

Taxon: <i>Dendrobium crumenatum</i> Sw.	Family: Orchidaceae
Common Name(s): dove orchid pigeon orchid	Synonym(s): <i>Aporum crumenatum</i> (Sw.) Brieger <i>Callista crumenata</i> (Sw.) Kuntze <i>Ceraia ephemera</i> (J.J.Sm.) M.A.Clem. <i>Dendrobium ephemerum</i> (J.J.Sm.) <i>Epidendrum caninum</i> Burm.f. <i>Onychium crumenatum</i> (Sw.) Blume

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 26 Jul 2018
WRA Score: 1.0	Designation: L	Rating: Low Risk

Keywords: Epiphytic Herb, Naturalized, Shade-Tolerant, Self-Incompatible, 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	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed		
305	Congeneric weed		
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		

Qsn #	Question	Answer Option	Answer
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y
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	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation		
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
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		
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
	Wuart, C. (2012). Medicinal Plants of China, Korea, and Japan: Bioresources for Tomorrow's Drugs and Cosmetics. CRC Press, Boca Raton, FL	[No evidence of domestication] "History: This plant was first formally described in Journal für die Botanik by Olof Peter Swartz in 1799. Swartz (1760–1818) was a Swedish botanist." ... "Medicinal uses: In Cambodia, Laos, and Vietnam, this plant is used to remove impurities from the blood. In Malaysia, the plant is used to heal boils and the juice extracted from the pseudobulbs is used to assuage earache."
	Wu, Z. Y., Raven, P. H. & Hong, D. Y. eds. 2009. Flora of China. Vol. 25 (Orchidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	No evidence of domestication

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2018. 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. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 25 Jul 2018]	"Native Asia-Temperate EASTERN ASIA: Taiwan Asia-Tropical INDIAN SUBCONTINENT: Sri Lanka INDO-CHINA: Cambodia, India, [Andaman and Nicobar] Laos, Myanmar, Thailand, Vietnam MALESIA: Indonesia, Malaysia, Philippines"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 25 Jul 2018]	

203	Broad climate suitability (environmental versatility)	n
-----	---	---

Qsn #	Question	Answer
	Source(s)	Notes
	Beeretz, L. (2015). Diversity of Vascular Epiphytes in Jungle Rubber Along a Distance Gradient to Bukit Duabelas National Park in Sumatra (Indonesia). Master Thesis. University of Göttingen, Göttingen, Germany	"Additionally two other species will be characterized as generalist species - <i>Dendrobium crumenatum</i> (orchid) and <i>Pyrrosia pilloselloides</i> (fern), both species showed relative wide vertical distributions, with <i>Pyrrosia pilloselloides</i> tending to the upper and <i>Dendrobium crumenatum</i> tending to the lower JZ zones" ... " <i>Dendrobium crumenatum</i> is known to grow from coastal areas to forests and even in urban habitats (Leong & Wee, 2013). From Hawaii this orchid is even reported to be neophytic (Ackerman, 2012) and it was one of the first orchids recolonizing Krakatau after its eruption in 1883 (Partomihardjo, 1992). It can be assumed that <i>Dendrobium crumenatum</i> and <i>Pyrrosia pilloselloides</i> both have wide ecological amplitudes."
	Ram, A. T., Shamina, M., & Pradeep, A. K. (2015). <i>Dendrobium crumenatum</i> (Orchidaceae): A new record for mainland India. <i>Rheedea</i> , 25(1), 69-71	"Growing in shady places on tree trunks in evergreen forest at an elevation of 1250 m"
	Teoh, E. S. (2016). <i>Medicinal Orchids of Asia</i> . Springer, Switzerland	"This lowland orchid (growing at 0–500 m) enjoys a large distribution extending from India and southern China through the Malay Archipelago to the Philippines."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Frohlich, D. & Lau, A. 2010. New plant records from O'ahu for 2008. <i>Bishop Museum Occasional Papers</i> 107: 3-18	" <i>Dendrobium crumenatum</i> ... This species, which is native to Sri Lanka, Burma, Indochina, throughout Malesia and the Philippines to Taiwan, was found spreading in the notches of <i>Plumeria</i> and other trees on surveys of Nu'uaniu and Mānoa Valleys."
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 25 Jul 2018]	"Native Asia-Temperate EASTERN ASIA: Taiwan Asia-Tropical INDIAN SUBCONTINENT: Sri Lanka INDO-CHINA: Cambodia, India, [Andaman and Nicobar] Laos, Myanmar, Thailand, Vietnam MALESIA: Indonesia, Malaysia, Philippines"

