

Taxon: <i>Zeuxine strateumatica</i> (L.) Schltr.	Family: Orchidaceae
Common Name(s): lawn orchid soldier orchid	Synonym(s): <i>Adenostylis strateumatica</i> (L.) Ames Basionym: <i>Orchis strateumatica</i> L. <i>Zeuxine sulcata</i> (L.) Lindl.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 24 Jul 2018
WRA Score: 10.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Naturalized Orchid, Disturbance-Adapted, Apomictic, Contaminant, 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	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed		
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	n
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		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
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)		
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people		
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	y
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)	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
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	[No evidence of domestication] " <i>Zeuxine strateumatica</i> (L.) Schltr. is native to SE Asia where it is widespread from Afghanistan and Turkmenistan to Japan and New Guinea. It has extended its range to the Arabian peninsula (Thomas 1998) and the USA (Luer 1975; Ackerman 2002). Thomas (1998) listed the first record from Florida as 1936 and added that it was found in Bermuda in 1988. It has also been reported from Georgia, Louisiana, Missouri and Texas (Ackerman 2002) and has been given the vernacular name of lawn or soldier orchid in the USA. Two collections have recently been made of it from the island of Maui in the Hawaiian archipelago, both from manmade habitats." ... " <i>Zeuxine strateumatica</i> is rarely, if ever, cultivated in ornamental collections and may well have been introduced with seed or imported soil."

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 24 Jul 2018]	"Native Asia-Temperate WESTERN ASIA: Afghanistan, Iran MIDDLE ASIA: Tajikistan CHINA: China [Fujian, Guangdong, Guangxi, Hainan, Hubei, Sichuan, Yunnan] EASTERN ASIA: Japan, [Okinawa, Ryukyu Islands] Japan, [Okinawa, Ryukyu Islands] Taiwan Asia-Tropical INDIAN SUBCONTINENT: India, Pakistan, Sri Lanka INDO-CHINA: Cambodia, Laos, Myanmar, Vietnam MALESIA: Indonesia, [Java, Sumatra] Philippines Naturalized (natzd. elsewhere)"

Qsn #	Question	Answer
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 24 Jul 2018]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Dave's Garden. (2018). Species Orchid, Lawn Orchid, Soldier Orchid, Centipede Grass Orchid - <i>Zeuxine strateumatica</i> . https://davesgarden.com/guides/pf/go/62751/ . [Accessed 24 Jul 2018]	"Hardiness: USDA Zone 10a: to -1.1 °C (30 °F) USDA Zone 10b: to 1.7 °C (35 °F) USDA Zone 11: above 4.5 °C (40 °F)"
	Neto, L., Miranda, M., & Cruz, D. (2011). <i>Zeuxine strateumatica</i> (Orchidaceae) goes south: A first record for Brazil. <i>Kew Bulletin</i> , 66(1), 155-158	[Broad geographic distribution] "Amongst the species, <i>Z. strateumatica</i> (L.) Schltr. has the widest geographical distribution. It is native to Southeast Asia (Cribb 2004) but is also distributed in central Asia, reaching tropical and subtropical regions of the continent and the islands of northern Oceania (World Checklist of Monocotyledons 2009). It has expanded its distribution as an alien to other places around the globe including the Middle East (Thomas 1998), United States (Ames 1938; Luer 1975; Duncan & Kartesz 1981; Romero-Gonzalez et al. 2003), Hawaii (Cribb 2004) and the Caribbean (Ackerman 1995, 2007). The present record widens its geographic distribution even farther to include South America. This is the southernmost record known for the species, representing a range extension in the Neotropics"
	Teoh, E. S. (2016). <i>Medicinal Orchids of Asia</i> . Springer, Switzerland	[Elevation range >1000 m] "It occurs abundantly in grassy locations in moist, swampy ground, even in running water, throughout India from the lowlands to 1600 m (Santapau and Kapadia 1966)." ... "It is found throughout the warm regions of Asia, up to 1600 m on the Himalayan foothills. In Pakistan, it is often found growing amidst grass at the edge of watercourses (Nasir and Ali 1972)."

