

Taxon: <i>Buddleja paniculata</i> Wall.	Family: Scrophulariaceae
Common Name(s): butterfly bush	Synonym(s): <i>B. gynandra</i> C. Marquand <i>Buddleja acutifolia</i> C. H. Wright

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 6 Nov 2017
WRA Score: 7.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Shrubby Tree, Ornamental, Fast-Growing, Dioecious, Wind-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	n
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n
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		
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n

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		
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	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation		
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	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)		
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
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence of domestication] "Forest edges in mountains, open woodlands, thickets; 500–3000 m. Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Yunnan [Bhutan, N India, Myanmar, Nepal, Vietnam]."
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
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 2 Nov 2017]	"Native: Asia-Temperate China: China - Guangxi, - Guizhou, - Hunan, - Jiangxi, - Sichuan, - Yunnan Asia-Tropical Indian Subcontinent: Bhutan; India; Nepal Indo-China: Myanmar; Vietnam"
202	Quality of climate match data	High
	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 2 Nov 2017]	
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forest edges in mountains, open woodlands, thickets; 500–3000 m." [Elevation range exceeds 1000 m, demonstrating environmental versatility]
	Plants for a Future. 2017. <i>Buddleja paniculata</i> . http://www.pfaf.org/User/ . [Accessed 2 Nov 2017]	"USDA hardiness - 7-10"

Qsn #	Question	Answer
204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forest edges in mountains, open woodlands, thickets; 500–3000 m. Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Yunnan [Bhutan, N India, Myanmar, Nepal, Vietnam]."
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 2 Nov 2017]	"Native: Asia-Temperate China: China - Guangxi, - Guizhou, - Hunan, - Jiangxi, - Sichuan, - Yunnan Asia-Tropical Indian Subcontinent: Bhutan; India; Nepal Indo-China: Myanmar; Vietnam"

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	Notes
	Lorence, D.H., Lorence, G. & Black, L. 1999. Specimen Details for <i>Buddleja paniculata</i> Wall.. ID Number 687510. Collection Number 8456, Bishop Museum, Honolulu, HI. http://nsdb.bishopmuseum.org/ . [Accessed 3 Nov 2017]	"USA - Hawaii - Kauai - Kokee, cabins along Hwy 550, SW of Lodge and Museum, Olapa" [Cultivated near cabins]
	Lorence, D.H. 1999. Specimen Details for <i>Buddleja paniculata</i> Wall.. ID Number 687510. Collection Number 8402. Bishop Museum, Honolulu, HI. http://nsdb.bishopmuseum.org/ . [Accessed 3 Nov 2017]	"USA - Hawaii - Kauai - Waimea, Kokee, Camp Sloggett, S of Mohihi Rd." [Cultivated]

301	Naturalized beyond native range	n
	Source(s)	Notes
	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 3 Nov 2017]	<i>Buddleja asiatica</i> Lour., <i>Buddleja davidii</i> Franch., & <i>Buddleja madagascariensis</i> Lam. recorded as naturalized. No records of <i>Buddleja paniculata</i> Wall. to date
	Imada, C. 2012. Hawaiian Native and Naturalized Vascular Plants Checklist (December 2012 update). Bishop Museum Technical Report 60. Bishop Museum, Honolulu, HI	<i>Buddleja asiatica</i> , <i>Buddleja davidii</i> , & <i>Buddleja madagascariensis</i> naturalized
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence to date