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Wiert, C. (2012). <i>Medicinal Plants of China, Korea, and Japan: Bioresources for Tomorrow's Drugs and Cosmetics</i> . CRC Press, Boca Raton, FL	"It is grown as an ornamental plant."
	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 26 Jul 2018]	"Locations: Foster Botanical Garden"

Qsn #	Question	Answer
	PlantUse contributors. (2018). <i>Dendrobium</i> (PROSEA). PlantUse. http://uses.plantnet-project.org/en/Dendrobium_(PROSEA) . [Accessed 26 Jul 2018]	"Of the <i>Dendrobium</i> species treated here, <i>D. crumenatum</i> , <i>D. nobile</i> and <i>D. purpureum</i> are also cultivated as ornamentals in Europe."
	Ackerman, J. D. 2007. Invasive orchids: weeds we hate to love. <i>Lankesteriana</i> , 7(1-2): 19-21	"TABLE 1. Orchid species naturalized in Puerto Rico." [<i>Dendrobium crumenatum</i> naturalized]
	Frohlich, D. & Lau, A. 2010. New plant records from O'ahu for 2008. <i>Bishop Museum Occasional Papers</i> 107: 3-18	"This species, which is native to Sri Lanka, Burma, Indochina, throughout Malesia and the Philippines to Taiwan, was found spreading in the notches of <i>Plumeria</i> and other trees on surveys of Nu'uaniu and Mānoa Valleys."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Frohlich, D. & Lau, A. 2010. New plant records from O'ahu for 2008. <i>Bishop Museum Occasional Papers</i> 107: 3-18	" <i>Dendrobium crumenatum</i> ... This species, which is native to Sri Lanka, Burma, Indochina, throughout Malesia and the Philippines to Taiwan, was found spreading in the notches of <i>Plumeria</i> and other trees on surveys of Nu'uaniu and Mānoa Valleys."
	Ackerman, J. 2012. Orchids gone wild. <i>Orchids</i> , 81(2): 88-93	" <i>Dendrobiums</i> are perhaps the most commonly cultivated genus in Hawaii and have been for a long time. Yet the pigeon orchid, <i>Dendrobium crumenatum</i> , was only just recently reported naturalized in the islands (Frohlich and Lau 2010). Considering the popularity of this orchid, its late establishment is somewhat surprising — but there is evidence that it is spreading fast. A population was first reported thriving on frangipani (<i>Plumeria rubra</i>). Because the locality was near the University, my students and I went up the valley and found the plants. A quick check in the neighborhood revealed other plants growing on coconut palms next to garbage cans. This was followed by a visit to my grandfather's old place farther up the valley. And there upon the trees next to the road were many plants in flower, which was lucky because local populations of <i>Den. crumenatum</i> flower simultaneously and the flowers last but one day."
	Ram, A. T., Shamina, M., & Pradeep, A. K. (2015). <i>Dendrobium crumenatum</i> (Orchidaceae): A new record for mainland India. <i>Rheedea</i> , 25(1), 69-71	"It is probably introduced and naturalised in Sri Lanka (Jayaweera, 1981)."
	Ackerman, J. D. 2007. Invasive orchids: weeds we hate to love. <i>Lankesteriana</i> , 7(1-2): 19-21	"TABLE 1. Orchid species naturalized in Puerto Rico." [<i>Dendrobium crumenatum</i> naturalized]
	Mújica, E., & González, E. (2015). A new checklist of orchid species from Cuba. <i>Lankesteriana</i> , 15(3), 219-269	[Garden escape in Cuba] "Recently, colonization by <i>Acampe rigida</i> (Buch.-Ham. ex Sm.) P.F.Hunt, <i>Cymbidium</i> sp., <i>Dendrobium crumenatum</i> Sw., and <i>Papilionanthe teres</i> (Roxb.) Schltr., was observed in close proximity to the Soroa Orchid Botanical Garden, suggesting that these species are capable of escaping cultivation without human assistance (Bocourt, pers. comm. 2015). Thus, it is plausible that these orchids will eventually become naturalized, adding to the total number."