204	Native or naturalized in regions with tropical or subtropical climates	y
	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 24 Jul 2018]	"Native Asia-Temperate WESTERN ASIA: Afghanistan, Iran MIDDLE ASIA: Tajikistan CHINA: China [Fujian, Guangdong, Guangxi, Hainan, Hubei, Sichuan, Yunnan] EASTERN ASIA: Japan, [Okinawa, Ryukyu Islands] Japan, [Okinawa, Ryukyu Islands] Taiwan Asia-Tropical INDIAN SUBCONTINENT: India, Pakistan, Sri Lanka INDO-CHINA: Cambodia, Laos, Myanmar, Vietnam MALESIA: Indonesia, [Java, Sumatra] Philippines Naturalized (natzd. elsewhere)"
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	" <i>Zeuxine strateumatica</i> , an Asiatic orchid with weedy tendencies that was reported in Florida in the USA for the first time in the 1930s and is now found in five south-eastern States, has recently been reported from the Hawaiian island of Maui."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Lansdown, R.V. 2011. <i>Zeuxine strateumatica</i> . The IUCN Red List of Threatened Species 2011: e.T169023A6562890. http://dx.doi.org/10.2305/IUCN.UK.2011-2.RLTS.T169023A6562890.en . [Accessed]	"Introduced: Puerto Rico (Puerto Rico (main island)); United States (Alabama, Florida, Georgia, Hawaiian Is., Louisiana, Mississippi, Texas)"
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	" <i>Zeuxine strateumatica</i> is rarely, if ever, cultivated in ornamental collections and may well have been introduced with seed or imported soil."
	WRA Specialist. 2018. Personal Communication	Repeatedly introduced unintentionally

301	Naturalized beyond native range	y
	Source(s)	Notes
	Ames, O. (1938). <i>Zeuxine strateumatica</i> in Florida. <i>Botanical Museum Leaflets, Harvard University</i> , 6(3), 37-45	"The occurrence of the Asiatic <i>Zeuxine strateumatica</i> in Florida was reported in <i>Orchidologia Zeylanica</i> 4 (1987) 89. This report was based on a single colony found on January 17, 1987, in a nursery, the Ormond Tropical Gardens, at Ormond in Volusia County. It was suggested that this orchid might have been introduced with nursery stock, but convincing evidence for such an introduction was lacking and efforts to substantiate it met with failure. Records of <i>Zeuxine strateumatica</i> having been cultivated in American gardens have not been found. It is not an orchid of horticultural significance and to my knowledge has never been cultivated in our botanic gardens."
	Richardson, A. 2011. <i>Plants of Deep South Texas: A Field Guide to the Woody and Flowering Species</i> . Texas A&M University Press, College Station, TX	"This is a new orchid for our area. Native to Asia and some Pacific islands, it was found in Florida in 1936. It was suspected that seeds arrived in shipments of centipede grass imported from China. From there, it spread along the Gulf Coast. It was first reported in Texas in 1989, in Montgomery County, and was later found in Harris County. This is the first report for our area."

Qsn #	Question	Answer
	Neto, L., Miranda, M., & Cruz, D. (2011). <i>Zeuxine strateumatica</i> (Orchidaceae) goes south: A first record for Brazil. <i>Kew Bulletin</i> , 66(1), 155-158	" <i>Zeuxine strateumatica</i> (L.) Schltr. is recorded for the first time in South America, in Sao Paulo State (Brazil), the southernmost record for the species. It also occurs in Asia, northern Oceania, North America and the Caribbean. A historical record of the geographical expansion of <i>Z. strateumatica</i> is outlined with emphasis on the New World."
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	" <i>Zeuxine strateumatica</i> , an Asiatic orchid with weedy tendencies that was reported in Florida in the USA for the first time in the 1930s and is now found in five south-eastern States, has recently been reported from the Hawaiian island of Maui."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Argue, C. L. (2012). <i>The Pollination Biology of North American Orchids: Volume 2: North of Florida and Mexico</i> . Springer, New York Dordrecht Heidelberg London	"Sun and Wong (2001) found that populations near Hong Kong are apomictic and occur only as colonizers of recently disturbed habitats."
	Wu, Z. Y., Raven, P. H. & Hong, D. Y. eds. 2009. <i>Flora of China</i> . Vol. 25 (Orchidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[The designation as a weed seems to be in the sense that it establishes in disturbed habitats. Impacts have not been specified] "Damp grasslands, meadows, valleys, along streams; below 1000 m." ... "This is a weed in Saudi Arabia and the United States (Florida, Hawaii)."
	Dave's Garden. (2018). <i>Species Orchid, Lawn Orchid, Soldier Orchid, Centipede Grass Orchid - Zeuxine strateumatica</i> . https://davesgarden.com/guides/pf/go/62751/ . [Accessed 24 Jul 2018]	[Valued by gardeners] "On Jan 30, 2011, plantladylin from (Zone 1) wrote: These have popped up in my lawn on occasion over the years and also in container plants. I haven't found them to be noxious weeds or invasive at all ... but rather, pretty little surprise plants!" ... "On Jan 15, 2009, safische123 from Tampa, FL wrote: This plant grows in Florida, Georgia and Texas in disturbed grassland areas. It is a true orchid, originating in Asia. It is not invasive, but rare, and acts as a groundcover. It attracts bees, butterflies and birds. If you try to transplant it, the plant will die. However, the plant does produce seeds or fruit, which may result in future lawn orchids where there was a failed transplant."
	WRA Specialist. 2018. Personal Communication	Identified as a "weed" in a number of sources, but evidence of negative impacts is generally lacking.