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence to date

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

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence to date

305	Congeneric weed	y
	Source(s)	Notes
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"Buddleja davidii...It is invasive because it quickly displaces primary native colonizers on fresh alluvial plains and accelerates succession to forests."
	Stock, D.H. & Wild, C.H. 2002. Natural propagation of orange buddleia (<i>Buddleja madagascariensis</i> Lamarck) in eastern Australia. Pp. 120-123 in Jacob, H.S. et al. (eds) 13th Australian Weeds Conference: weeds "threats now & forever?". CABI, Wallingford, UK	"The exotic ornamental scrambling bramble orange buddleia, <i>B. madagascariensis</i> , forms dense impenetrable thickets in various forest types in eastern Australia. The plant is widespread throughout the world and weedy in many locations. In Australia, it is found growing in patches in the national parks of the Border Ranges between Queensland and New South Wales where it is of great concern for the damage it might do to the rain forest where it grows. <i>B. madagascariensis</i> is sterile in Australia and no seeds have been seen on the plant despite extensive searches of plants in eastern Australia nor reported in the literature. It is therefore curious that the plant is able to establish and grow in the midst of national parks apparently distant from any source of infestation. This study investigates the hypothesis that <i>B. madagascariensis</i> can be spread by stem sections that may be carried by birds, water, or perhaps people, and that simply casting them upon the ground is sufficient to allow them to root and grow. Stems of <i>B. madagascariensis</i> were placed on the ground in rain forest under various circumstances and it was found that a small proportion of stems can root and grow under a wide range of conditions."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	A number of species are cited as invasive weeds

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Shrubs or small trees 1–6 m tall. Branchlets terete or nearly 4-angled, stellate tomentose. Stipules present, sometimes leafy. Petiole 0.2–2 cm; leaf blade narrowly elliptic, narrowly ovate, or less often ovate or elliptic, 2–25 ! 0.7–9 cm, abaxially stellate tomentose, adaxially slightly bullate, stellate tomentulose, and often with glandular hairs but glabrescent, base decurrent, margin entire or less often serrate, apex acuminate to rarely acute or obtuse; lateral veins 8–13 per side."

Qsn #	Question	Answer
402	Allelopathic	
	Source(s)	Notes
	Fan, P. (2009). Phytochemical and bioactivity investigations of three invasive neophytes <i>Buddleja davidii</i> Franch (Buddlejaceae), <i>Polygonum cuspidatum</i> Sieb. & Zucc. and <i>Polygonum sachalinensis</i> F. Schmidt ex Maxim (Nakai)(Polygonaceae). PhD Dissertation. University of Geneva	[Unknown. Allelopathy documented in genus] "This work aimed to reveal the invasive mechanism of invasive plant species and to study their beneficial uses. An acetylcholinesterase inhibitor linarin was isolated from <i>Buddleja davidii</i> Franch (Buddlejaceae), and the structure-activity relationship was studied. HPLC/UV/ESI-MS analyses demonstrated different phytochemical profiles of <i>Polygonum cuspidatum</i> Sieb. & Zucc. and <i>P. sachalinensis</i> F. Schmidt ex Maxim (Polygonaceae) from China and Switzerland. Seven compounds of 21 isolated compounds were reported for the first time from these two species. Allelopathy tests revealed strong phytotoxicity of the leaf and root extracts, and discovered two strong allelochemicals resveratrol and rhein, as well as piceid, resveratrolsides or piceatannol glucoside with stronger activity than (-) - catechin. Other biotests showed the potential of the isolated compounds against α -glucosidase, aromatase or as anti-inflammatory agents. At last the total content of resveratrol in the invasive Swiss variety of <i>P. cuspidatum</i> was measured to prove it a source of resveratrol."

403	Parasitic	n
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Shrubs or small trees 1–6 m tall. Branchlets terete or nearly 4-angled, stellate tomentose. Stipules present, sometimes leafy." [No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Pala, N. A., Negi, A. K., Shah, S., & Todaria, N. P. (2013). Floristic composition, ecosystem services and biodiversity value of temple landscapes in Garhwal Himalaya. <i>Indian Journal of Forestry</i> , 36(3), 353-362	"Table-2 : Showing the biodiversity values/ ecosystem services of different species" ... " <i>Buddleja paniculata</i> - Biodiversity Values/ ecosystem service = Fuelwood, Bee-forage, Soil binder" [Fodder, which is listed as a use of several other plants in the region, is not one of the listed values of <i>Buddleja paniculata</i> , suggesting it may be unpalatable]
	Deer-resistant Landscape Nursery. 2017. <i>Buddleia</i> -- Butterfly Bush. http://www.deerlandscape.com . [Accessed 6 Nov 2017]	Unknown for <i>Buddleja paniculata</i> , but several other species and cultivars identified as deer-resistant
	WRA Specialist. 2017. Personal Communication	Unknown, but <i>Buddleja</i> plants have been identified as deer resistant landscaping plants, suggesting possible unpalatability

