipelago, Japan. <i>Biotropica</i> , 38(3): 405-413	"...adapted to endozoochory by birds and mammals..." [fleshy-fruited, terrestrial plant with no apparent adaptations for water dispersal. Seed production in the Hawaiian Islands may be limited]
706	Propagules bird dispersed	y
	Source(s)	Notes
	Kominami, Y., Sato, T., Takeshita, K., Manabe, T., Endo, A., & Noma, N. (2003). Classification of bird-dispersed plants by fruiting phenology, fruit size, and growth form in a primary lucidophyllous forest: an analysis, with implications for the conservation of fruit-bird interactions. <i>Ornithological Science</i> , 2(1): 3-23	"Appendix 2. Traits and abundance of 111 endozoochorous plant species in the Aya Research Site." [Includes Rubus sieboldii]
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Fruit red, sweet."

Qsn #	Question	Answer
	Yamashiro, A., & Yamashiro, T. 2006. Seed Dispersal by Kerama Deer (<i>Cervus nippon keramae</i>) on Aka Island, the Ryukyu Archipelago, Japan. <i>Biotropica</i> , 38(3): 405-413	"We found three species with relatively large woody plant seeds— <i>Diospyros japonica</i> , <i>Psidium guajava</i> , and <i>Rubus sieboldii</i> —in fecal samples. These seeds were not damaged during feeding or digestion. The relatively large seeds of <i>Psidium guajava</i> germinated at especially high rates. Although the seeds of <i>Diospyros japonica</i> and <i>Rubus sieboldii</i> did not germinate, they remained hard 8 mo after sowing. In these species, both our germination treatment and the digestive process of kerama deer probably did not break the seed's dormancy. These three relatively large woody seeds have very hard seed coats adapted to endozoochory by birds and mammals. Therefore, the hardness of the seed coat seems to be a more important factor than size in the ability of woody plant seeds to survive feeding and digestion by herbivores."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Yamashiro, A., & Yamashiro, T. 2006. Seed Dispersal by Kerama Deer (<i>Cervus nippon keramae</i>) on Aka Island, the Ryukyu Archipelago, Japan. <i>Biotropica</i> , 38(3): 405-413	"...adapted to endozoochory by birds and mammals..." [seeds dispersed internally with no means of external attachment]

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Yamashiro, A., & Yamashiro, T. 2006. Seed Dispersal by Kerama Deer (<i>Cervus nippon keramae</i>) on Aka Island, the Ryukyu Archipelago, Japan. <i>Biotropica</i> , 38(3): 405-413	"We found three species with relatively large woody plant seeds— <i>Diospyros japonica</i> , <i>Psidium guajava</i> , and <i>Rubus sieboldii</i> —in fecal samples. "

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Parker, J.L. & Parsons, B. 2012. New Plant Records from the Big Island for 2010–2011. <i>Bishop Museum Occasional Papers</i> 113: 65-74	"No fruit observed, naturalized near small drainage"
	Skelton, A. 2015. Plant Pono & WRA Liaison. Pers. Comm. 30 June	"we have never seen it produce seed"
	WRA Specialist. (2020). Personal Communication	Seeds produced within native range, but apparently limited seed production in the Hawaiian Islands. Spreads primarily by vegetative means

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

Qsn #	Question	Answer
	<p>Yamashiro, A., & Yamashiro, T. 2006. Seed Dispersal by Kerama Deer (<i>Cervus nippon keramae</i>) on Aka Island, the Ryukyu Archipelago, Japan. <i>Biotropica</i>, 38(3): 405-413</p>	<p>[Potential to form a long lasting seed bank] "Although the seeds of <i>Diospyros japonica</i> and <i>Rubus sieboldii</i> did not germinate, they remained hard 8 mo after sowing. In these species, both our germination treatment and the digestive process of kerama deer probably did not break the seed's dormancy. These three relatively large woody seeds have very hard seed coats adapted to endozoochory by birds and mammals. Therefore, the hardness of the seed coat seems to be a more important factor than size in the ability of woody plant seeds to survive feeding and digestion by herbivores."</p>