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	Teoh, E. S. (2016). <i>Medicinal Orchids of Asia</i> . Springer, Switzerland	"It is almost a weed of some padi at low elevations in Malaysia and Indonesia (Wood et al. 2011). Its subterranean rhizome confers a survival advantage in harsh environments (Ormerod and Cribb 2003)"

Qsn #	Question	Answer
	Subudhi, H. N., Panda, S. P., Behera, P. K., & Patnaik, C. (2015). A Check List of Weeds in Rice Fields of Coastal Orissa, India. <i>Journal of Agricultural Science</i> , 7(6), 207-216	[<i>Zeuxine strateumatica</i> recorded in rice fields. Impacts unspecified] "A survey was undertaken to different rice ecologies to collect, identify and conserve the weed species as herbarium specimens in coastal districts of Orissa. In this programme, 201 angiosperm taxa and 3 pteridophytes under 146 genera belonging to 56 families were collected, identified and documented. Poaceae was the dominant family followed by Fabaceae and Cyperaceae. Families are arranged according to modified Bentham and Hooker's system of classification in the enumeration. Genus and species were arranged alphabetically under each family and genus. The number of weed species was more in upland followed by irrigated, semi deep water and deep water. Conservation strategies are also highlighted in this paper."

304	Environmental weed	n
	Source(s)	Notes
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	"It is an attractive addition to the flora of Hawaii and unlikely to pose a threat to native plants, being confined to man-made habitats such as lawns and road-side verges."
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

305	Congeneric weed	n
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wu, Z. Y., Raven, P. H. & Hong, D. Y. eds. 2009. <i>Flora of China</i> . Vol. 25 (Orchidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Plants 4–24 cm tall, slender. Rhizome short. Stem erect or ascending, pale brown, with several to many leaves. Leaves cauline, usually clustered and overlapping, pale brown, linear to linear-lanceolate, sometimes bractlike, 2–8 × 0.2–0.6 cm, base directly sheathing stem, not stalked, apex acuminate."

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

403	Parasitic	n
	Source(s)	Notes
	Wu, Z. Y., Raven, P. H. & Hong, D. Y. eds. 2009. <i>Flora of China</i> . Vol. 25 (Orchidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Plants 4–24 cm tall, slender. Rhizome short. Stem erect or ascending, pale brown, with several to many leaves." [Orchidaceae. No evidence]

Qsn #	Question	Answer
404	Unpalatable to grazing animals	
	Source(s)	Notes
	Kotia, A., Kumar, P. & Dookia, S. (2013). A Note on Rediscovery of <i>Zeuxine Strateumatica</i> (L.) Schltr. (Orchidaceae). <i>Indian Forester</i> , 139(2), 180-181	[Livestock trampling considered a threat to this species. Palatability unknown] "Conservation: This is a water loving orchid and is often considered as a semi-aquatic plant. Low rainfall could be the main reason for the depletion of the population of this orchid in its natural habitat as there has not been enough rain since past 7-8 years in the area. This had led to drastic reduction of the wetland area. Other reasons could be anthropogenic activities like over grazing which directly affects these plants due to trampling by livestock."