405	Toxic to animals	
	Source(s)	Notes
	Joshi, A. R., & Joshi, K. 2005. Piscicidal plants of the Bagmati Watershed, Nepal: Traditional uses and indigenous practices. <i>Ethnobotany</i> 17: 184-186	[Fish poison. Effects on other animals unknown] "Table 1. Some piscicidal plants of the Bagmati watershed, Nepal." [<i>Buddleja paniculata</i> - Parts of the plant used = pounded leaves]

Qsn #	Question	Answer
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Fish toxin. Toxicity to other animals unknown] "Ritual, ceremonial, offered to God, waving a bunch of it before the God. Pounded young leaves as fish poison."

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Attique, M. R., Rafiq, M., Ghaffar, A., Ahmad, Z., & Mohyuddin, A. I. (2003). Hosts of <i>Bemisia tabaci</i> (Genn.) (Homoptera: Aleyrodidae) in cotton areas of Punjab, Pakistan. <i>Crop Protection</i> , 22(5), 715-720	"A survey for the host plants of <i>Bemisia tabaci</i> (Genn.) from the cotton-growing areas of Punjab, Pakistan, during 1996–1999 revealed 160 plant species belonging to 113 genera of 42 families including crops, ornamentals, fruit and forest trees, and weeds were recorded. Among these, 79 plant species were recorded for the first time from this region. Out of these, 36 host plant species have not been reported previously from anywhere. So far, a total of 229 hosts of <i>B. tabaci</i> have been recorded from Pakistan including 69 plants noted by previous workers but not recorded as hosts during the present survey." [Buddleja paniculata - Host status = Rare; Pest status = Minor]
	Singh, G., & Singh, R. (2017). Food plant records of Aphidini (Aphidinae: Aphididae: Hemiptera) in India. <i>Journal of Entomology and Zoology Studies</i> , 5(2): 1280-1302	[Importance unknown] "The Aphidini is one of the 2 tribes of the subfamily Aphidinae (Aphididae: Hemiptera) containing about 830 species/subspecies assigned to 33 genera. Out of these, only 9 genera and 70 species/subspecies were recorded from India infesting 940 plant species belonging to 138 families, out of which only 19 families are monocot. Indian Aphidini are recorded mostly on the plant family Asteraceae (102 plant species), followed by Fabaceae (96 plant species), Poaceae (92 plant species), Lamiaceae (46 plant species), Rosaceae (38 plant species), Solanaceae (34 plant species), Apocyanaceae (28 plant species), Rubiaceae (26 plant species), Malvaceae (25 plant species), Rutaceae (22 plant species), Cucurbitaceae (22 plant species), Polygonaceae (21 plant species), etc. Out of 70 described species of Aphidini from India, 14 species are monophagous; 40 species are oligophagous infesting 2 to 20 plant species; and 8 species are moderately polyphagous infesting 21 to 55 plant species while 8 species are highly polyphagous feeding on 55 upto 569 plant species. The present contribution provides updated checklist of Indian Aphidini with the valid scientific name of the aphids as well as their food plants."

407	Causes allergies or is otherwise toxic to humans	
	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	[Fish toxin. No reports of toxicity to humans, but possibly that inadvertent poisoning could occur. Unlikely, but caution may be warranted] "Ritual, ceremonial, offered to God, waving a bunch of it before the God. Pounded young leaves as fish poison."