Qsn #	Question	Answer
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

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

304	Environmental weed	
	Source(s)	Notes
	Friedmann, F. (1991). The threatened plants of the flora of the Seychelles and their conservation. Pp. 193-208 in V.H. Heywood and P.S. Wyse Jackson (eds.). Tropical Botanic Gardens, Their Role in Conservation and Development. Academic Press, London	[May be competing with native orchids] "Even an orchid such as <i>Dendrobium crumenatum</i> which colonizes the shady rocks and tree trunks at medium altitude, has come to compete with indigenous orchids by occupying their ecological niche."

305	Congeneric weed	
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	A number of <i>Dendrobium</i> species are naturalized, & some are listed as weeds, but evidence of negative impacts is lacking to date

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wu, Z. Y., Raven, P. H. & Hong, D. Y. eds. 2009. Flora of China. Vol. 25 (Orchidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Stems slightly compressed, cylindric, 40–70 cm, upper part slender, with 3 or 4 internodes dilated and fusiform above base, dilated portion of stem to 2 cm in diam., often with longitudinal ridges. Leaves distichous on middle part of stem, ovate-oblong, ca. 6 × 2.5 cm, leathery, with clasping sheaths at base, apex obtuse and unequally bilobed."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown. Epiphytic. No evidence found

Qsn #	Question	Answer
403	Parasitic	n
	Source(s)	Notes
	Wu, Z. Y., Raven, P. H. & Hong, D. Y. eds. 2009. Flora of China. Vol. 25 (Orchidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Stems slightly compressed, cylindric, 40-70 cm, upper part slender, with 3 or 4 internodes dilated and fusiform above base, dilated portion of stem to 2 cm in diam., often with longitudinal ridges." [Orchidaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown. Epiphytic. Unlikely to be consumed by browsing or grazing animals

405	Toxic to animals	n
	Source(s)	Notes
	Useful Tropical Plants Database. (2018). <i>Dendrobium crumenatum</i> . http://tropical.theferns.info/viewtropical.php?id=Dendrobium+crumenatum . [Accessed 26 Jul 2018]	"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

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	PlantUse contributors. (2018). <i>Dendrobium</i> (PROSEA). PlantUse. http://uses.plantnet-project.org/en/Dendrobium_(PROSEA) . [Accessed 26 Jul 2018]	"Many different viruses (e.g. <i>Dendrobium</i> Mosaic Potyvirus, <i>Cymbidium</i> Mosaic Potexvirus), fungi and bacteria are known to attack <i>Dendrobium</i> , while cockroaches, scale insects, caterpillars, red spider mites and slugs can be serious pests, although they rarely eliminate the plants entirely. Young mistletoe (<i>Loranthus pentandrus</i> L.) plants were found growing on the stems of <i>D. crumenatum</i> in the garden of the Botany Department of the National University of Singapore."

Qsn #	Question	Answer
407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Teoh, E. S. (2016). <i>Medicinal Orchids of Asia</i> . Springer, Switzerland	[Medicinal. No evidence of toxicity] "Herbal Usage: Juice from the crushed pseudobulbs, fresh, boiled or roasted, was dropped into the ear to treat pain caused by small abscesses, boils or other intractable swellings in the external ear (bunting telinga, Malay) in Malaysia and earache in Indonesia (Ridley 1906, 1907)."
	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	[Medicinal. No evidence of toxicity] "Pounded leaves and fruits applied to boils and pimples; pounded leaves boiled in coconut oil and rubbed on body as febrifuge. The juice of the heated pseudobulbs used in infected ears, earache. Magic, bewitchment, plant used for sprinkling water through the house after a death occurred in it to keep the spirit from haunting it."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Wiert, C. (2012). <i>Medicinal Plants of China, Korea, and Japan: Bioresources for Tomorrow's Drugs and Cosmetics</i> . CRC Press, Boca Raton, FL	[Epiphytic. No evidence of increased fire risk] "This epiphytic orchid grows on trees in a geographical area covering Taiwan, Cambodia, India, Andaman islands, Indonesia, Laos, Malaysia, Burma, the Philippines, Sri Lanka, Thailand, and Vietnam."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Friedmann, F. (1991). The threatened plants of the flora of the Seychelles and their conservation. Pp. 193-208 in V.H. Heywood and P.S. Wyse Jackson (eds.). <i>Tropical Botanic Gardens, Their Role in Conservation and Development</i> . Academic Press, London	"Even an orchid such as <i>Dendrobium crumenatum</i> which colonizes the shady rocks and tree trunks at medium altitude, has come to compete with indigenous orchids by occupying their ecological niche."
	Ram, A. T., Shamina, M., & Pradeep, A. K. (2015). <i>Dendrobium crumenatum</i> (Orchidaceae): A new record for mainland India. <i>Rheedea</i> , 25(1), 69-71	"Habitat: Growing in shady places on tree trunks in evergreen forest at an elevation of 1250 m in Pandimotta, Shenduruni Wildlife Sanctuary, Kollam District, Kerala."
	NParks Flora&FaunaWeb. (2018). <i>Dendrobium crumenatum</i> . https://florafaunaweb.nparks.gov.sg/Special-Pages/plant-detail.aspx?id=1924 . [Accessed 26 Jul 2018]	"Light Preference : Full Sun, Semi-Shade"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes

Qsn #	Question	Answer
	Rafee, M. I. B. M. (2018). Conservation of epiphytic orchids in urbanized tropical environments. PhD Dissertation. National University of Singapore	[An epiphyte, but may be dependent on humus content on host tree] "Dendrobium crumenatum's germination tended to occur on larger trees, perhaps the result of greater humus content resulting from greater surface area of larger trees. The larger surface area also permits greater fungal spore interception, increasing the probability of OMF establishment over time (Izuddin and Webb 2015). The association between D. crumenatum and humus suggests that this species' germination may be more dependent on mineral nutrients (e.g., nitrogen, phosphorus) than other study species (Zotz and Asshoff 2010; Zotz et al. 2011). As mentioned, pockets of humus are also important water sources and hence may facilitate germination by preventing seed desiccation and promoting water imbibition (Scott and Carey 2002; Yoder et al. 2000)."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Seidenfaden, G., Wood, J.J.& Holttum, R.E. 1992. The orchids of peninsular Malaysia and Singapore. Olsen & Olsen, Fredensborg, Denmark	"This plant, like Spathoglottis, has sympodial growth, but it has many differences from Spathoglottis. In the first place, it is an epiphyte, growing on trees or rocks in fairly exposed positions, where its roots do not have such a continuous supply of water as those of Spathoglottis growing in the earth." [Epiphytic, but not climbing or smothering]

412	Forms dense thickets	n
	Source(s)	Notes
	Teoh, E. S. (2016). Medicinal Orchids of Asia. Springer, Switzerland	[Epiphytic. No evidence] "Large colonies of Dendrobium crumenatum and Bulbophyllum vaginatum are found on old Rain Trees (Samanea samaan) in Singapore"

501	Aquatic	n
	Source(s)	Notes
	Wiert, C. (2012). Medicinal Plants of China, Korea, and Japan: Bioresources for Tomorrow's Drugs and Cosmetics. CRC Press, Boca Raton, FL	"This epiphytic orchid grows on trees ... The stems of Dendrobium crumenatum Sw. are 1 m long. The pseudobulbs are elliptical, grooved, and 9 cm × 2.5 cm."

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 26 Jul 2018]	Family: Orchidaceae Subfamily: Epidendroideae Tribe: Dendrobieae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes

Qsn #	Question	Answer
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 26 Jul 2018]	Family: Orchidaceae Subfamily: Epidendroideae Tribe: Dendrobieae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wiert, C. (2012). Medicinal Plants of China, Korea, and Japan: Bioresources for Tomorrow's Drugs and Cosmetics. CRC Press, Boca Raton, FL	"This epiphytic orchid grows on trees ... The stems of <i>Dendrobium crumenatum</i> Sw. are 1 m long. The pseudobulbs are elliptical, grooved, and 9 cm × 2.5 cm."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Ang, W. F., Lok, A. F. S. L., Yeo, C. K., Tan, S. Y., & Tan, H. T. (2010). Rediscovery of <i>Dendrobium aloifolium</i> (blume) rchb. f.(orchidaceae) in singapore. <i>Nature in Singapore</i> , 3, 321-325	"Of the five extant species, <i>Dendrobium crumenatum</i> is the most widespread species, occurring on trees in forests, urban parks, and roadsides in Singapore."
	Wiert, C. (2012). Medicinal Plants of China, Korea, and Japan: Bioresources for Tomorrow's Drugs and Cosmetics. CRC Press, Boca Raton, FL	[No evidence] "This epiphytic orchid grows on trees in a geographical area covering Taiwan, Cambodia, India, Andaman islands, Indonesia, Laos, Malaysia, Burma, the Philippines, Sri Lanka, Thailand, and Vietnam."