405	Toxic to animals	n
	Source(s)	Notes
	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	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Childers, C. C., Rodrigues, J. C. V., & Welbourn, W. C. (2003). Host plants of <i>Brevipalpus californicus</i> , <i>B. obovatus</i> , and <i>B. phoenicis</i> (Acari: Tenuipalpidae) and their potential involvement in the spread of viral diseases vectored by these mites. <i>Experimental & Applied Acarology</i> , 30(1-3), 29-105	[<i>Zeuxine strateumatica</i> listed among numerous hosts] "Abstract. The family Tenuipalpidae has over 622 species in 30 genera described worldwide. A total of 928 plant species in 513 genera within 139 families are recorded hosts of one or more of the following species: <i>Brevipalpus californicus</i> (Banks), <i>B. obovatus</i> Donnadieu, and <i>B. phoenicis</i> (Geijskes). <i>B. californicus</i> has 316 plant species reported as hosts compared with 451 and 486 host plants for <i>B. obovatus</i> and <i>B. phoenicis</i> , respectively. There are 67 genera of plants within 33 families that are reported hosts of only <i>B. californicus</i> , 119 genera within 55 plant families that are hosts of only <i>B. obovatus</i> , and 118 genera of plants within 64 families that are hosts of only <i>B. phoenicis</i> . There are 14 genera of plants within 12 families that are hosts to both <i>B. californicus</i> and <i>B. obovatus</i> , while there are 40 genera of host plants within 26 families that are hosts for both <i>B. californicus</i> and <i>B. phoenicis</i> . A total of 70 genera of host plants within 39 families have been reported as hosts of both <i>B. obovatus</i> and <i>B. phoenicis</i> , while 77 genera of plants within 44 families have been reported as hosts of all three <i>Brevipalpus</i> species. Geographical differences in the three species of <i>Brevipalpus</i> identified on different plant species within the same genus are common."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes

Qsn #	Question	Answer
	Teoh, E. S. (2016). Medicinal Orchids of Asia. Springer, Switzerland	[No evidence of toxicity. Used medicinally] "Herbal Usage: Tubers of <i>Z. strateumatica</i> were used as salep (Caius 1936). They are combined with the roots of <i>Cymbidium aloifolium</i> (L.) Sw. to form a tonic in the Uttara Kannada district of Karnataka (Lawler 1984; Rao 2004). Considered to be a blood purifier and tonic, it is used externally for boils (Trivedi et al. 1980). <i>Z. strateumatica</i> is also used to treat infections of the eye (Rao 2004). It is still used as a tonic, or as a form of salep, in Bangladesh (Musharof Hossain 2009; Uddin and Yusuf 2011) and Nepal (Baral and Kurmi 2006; Subedi et al. 2013)."
	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

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	"It is an attractive addition to the flora of Hawaii and unlikely to pose a threat to native plants being confined to man-made habitats such as lawns and road-side verges."
	Teoh, E. S. (2016). Medicinal Orchids of Asia. Springer, Switzerland	[No evidence. Habit & habitat would likely preclude any fire risks] "A terrestrial herb, 5–20 cm tall with a soft, slender, purplish stem sheathed with several narrow, grass-like leaves, 4 cm long and a tenth as wide, with the edges turned backwards." ... "It occurs abundantly in grassy locations in moist, swampy ground, even in running water, throughout India from the lowlands to 1600 m"

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	American Orchid Society. (2018). <i>Zeuxine</i> . http://www.aos.org/orchids/orchids-a-to-z/letter-z/zeuxine.aspx# . [Accessed 24 Jul 2018]	"Light: Full sun to partial shade (2400 footcandles)"
	Dave's Garden. (2018). Species Orchid, Lawn Orchid, Soldier Orchid, Centipede Grass Orchid - <i>Zeuxine strateumatica</i> . https://davesgarden.com/guides/pf/go/62751/ . [Accessed 24 Jul 2018]	"Sun Exposure: Full Sun. Sun to Partial Shade. Light Shade"
	Ames, O. (1938). <i>Zeuxine strateumatica</i> in Florida. <i>Botanical Museum Leaflets, Harvard University</i> , 6(3), 37-45	"Where it occurs it exhibits the propensities of a weed and has become amenable to a diversity of conditions, growing in clipped lawns, under shrubs, along ditches, and thriving equally in sun or shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Neto, L., Miranda, M., & Cruz, D. (2011). <i>Zeuxine strateumatica</i> (Orchidaceae) goes south: A first record for Brazil. <i>Kew Bulletin</i> , 66(1), 155-158	"it was growing in sandy-day soil; near sea level."