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes

Qsn #	Question	Answer
	Leeuwenberg, A. J. M. (1979). The Loganiaceae of Africa XVIII. <i>Buddleja</i> L. II. Revision of the African and Asiatic species. H. Veenman & Zonen B.V., Wageningen, Netherlands	[Fire ecology unknown. No evidence found] "Forest edges, thickets, and open places, often on riverbanks, in the mountains."
409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Top Tropicals. 2017. <i>Buddleja paniculata</i> . https://toptropicals.com/catalog/uid/Buddleja_paniculata.htm . [Accessed 3 Nov 2017]	"It cannot grow in the shade. It requires dry or moist soil and can tolerate drought. It can tolerate atmospheric pollution."
	Plants for a Future. 2017. <i>Buddleia paniculata</i> . http://www.pfaf.org/User/ . [Accessed 3 Nov 2017]	"It cannot grow in the shade."
	Leeuwenberg, A. J. M. (1979). The Loganiaceae of Africa XVIII. <i>Buddleja</i> L. II. Revision of the African and Asiatic species. H. Veenman & Zonen B.V., Wageningen, Netherlands	[Open places. Suggests high light environments] "Forest edges, thickets, and open places, often on riverbanks, in the mountains. "
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Plants for a Future. 2017. <i>Buddleia paniculata</i> . http://www.pfaf.org/User/ . [Accessed 6 Nov 2017]	"Succeeds in most well-drained garden soils but it prefers a rich loamy soil[1, 11, 200]. Very tolerant of alkaline soils[200]."
411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Shrubs or small trees 1–6 m tall. Branchlets terete or nearly 4-angled, stellate tomentose. Stipules present, sometimes leafy."
412	Forms dense thickets	
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forest edges in mountains, open woodlands, thickets" [Unknown if a component of thickets, or forms thickets itself]
501	Aquatic	n
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Shrubs or small trees 1–6 m tall. Branchlets terete or nearly 4-angled, stellate tomentose. Stipules present, sometimes leafy." ... "Forest edges in mountains, open woodlands, thickets; 50–3000 m."
502	Grass	n

Qsn #	Question	Answer
	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 2 Nov 2017]	Family: Scrophulariaceae Tribe: Buddlejeae

503	Nitrogen fixing woody plant	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 2 Nov 2017]	Family: Scrophulariaceae Tribe: Buddlejeae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Shrubs or small trees 1–6 m tall. Branchlets terete or nearly 4-angled, stellate tomentose. Stipules present, sometimes leafy."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence. Broadly distributed] "Forest edges in mountains, open woodlands, thickets; 500–3000 m. Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Yunnan [Bhutan, N India, Myanmar, Nepal, Vietnam]."

602	Produces viable seed	y
	Source(s)	Notes
	Plants for a Future. 2017. <i>Buddleia paniculata</i> . http://www.pfaf.org/User/ . [Accessed 3 Nov 2017]	"Propagation Seed - cold stratify for 4 weeks at 4°C [138] and surface sow the seed in February/March in a greenhouse [78, 113] (the pre-chilling might not be required for this species). Germination usually takes place within 3 - 4 weeks at 21°C [138]. When large enough to handle, prick the seedlings out into individual pots and grow them on in the greenhouse for at least their first winter, planting them out into their permanent positions in late spring or early summer, after the last expected frosts."
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Seeds oblong, 1–1.2 mm, winged at both ends."

603	Hybridizes naturally	y
	Source(s)	Notes

Qsn #	Question	Answer
	Leeuwenberg, A. J. M. (1979). The Loganiaceae of Africa XVIII. <i>Buddleja</i> L. II. Revision of the African and Asiatic species. H. Veenman & Zonen B.V., Wageningen, Netherlands	"A great number of artificial hybrids of <i>Buddleja</i> species are in cultivation." [Includes <i>B. alternifolia</i> x (<i>B. asiatica</i> x <i>B. paniculata</i>), <i>B. asiatica</i> x (<i>B. crispa</i> x <i>B. paniculata</i>); <i>B. asiatica</i> x <i>B. paniculata</i> ; <i>B. crispa</i> x <i>B. paniculata</i>]
	Plants for a Future. 2017. <i>Buddleia paniculata</i> . http://www.pfaf.org/User/ . [Accessed 6 Nov 2017]	"A very ornamental plant[1], it hybridizes freely with other members of this genus[200]."