803	Well controlled by herbicides	
	Source(s)	Notes
	<p>Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI</p>	<p>[Possibly. Herbicides provide control of other invasive <i>Rubus</i> spp.] "<i>Rubus argutus</i> ... Sensitive to foliar applications of triclopyr and picloram; dicamba not effective(50). Sensitive to metsulfuron. Susceptible to drizzle applications of triclopyr and of glyphosate in trail work on the Nāpali Coast of Kauaʻi. Chris Zimmer and Tim Tunison at HAVO reported triclopyr amine at 0.5 % of product without surfactant, sprayed to wet the foliage, was effective. Pat Bily (TNC) confirmed triclopyr amine at 0.5% of product without surfactant effective. Bily also reported 10% triclopyr ester product in vegetable-oil based carrier applied to 2–3 inches at base of each cane very effective." ... "<i>Rubus ellipticus</i> ... Effective control was achieved by drizzle application of triclopyr ester at 40% in water and picloram at 20% product in water applied to cut stumps(66). Applications to cut stumps with 50% imazapyr product in water, 50% triclopyr amine product in water, triclopyr ester in diesel oil, and metsulfuron (about 1 oz/qt or 28 g/l), were effective. Applications of 20% picloram product and 50% of Crossbow® (Dow Agrosiences) in water were less effective(65). Sensitive to foliar applications of triclopyr at 1 lb/acre and metsulfuron at 0.75 oz/acre. Also very sensitive to triclopyr at 1 lb/acre applied by drizzle application in a crop oil carrier. HAVO staff reported control with foliar application of glyphosate at 1% product or cut stump applications at 10% product in water (Chris Zimmer, HAVO)." ... "<i>Rubus niveus</i> ... Sensitive to drizzle application of triclopyr ester in a crop oil carrier at 1 lb/acre, and to very-low volume basal bark applications of triclopyr ester at 15% product in a crop oil carrier. Reportedly tolerant of triclopyr with water as the carrier (Glenn Shishido, DOFAW)." ... "<i>Rubus rosifolius</i> .. Sensitive to triclopyr ester in water and very sensitive to triclopyr ester in a crop oil carrier, each applied by the drizzle method at 1 lb/acre. HAVO staff reported control with foliar application of either glyphosate at 1% product or triclopyr ester at 1% product in water (Chris Zimmer, HAVO)."</p>

Qsn #	Question	Answer
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Big Island Invasive Species Committee (BIISC). 2014. Early Detection Target - Molucca Raspberry. <i>Rubus sieboldii</i> . www.biisc.org/wp-content/uploads/BigIsland_RubSie.pdf	"The plant also produces suckers from the base and will also sprout from roots." [Will resprout with herbicide treatment]

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2020). Personal Communication	Unknown. Seven <i>Rubus</i> species naturalized in the Hawaiian Islands. No biological control releases to date

Summary of Risk Traits:

High Risk / Undesirable Traits

- Grows in subtropical to temperate climates
- Naturalized on Hawaii and Kauai islands
- A disturbance weed with potential negative impacts to natural areas
- Other *Rubus* species have become invasive weeds
- Stems and leaves covered with prickles
- Unpalatable to browsing animals (prickles deter browsing)
- Tolerates many soil types
- Forms thickets & can potentially smother other vegetation
- Reproduces by seeds (at least within native range)
- Can hybridize with other *Rubus* species
- Able to spread vegetatively by root suckers and rhizomatous canes
- Seeds, when produced, dispersed by birds, mammals and intentionally by people
- Seeds, if produced, may persist in the soil
- Able to resprout after cutting

Low Risk Traits

- Non-toxic
- Seed production may be limited in the Hawaiian Islands, possibly minimizing long-distance dispersal