Qsn #	Question	Answer
	American Orchid Society. (2018). <i>Zeuxine</i> . http://www.aos.org/orchids/orchids-a-to-z/letter-z/zeuxine.aspx# . [Accessed 24 Jul 2018]	"Potting: Any well drained terrestrial medium"
	Verma, J., Kusum, K. T., & Vij, S. P. (2014). Lesser known orchids of Himachal Pradesh: I. Genus <i>Zeuxine</i> Lindley. <i>Pleione</i> 8(1): 1-8	" <i>Zeuxine strateumatica</i> ... in more or less sandy soils on open riverbed and along the banks of seasonal water channels"
	WRA Specialist. 2018. Personal Communication	Widespread terrestrial orchid. Probably tolerates many soil types, but little specific information is available on soil tolerance or preferences

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wu, Z. Y., Raven, P. H. & Hong, D. Y. eds. 2009. <i>Flora of China</i> . Vol. 25 (Orchidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Plants 4–24 cm tall, slender. Rhizome short. Stem erect or ascending, pale brown, with several to many leaves."

412	Forms dense thickets	n
	Source(s)	Notes
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	[No evidence] "This orchid is rather inconspicuous, usually 8 - 12 cm tall." ... "Its grass-like leaves render it relatively inconspicuous unless it flowers."

501	Aquatic	n
	Source(s)	Notes
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	"This orchid is rather inconspicuous, usually 8 - 12 cm tall. It is terrestrial and has pinkish to greenish red stems, buff, pinkish or reddish green grass-like leaves and white fragrant flowers."
	Wu, Z. Y., Raven, P. H. & Hong, D. Y. eds. 2009. <i>Flora of China</i> . Vol. 25 (Orchidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial herb] "Plants 4–24 cm tall, slender. Rhizome short. Stem erect or ascending, pale brown, with several to many leaves." ... "Damp grasslands, meadows, valleys, along streams; below 1000 m."

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 24 Jul 2018]	Family: Orchidaceae Subfamily: Orchidoideae Tribe: Cranichideae

Qsn #	Question	Answer
503	Nitrogen fixing woody plant	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 24 Jul 2018]	Family: Orchidaceae Subfamily: Orchidoideae Tribe: Cranichideae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	
	Source(s)	Notes
	Neto, L., Miranda, M., & Cruz, D. (2011). <i>Zeuxine strateumatica</i> (Orchidaceae) goes south: A first record for Brazil. <i>Kew Bulletin</i> , 66(1), 155-158	"Terrestrial herb, c. 13 cm tall, commonly caespitose. Stem erect, slender, dark-green, sometimes reddish. Leaves 6, spirally arranged, sessile, with amplexicaul sheath, dark green, sometimes reddish." ... "Its success in disturbed environments, promoted by apomixis and a subterranean rhizome, makes it a coloniser species (Sun 1997; Sun & Wong 2001) and helps to explain its observed expansion over the last two centuries."
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. <i>Plant Protection Quarterly</i> , 25(2): 56-74	"This question is specifically to deal with plants that have specialized organs and should not include plants merely with rhizomes/ stolons (see 6.06)."
	Teoh, E. S. (2016). <i>Medicinal Orchids of Asia</i> . Springer, Switzerland	[May behave functionally as a geophyte under certain conditions] "Its subterranean rhizome confers a survival advantage in harsh environments"
	Weaver, Jr., R.E. (2003). <i>Botany Section</i> . TRI-OLOGY 42(5): September-October	[May sometimes behave like a geophyte] "Like all annuals, it dies after blooming and maturing its fruit, although a small percentage of plants send up a new shoot from the old roots."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Neto, L., Miranda, M., & Cruz, D. (2011). <i>Zeuxine strateumatica</i> (Orchidaceae) goes south: A first record for Brazil. <i>Kew Bulletin</i> , 66(1), 155-158	"Amongst the species, <i>Z. strateumatica</i> (L.) Schltr. has the widest geographical distribution." ... "CONSERVATION STATUS. Least Concern (LC) due to its widespread distribution."
	Lansdown, R.V. 2011. <i>Zeuxine strateumatica</i> . The IUCN Red List of Threatened Species 2011: e.T169023A6562890. http://dx.doi.org/10.2305/IUCN.UK.2011-2.RLTS.T169023A6562890.en . [Accessed 24 Jul 2018]	"The species occurs over a reasonably large geographical area and is capable of exploiting anthropogenic habitats, it is unlikely to become extinct in the short term and so is assessed as Least Concern."