604	Self-compatible or apomictic	n
	Source(s)	Notes
	Plants for a Future. 2017. <i>Buddleia paniculata</i> . http://www.pfaf.org/User/ . [Accessed 3 Nov 2017]	"The flowers are dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required) and are pollinated by Bees, lepidoptera. The plant is not self-fertile."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Inflorescences terminal and in axils of apical leaves, paniculate or thyrsoid cymes, 3–25 ! 2–12 cm. Calyx campanulate, 2.5–4 mm, outside stellate tomentose and mostly with glandular hairs, inside usually glabrous; lobes triangular to broadly triangular, 0.3–1.2 mm. Corolla white, pink, or lavender, with an orange throat, 7–12 mm, outside stellate tomentose and with some glandular hairs; tube 6–10 ! 1.2–1.6(–2) mm, inside pilose above base; lobes suborbicular, –2.5 ! 1.8–2.2 mm. Stamens inserted just below corolla mouth, included; anthers oblong, 1–1.2 mm. Ovary ovoid, 1.2–2 ! 0.8–1.2 mm, stellate pubescent and with glandular hairs except for glabrous base. Stigma clavate, 1–1.5 mm."
	Gaur, R. D., Tiwari, P., Tiwari, J. K., Rawat, D. S., & Ballabha, R. (2014). Bee forage potential of Garhwal Himalaya, India. <i>Indian Journal of Fundamental and Applied Life Sciences</i> , 4, 196-204	"Table 1: Checklist of the bee forage plants from Garhwal Himalaya, India" [Includes <i>Buddleja paniculata</i>]
	Plants for a Future. 2017. <i>Buddleia paniculata</i> . http://www.pfaf.org/User/ . [Accessed 3 Nov 2017]	"The flowers are dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required) and are pollinated by Bees, lepidoptera. The plant is not self-fertile."

Qsn #	Question	Answer
606	Reproduction by vegetative fragmentation	
	Source(s)	Notes
	Plants for a Future. 2017. <i>Buddleia paniculata</i> . http://www.pfaf.org/User/ . [Accessed 6 Nov 2017]	"Cuttings of half-ripe wood, July/August in a frame[11, 113]. Use short side-shoots[78]. Very high percentage[113]. Cuttings of mature wood of the current season's growth, 15 - 20cm long, October/November in a frame[200]." [Propagated vegetatively. Unknown if natural vegetative spread occurs]
	Norman, E.M. 2000. <i>Buddlejaceae</i> . <i>Flora Neotropica</i> 81: 1-224	[Unknown for <i>B. paniculata</i> . Documented in genus] "In some species, notably <i>B. crotonoides</i> , <i>B. scordioides</i> , and <i>B. incana</i> , basal branches may root and the plants can spread vegetatively some distance from the parent stock. An extreme of this phenomenon may be seen in the African <i>B. madagascariensis</i> , often grown in tropical and sub-tropical regions, which forms thickets."
607	Minimum generative time (years)	
	Source(s)	Notes
	Plants for a Future. 2017. <i>Buddleia paniculata</i> . http://www.pfaf.org/User/ . [Accessed 6 Nov 2017]	[Unknown, but rapid growth rate indicates possible rapid maturation] "Plants are fairly fast growing and have an extensive root system, they are useful as pioneer species for restocking bare hillsides and preventing soil erosion on the slopes[158]."
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown. Other taxa spread through dumped garden waste. Small seeds adapted for wind-dispersal could also adhere to footwear, vehicles or other equipment in soil, but evidence lacking at this time.
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	The Royal Horticultural Society. 2017. <i>Buddleja paniculata</i> . https://www.rhs.org.uk/Plants/2459/Buddleja-paniculata/Details . [Accessed 3 Nov 2017]	Cultivated and sold as an ornamental
703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	No evidence. Unlikely, given lack of cultivation with produce or other commercial products