602	Produces viable seed	y
	Source(s)	Notes
	Rafee, M. I. B. M. (2018). Conservation of epiphytic orchids in urbanized tropical environments. PhD Dissertation. National University of Singapore	"All seeds had high initial / pre-experiment seed viability: <i>D. crumenatum</i> 88.3%, <i>B. vaginatum</i> 72.7%, <i>C. finlaysonianum</i> 87.7%, and <i>G. speciosum</i> 80.7% (Table 3.4). Seed viability of non germinated <i>D. crumenatum</i> seeds decreased to 47.0% and 34.2% under controlled (1-year period; orchid mycorrhizal fungal baiting experiment) and variable environmental conditions (10-month period; seed sowing experiment) respectively."
	NParks Flora&FaunaWeb. (2018). <i>Dendrobium crumenatum</i> . https://florafaunaweb.nparks.gov.sg/Special-Pages/plant-detail.aspx?id=1924 . [Accessed 26 Jul 2018]	"Propagation Method : Seed, Division, Tissue Culture"

603	Hybridizes naturally	
	Source(s)	Notes

Qsn #	Question	Answer
	Ackerman, J. 2012. Orchids gone wild. <i>Orchids</i> , 81(2): 88-93	[Unknown for <i>Dendrobium crumenatum</i>] "The naturalization of various hybrid dendrobiums suggests that honeybees have indeed been busy bees. Fruit production is not high, but is certainly typical for species that offer no pollinator rewards, which is the case for the majority of dendrobiums cultivated in the islands (not the pigeon orchid, though). Honeybees are common everywhere, from the city streets to the forested mountains, providing pollinator service for many different kinds of plants, likely including the hybrid <i>Dendrobium</i> populations we have seen. As for the hybrid <i>Dendrobium</i> populations we have found on the ridges above Honolulu, the original source may not be from the city since the tradewinds would take the seeds produced in those gardens out toward the sea. It may be more likely that seeds produced from plants cultivated on the windward side of the island were carried over the mountains and deposited on the ridges leading to the city."
	Adams, H., & Anderson, E. (1958). A Conspectus of Hybridization in the Orchidaceae. <i>Evolution</i> , 12(4), 512-518	[Unknown if natural hybrids occur] "It is, of course, a well-known fact that <i>Dendrobiums</i> will only cross within their own closely circumscribed groups" ... "For the most commonly cultivated orchids such as the <i>Cypripedileae</i> , the genera <i>Cattleya</i> , <i>Dendrobium</i> , <i>Odontoglossum</i> and <i>Vanda</i> , the number of registered secondary hybrids exceeds almost ten-fold the number of primary hybrids and the proportion as well as the number of such secondary hybrids is very much on the increase."

604	Self-compatible or apomictic	n
	Source(s)	Notes
	Pinheiro, F., Cafasso, D., Cozzolino, S., & Scopece, G. (2015). Transitions between self-compatibility and self-incompatibility and the evolution of reproductive isolation in the large and diverse tropical genus <i>Dendrobium</i> (Orchidaceae). <i>Annals of Botany</i> , 116(3), 457-467	"TABLE 1. Total number of <i>Dendrobium</i> species analysed in this study." [D. <i>crumenatum</i> - Compatibility system = SI - self-incompatible species]