Qsn #	Question	Answer
602	Produces viable seed	y
	Source(s)	Notes
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	"The success of <i>Z. strateumatica</i> as a weed is associated with its ability to set seed without cross-pollination. All of the flowers of two of the three plants collected by Oppenheimer were in fruit, the third plant was still in full flower. The pollen masses are able to enter the stigma of the same flower because of the great reduction of the rostellum which in most orchids effectively separates the stamen from the stigma and prevents self-pollination."

603	Hybridizes naturally	
	Source(s)	Notes
	Verma, J., Kusum, K. T., & Vij, S. P. (2014). Lesser known orchids of Himachal Pradesh: I. Genus <i>Zeuxine</i> Lindley. <i>Pleione</i> 8(1): 1-8	[Possibly] " <i>Z. strateumatica</i> is a highly polymorphic taxon and critical examination of the different specimens revealed occurrence of three different morphotypes under this species complex. One of these seems to be an intermediate between <i>Z. membranacea</i> and <i>Z. strateumatica</i> that might be a natural hybridization product between the two."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Argue, C. L. (2012). <i>The Pollination Biology of North American Orchids: Volume 2: North of Florida and Mexico</i> . Springer, New York Dordrecht Heidelberg London	"Luer (1975) observed small flies visiting the colorful and highly fragrant flowers, but based on its prolific seed production, rapid spread, and free reproduction in hot houses, he and Ackerman (2002a) concluded that it is almost certainly autogamous or apomictic. Sun and Wong (2001) found that populations near Hong Kong are apomictic and occur only as colonizers of recently disturbed habitats."
	Kant, R., & Verma, J. (2012). Obligate apomixis in <i>Zeuxine strateumatica</i> (Lindl.) Schltr. (Orchidaceae). <i>Vegetos</i> , 25, 274-277	"Mode of embryo formation was studied in a population of <i>Zeuxine strateumatica</i> (Lindl.) Schltr. growing naturally at Dhanas (340 m), Chandigarh, India. The gynoecium was tricarpeal and syncarpous. The unilocular ovary possess 3 parietal placentae which developed ovule primordia. The hypodermal cell of ovule primordium got differentiated into an archesporial cell. Megaspore mother cell either developed directly into embryo through mitosis or got degenerated. In most of the ovules, 1-3 nucellar cells function as embryonal initial which subsequently form mature embryo. Presently studied population exhibited obligate apomixis, a type of asexual reproduction observed occasionally in some angiosperms."
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	"The success of <i>Z. strateumatica</i> as a weed is associated with its ability to set seed without cross-pollination. All of the flowers of two of the three plants collected by Oppenheimer were in fruit, the third plant was still in full flower. The pollen masses are able to enter the stigma of the same flower because of the great reduction of the rostellum which in most orchids effectively separates the stamen from the stigma and prevents self-pollination."

605	Requires specialist pollinators	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Argue, C. L. (2012). <i>The Pollination Biology of North American Orchids: Volume 2: North of Florida and Mexico</i> . Springer, New York Dordrecht Heidelberg London	[Pollinated by small flies, & apomictic] " <i>Zeuxine strateumatica</i> (L.) Schltr. (soldier's orchid) (Fig. 1.4a), native to Arabia, Asia, Australia, and the Pacific Islands, was first introduced to North America in Florida and is now also found in Georgia, Mississippi, Louisiana and Texas (Ames 1938; Thieret 1972; Correll 1978; Ackerman 2002a). Luer (1975) observed small flies visiting the colorful and highly fragrant flowers, but based on its prolific seed production, rapid spread, and free reproduction in hot houses, he and Ackerman (2002a) concluded that it is almost certainly autogamous or apomictic. Sun and Wong (2001) found that populations near Hong Kong are apomictic and occur only as colonizers of recently disturbed habitats."
	Teoh, E. S. (2016). <i>Medicinal Orchids of Asia</i> . Springer, Switzerland	[Self-pollinating] "A short rachis of 4 cm carries numerous small, white to pink flowers. The petals form a hood with the dorsal sepal to cover the column. However, flowers barely open and are quickly self-pollinating"

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Teoh, E. S. (2016). <i>Medicinal Orchids of Asia</i> . Springer, Switzerland	"Its subterranean rhizome confers a survival advantage in harsh environments" [May allow it to persist, but does not appear to spread vegetatively]
	Weaver, Jr., R.E. (2003). <i>Botany Section. TRI-OLOGY 42(5): September-October</i>	[May persist from rhizomes, but does not appear to spread vegetatively] "Like all annuals, it dies after blooming and maturing its fruit, although a small percentage of plants send up a new shoot from the old roots."