Qsn #	Question	Answer
704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Leeuwenberg, A. J. M. (1979). The Loganiaceae of Africa XVIII. <i>Buddleja</i> L. II. Revision of the African and Asiatic species. H. Veenman & Zonen B.V., Wageningen, Netherlands	[Winged-seeds, presumably wind-dispersed] "Seeds pale brown, reticulate 1-1.2 x 0.3-0.4 x 0.2-0.3 mm, winged at both ends; grain 0.6 x 0.3 x 0.2 mm."
705	Propagules water dispersed	y
	Source(s)	Notes
	Leeuwenberg, A. J. M. (1979). The Loganiaceae of Africa XVIII. <i>Buddleja</i> L. II. Revision of the African and Asiatic species. H. Veenman & Zonen B.V., Wageningen, Netherlands	[Distribution along riverbanks suggest wind-dispersed seeds are also probably secondarily dispersed by water] "Seeds pale brown, reticulate, 1-1.2 x 0.3-0.4 x 0.2-0.3 mm, winged at both ends; grain 0.6 x 0.3 x 0.2 mm." ... "Forest edges, thickets, and open places, often on riverbanks, in the mountains."
	Western Australian Herbarium. 2017. FloraBase - The Western Australian Flora - <i>Buddleja madagascariensis</i> . Department of Environment and Conservation. http://florabase.calm.wa.gov.au . [Accessed 3 Nov 2017]	[Related taxon spread by water] "Reproduction. Stem fragments. Dispersal. Water, garden refuse."
706	Propagules bird dispersed	n
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence of consumption] "Capsule ellipsoid, 4-7 ! 2-3 mm, stellate pubescent, glabrescent. Seeds oblong, 1-1.2 mm, winged at both ends."
707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Seeds oblong, 1-1.2 mm, winged at both ends." [Seeds small & wind-dispersed, but could possibly adhere to animals in soil.]
708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Capsule ellipsoid, 4-7 ! 2-3 mm, stellate pubescent, glabrescent. Seeds oblong, 1-1.2 mm, winged at both ends." [No adaptations for frugivory]
801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Wu, Z. Y. & P. H. Raven, eds. 1996. Flora of China. Vol. 15 (Myrsinaceae through Loganiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Seed number & density unknown] "Capsule ellipsoid, 4-7 ! 2-3 mm, stellate pubescent, glabrescent. Seeds oblong, 1-1.2 mm, winged at both ends."

Qsn #	Question	Answer
802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2017) Seed Information Database (SID). Version 7.1. Available from: http://data.kew.org/sid/ . [Accessed 6 Nov 2017]	Unknown for <i>Buddleja paniculata</i> . Seeds of several other species reported to have orthodox seeds, suggesting possibility of persistence in soil seed bank
803	Well controlled by herbicides	
	Source(s)	Notes
	Western Australian Herbarium. 2017. FloraBase - The Western Australian Flora - <i>Buddleja madagascariensis</i> . Department of Environment and Conservation. http://florabase.calm.wa.gov.au . [Accessed]	"Hand pull small plants removing all stem material. For stems greater than 7 cm diameter, apply 250 ml Access® in 15 L of diesel to basal 50 cm of stem (basal bark) or cut and paint with 50% glyphosate." [Herbicides are effective on other invasive <i>Buddleja</i> species]
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Western Australian Herbarium. 2017. FloraBase - The Western Australian Flora - <i>Buddleja madagascariensis</i> . Department of Environment and Conservation. http://florabase.calm.wa.gov.au . [Accessed 3 Nov 2017]	" <i>Buddleja madagascariensis</i> " ... "Vegetative regeneration strategy. Resprouts, produces root suckers, stem layering, broken stems." [Related taxa can resprout when cut back]
	Plants for a Future. 2017. <i>Buddleia paniculata</i> . http://www.pfaf.org/User/ . [Accessed 3 Nov 2017]	"It resprouts freely from the base if cut back by severe weather [200]."
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown. No biological control agents currently known or being developed for <i>Buddleja</i> species in the Hawaiian Islands

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Grows in tropical & temperate climates
- Other species have become invasive
- Tolerates many soil types
- Reproduces by seeds
- Hybridizes with other *Buddleja* species
- Seeds dispersed by wind, secondarily by water & intentionally by people
- Able to coppice & resprout after cutting
- Limited ecological information may reduce accuracy of risk prediction

Low Risk Traits

- No reports of invasiveness or naturalization, but no evidence of widespread introduction outside native range
- Unarmed (no spines, thorns, or burrs)
- Ornamental
- Dioecious (requires male & female plants to produce viable seed)
- Herbicides may provide effective control