Qsn #	Question	Answer
605	Requires specialist pollinators	n
	Source(s)	Notes
	Leong, T. M., & Wee, Y. C. (2013). Observations of pollination in the pigeon orchid, <i>Dendrobium crumenatum</i> Swartz (Orchidaceae) in Singapore. <i>Nature in Singapore</i> , 6, 91-96	"As the flowers of the pigeon orchid, <i>Dendrobium crumenatum</i> , bloom for just one day, this presents only a narrow window of opportunity for pollination to be carried out. We report observations of bees (<i>Apis cerana</i>) performing this important duty on the morning of its full blossom, and subsequently estimate the relative success of pollination by the floral visitors."
	PlantUse contributors. (2018). <i>Dendrobium</i> (PROSEA). PlantUse. http://uses.plantnet-project.org/en/Dendrobium_(PROSEA) . [Accessed 26 Jul 2018]	" <i>Dendrobium</i> grows best under permanent warm temperature conditions, and is usually pollinated by bees or ants."
	Ackerman, J. 2012. Orchids gone wild. <i>Orchids</i> , 81(2): 88-93	[Pollinated by bees] "And there upon the trees next to the road were many plants in flower, which was lucky because local populations of <i>Den. crumenatum</i> flower simultaneously and the flowers last but one day. And what was even more exciting, we watched carpenter bees rob nectar from the spurs, honeybees using the same holes to thieve a little for themselves, and a few more entering the flowers legitimately and pollinating them. What a marvelous sight."

606	Reproduction by vegetative fragmentation	
	Source(s)	Notes
	PlantUse contributors. (2018). <i>Dendrobium</i> (PROSEA). PlantUse. http://uses.plantnet-project.org/en/Dendrobium_(PROSEA) . [Accessed 26 Jul 2018]	" <i>Dendrobium</i> is propagated vegetatively by division, by seed or by tissue culture."
	Ram, A. T., Shamina, M., & Pradeep, A. K. (2015). <i>Dendrobium crumenatum</i> (Orchidaceae): A new record for mainland India. <i>Rheedea</i> , 25(1), 69-71	[No indication that plant spreads vegetatively from bulbs, but may be able to spread if fragmentation occurs] "Epiphytic herbs with pseudobulbous stems, usually leafless when in flower; stems 40–60 cm long, slightly compressed or cylindrical; pseudobulbs c. 2 cm in diameter, spindle-shaped."

607	Minimum generative time (years)	>3
	Source(s)	Notes
	PlantUse contributors. (2018). <i>Dendrobium</i> (PROSEA). PlantUse. http://uses.plantnet-project.org/en/Dendrobium_(PROSEA) . [Accessed 26 Jul 2018]	" <i>D. crumenatum</i> can be found flowering throughout the year, but its main flowering period is between November-April in the humid tropics. Gregarious flowering follows 8-10 days after a temperature drop caused by heavy rainfall. The flowers are usually ephemeral." [Time to maturity unspecified]
	Meesawat, U., & Kanchanapoom, K. (2007). Understanding the flowering behavior of pigeon orchid (<i>Dendrobium crumenatum</i> Swartz). <i>Orchid Science and Biotechnology</i> , 1, 6-14	"The in vitro induced plants flowered within 8-12 months as compared to 5-7 years for natural plants. This system shortened the juvenile period of this orchid. This knowledge is very useful and critical for many aspects of future flowering research."

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

Qsn #	Question	Answer
	Source(s)	Notes
	NParks Flora&FaunaWeb. (2018). <i>Dendrobium crumenatum</i> . https://florafaunaweb.nparks.gov.sg/Special-Pages/plant-detail.aspx?id=1924 . [Accessed 26 Jul 2018]	"Seed / Spore Dispersal : Abiotic (Wind; Explosive Dehiscence)"
	Teoh, E. S. (2016). <i>Medicinal Orchids of Asia</i> . Springer, Switzerland	[Occurs along roadsides, but an epiphyte, so unlikely to be dispersed accidentally] "The beautiful, fragrant, white Pigeon Orchid is found growing on trees in exposed places all over Malaysia and is extremely common on mature roadside trees in Singapore, even right in the heart of the city."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	PlantUse contributors. (2018). <i>Dendrobium</i> (PROSEA). PlantUse. http://uses.plantnet-project.org/en/Dendrobium_(PROSEA) . [Accessed 26 Jul 2018]	"Of the <i>Dendrobium</i> species treated here, <i>D. crumenatum</i> , <i>D. nobile</i> and <i>D. purpureum</i> are also cultivated as ornamentals in Europe."
	Wiert, C. (2012). <i>Medicinal Plants of China, Korea, and Japan: Bioresources for Tomorrow's Drugs and Cosmetics</i> . CRC Press, Boca Raton, FL	[Ornamental] "Habitat: This epiphytic orchid grows on trees in a geographical area covering Taiwan, Cambodia, India, Andaman islands, Indonesia, Laos, Malaysia, Burma, the Philippines, Sri Lanka, Thailand, and Vietnam. It is grown as an ornamental plant."