607	Minimum generative time (years)	1
	Source(s)	Notes
	Weaver, Jr., R.E. (2003). <i>Botany Section. TRI-OLOGY 42(5): September-October</i>	"This is one of the very few annual orchids." ... "This "weedy" orchid can go from seed to flower in as little as 10 months. Like all annuals, it dies after blooming and maturing its fruit, although a small percentage of plants send up a new shoot from the old roots."
	Sun, M. (1997). <i>Genetic diversity in three colonizing orchids with contrasting mating systems. American Journal of Botany, 84(2), 224-232</i>	" <i>Zeuxine strateumatica</i> (Linn.) Schltr. is a short terrestrial orchid that behaves like an annual." ... "The flowering season is from November to February in Hong Kong."

Qsn #	Question	Answer
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	[Occurs in heavily trafficked areas] "It is an attractive addition to the flora of Hawaii and unlikely to pose a threat to native plants being confined to man-made habitats such as lawns and road-side verges."
	Neto, L., Miranda, M., & Cruz, D. (2011). <i>Zeuxine strateumatica</i> (Orchidaceae) goes south: A first record for Brazil. <i>Kew Bulletin</i> , 66(1), 155-158	[Occurs in heavily trafficked, disturbed sites] " <i>Zeuxine strateumatica</i> is often found in humid environments with anthropogenic influence, such as lawns (receiving the vernacular name of lawn orchid in the USA), marshes, roadside slopes, crops, abandoned areas, building sites, etc. (Ames 1938; Sun 1997; Pridgeon et al. 2003; Cribb 2004)."

702	Propagules dispersed intentionally by people	
	Source(s)	Notes
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	" <i>Zeuxine strateumatica</i> is rarely, if ever, cultivated in ornamental collections and may well have been introduced with seed or imported soil."
	WRA Specialist. 2018. Personal Communication	Most records suggest this species is an unintentional introduction. Unknown whether or not it is intentionally imported or cultivated in the Hawaiian Islands

703	Propagules likely to disperse as a produce contaminant	y
	Source(s)	Notes
	Richardson, A. 2011. <i>Plants of Deep South Texas: A Field Guide to the Woody and Flowering Species</i> . Texas A&M University Press, College Station, TX	"This is a new orchid for our area. Na-tive to Asia and some Pacific islands, it was found in Florida in 1936. It was suspected that seeds arrived in shipments of centipede grass imported from China. From there, it spread along the Gulf Coast. It was first reported in Texas in 1989, in Montgomery County, and was later found in Harris County. This is the first report for our area. It has been observed at two nurseries in the Harlingen area. There was an unconfirmed sighting in 2006 on the campus of the University of Texas at Brownsville/Texas Southmost College (Cameron County). This orchid is probably spreading in various nursery plants, evidently germinating and growing well from seed. It has been suggested that lawn orchid reproduces by self-pollination or by non-sexual means (Diggs et al. 2006)."
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	" <i>Zeuxine strateumatica</i> is rarely, if ever, cultivated in ornamental collections and may well have been introduced with seed or imported soil."

Qsn #	Question	Answer
704	Propagules adapted to wind dispersal	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 produce capsules ... and typically form minute wind-dispersed seeds of only 0. 1-6 mm in size." ... "Orchids typically have tiny wind-dispersed seeds, often called "dust-seeds". Most orchids are wind-dispersed, but there are exceptions and the dispersal mechanisms of orchids are more diverse than assumed earlier."

705	Propagules water dispersed	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	"In addition to wind-dispersal, water-dispersal (hydrochory) could play a role in some species (Dressler 198 1), e.g. in <i>Epipactis gigantea</i> (Epidendroideae-Neottieae), a species often found growing next to streams."
	Verma, J., Kusum, K. T., & Vij, S. P. (2014). Lesser known orchids of Himachal Pradesh: I. Genus <i>Zeuxine</i> Lindley. <i>Pleione</i> 8(1): 1-8	" <i>Zeuxine strateumatica</i> ... in more or less sandy soils on open riverbed and along the banks of seasonal water channels"
	Wu, Z. Y., Raven, P. H. & Hong, D. Y. eds. 2009. <i>Flora of China</i> . Vol. 25 (Orchidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Along streams. Small seeds likely moved by water] "Damp grasslands, meadows, valleys, along streams; below 1000 m."
	Teoh, E. S. (2016). <i>Medicinal Orchids of Asia</i> . Springer, Switzerland	[Small seeds likely moved by water] "It occurs abundantly in grassy locations in moist, swampy ground, even in running water, throughout India from the lowlands to 1600 m (Santapau and Kapadia 1966)." ... "It is found throughout the warm regions of Asia, up to 1600 m on the Himalayan foothills. In Pakistan, it is often found growing amidst grass at the edge of watercourses (Nasir and Ali 1972)."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Wu, Z. Y., Raven, P. H. & Hong, D. Y. eds. 2009. <i>Flora of China</i> . Vol. 25 (Orchidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Capsule pale brown, elliptic, ca. 6 mm." [Not fleshy-fruited]
	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".

Qsn #	Question	Answer
707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Weaver, Jr., R.E. (2003). Botany Section. TRI-ODOGY 42(5): September-October	"It is still commonly found as a weed in lawns, but grows in a variety of other habitats from dense swamps to sidewalk cracks."
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. Kew Bulletin, 59(4), 652-652	[Common in anthropogenic habitats. Small seeds may adhere to animals, but direct evidence is lacking] "It is an attractive addition to the flora of Hawaii and unlikely to pose a threat to native plants, Accepted for publication November 2004. 1 Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, IW9 3AB, U.K. being confined to man-made habitats such as lawns and road-side verges."

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Barthlott, W., Große-Veldmann, B., & Korotkova, N. (2014). Orchid seed diversity: A scanning electron microscopy survey. Englera, 32: 1-245	"Orchids typically have tiny wind-dispersed seeds, often called "dust-seeds". [Unlikely to be consumed or internally dispersed]

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. Englera, 32: 1-245	"Orchids typically have tiny wind-dispersed seeds, often called "dust-seeds".
	Argue, C. L. (2012). The Pollination Biology of North American Orchids: Volume 2: North of Florida and Mexico. Springer, New York Dordrecht Heidelberg London	[Presumably Yes. Prolific seed production] "Luer (1975) observed small flies visiting the colorful and highly fragrant flowers, but based on its prolific seed production, rapid spread, and free reproduction in hot houses, he and Ackerman (2002a) concluded that it is almost certainly autogamous or apomictic."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2018) Seed Information Database (SID). Version 7.1. Available from: http://data.kew.org/sid/ . [Accessed 24 Jul 2018]	Unknown. No storage information available

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

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes

Qsn #	Question	Answer
	Teoh, E. S. (2016). <i>Medicinal Orchids of Asia</i> . Springer, Switzerland	[Unknown. May be able to resprout from rhizomes if foliage is damaged or removed] "Its subterranean rhizome confers a survival advantage in harsh environments"
	Weaver, Jr., R.E. (2003). <i>Botany Section</i> . TRI-ODOGY 42(5): September-October	[Unknown. May be able to resprout from roots] "Like all annuals, it dies after blooming and maturing its fruit, although a small percentage of plants send up a new shoot from the old roots."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Cribb, P. (2004). <i>Zeuxine strateumatica</i> (Orchidaceae), a New Record for Hawaii. <i>Kew Bulletin</i> , 59(4), 652-652	[Unknown] "It is an attractive addition to the flora of Hawaii and unlikely to pose a threat to native plants, being confined to man-made habitats such as lawns and road-side verges."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Broad geographic distribution & elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Naturalized on Maui (Hawaiian Islands) & widely naturalized elsewhere
- Regarded as weedy in several habitats, often disturbed (but evidence of negative impacts lacking)
- Shade tolerant
- Reproduces by seeds (& may resprout from rhizomes)
- Apomictic
- Reaches maturity in <1 year (10 months)
- Seeds dispersed by wind, water & as a contaminant of seed & soil
- Prolific seed production

Low Risk Traits

- Despite widespread naturalization & description as a weed, evidence of negative impacts is generally unspecified or lacking
- Generally restricted to anthropogenic habitats
- Unarmed (no spines, thorns, or burrs)
- Non-toxic
- Ornamental