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown. If cultivated with other ornamental plants, small, wind-dispersed seeds could theoretically be moved in soil with potted plants. Evidence lacking to date

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	NParks Flora&FaunaWeb. (2018). <i>Dendrobium crumenatum</i> . https://florafaunaweb.nparks.gov.sg/Special-Pages/plant-detail.aspx?id=1924 . [Accessed 26 Jul 2018]	"Seed / Spore Dispersal : Abiotic (Wind; Explosive Dehiscence)"
	Teoh, E. S. (2016). <i>Medicinal Orchids of Asia</i> . Springer, Switzerland	[Family description] "Orchid seeds are present by the thousands in many orchid fruits. Wind dispersal is capable of distributing such seeds across long distances, so theoretically they should become established over vast areas, wherever suitable ecological conditions are present."
	Partomihardjo, T. (2003). Colonisation of orchids on the Krakatau Islands. <i>Teloepa</i> , 10(1), 299-310	[Presumably wind dispersed] "The first orchid recorded from Anak Krakatau since it emerged from the sea in 1930 was <i>Dendrobium crumenatum</i> . This epiphytic orchid was found growing on the cliff of an eroded gully."

705	Propagules water dispersed	n
-----	----------------------------	---

Qsn #	Question	Answer
	Source(s)	Notes
	PlantUse contributors. (2018). Dendrobium (PROSEA). PlantUse. http://uses.plantnet-project.org/en/Dendrobium_(PROSEA) . [Accessed 26 Jul 2018]	"The seeds may be dispersed by wind."
	WRA Specialist. 2018. Personal Communication	Although small, wind-dispersed seeds could probably be moved by water, they are unlikely to establish in suitable epiphytic sites.

706	Propagules bird dispersed	n
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unlikely. Small, wind-dispersed seeds establish in epiphytic sites & could potentially be dispersed by adhering to birds.

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unlikely. Small, wind-dispersed seeds could possibly adhere to birds or bats & establish in appropriate epiphytic sites, but this is probably a rare event.

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unlikely to be consumed or to survive gut passage

801	Prolific seed production (>1000/m2)	y
	Source(s)	Notes
	Barthlott, W., Große-Veldmann, B., & Korotkova, N. (2014). Orchid seed diversity: A scanning electron microscopy survey. <i>Englera</i> , 32: 1-245	"Orchids typically have tiny wind-dispersed seeds, often called "dust-seeds".
	Xu, Y., Teo, L. L., Zhou, J., Kumar, P. P., & Yu, H. (2006). Floral organ identity genes in the orchid <i>Dendrobium crumenatum</i> . <i>The Plant Journal</i> , 46(1), 54-68	[Presumably Yes] "After successful pollination, the ovary develops into a capsule containing numerous seeds."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

Qsn #	Question	Answer
804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	Unknown

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Frohlich, D. & Lau, A. 2010. New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	[Unknown] "This species, which is native to Sri Lanka, Burma, Indochina, throughout Malesia and the Philippines to Taiwan, was found spreading in the notches of Plumeria and other trees on surveys of Nu'uaniu and Mānoa Valleys."

Sw.

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Naturalized on Oahu (Hawaiian Islands), Puerto Rico & possibly elsewhere
- May compete with native orchids in the Seychelles
- Other *Dendrobium* species may be weeds
- Reproduces by seeds
- Seeds dispersed by wind & intentionally by people
- Prolific seed production

Low Risk Traits

- No negative impacts documented to date
- Unarmed (no spines, thorns, or burrs)
- Ornamental & medicinal uses
- Reported to be self-incompatible
- Reaches maturity in 5-7 years in natural conditions
- Epiphytic habit may limit dispersal vectors to wind or intentional planting

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

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

Outcome = Accept (Low Risk)