

Taxon: <i>Lilium philippinense</i> Baker	Family: Liliaceae
Common Name(s): Benguet lily Philippine lily	Synonym(s): <i>Lilium philippinense</i> Baker var. <i>philippinense</i> <i>Lilium yoshidae</i> Leichtlin

Assessor: Chuck Chimera	Status: Approved	End Date: 10 Dec 2024
WRA Score: 8.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Geophyte, Ornamental, Naturalized Elsewhere, Self-Compatible, 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)	Intermediate
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	y = 2*multiplier (see Appendix 2), n = 0	n
304	Environmental weed	y = 2*multiplier (see Appendix 2), n = 0	n
305	Congeneric weed	y = 1*multiplier (see Appendix 2), n = 0	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	y = 1, n = 0	y
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems	y = 1, n = 0	n
409	Is a shade tolerant plant at some stage of its life cycle		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y = 1, n = 0	n

Qsn #	Question	Answer Option	Answer
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	y
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	y
606	Reproduction by vegetative fragmentation	y = 1, n = -1	y
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)		
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		
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/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y = -1, n = 1	y
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
	Steenis, C.G.G.J. van (ed.). Flora Malesiana. Series I, Spermatophyta: Flowering plants. Volume 9. Martinus Nijhoff/Dr. W. Junk Publishers. The Hague - Boston - London	[No evidence of domestication] "Distr. Taiwan and Malesia: Philippines: North Luzon (Bontoc, Benguet and Pangasinan Prov.). E c o l. Open grassy slopes in the pine region, 1100-2300 m. Fl. May, fr. Oct."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2024). 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"	Intermediate
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch . [Accessed 9 Dec 2024]	"Native Asia-Temperate EASTERN ASIA: Taiwan Asia-Tropical MALESIA: Philippines"
	Balangcod, T. D., Cuevas, V. C., Buot, I. E., & Balangcod, A. K. D. (2011). Geographic distribution of <i>Lilium philippinense baker</i> (Liliaceae) in the Cordillera central range, Luzon island, Philippines. <i>Taiwania</i> , 56(3), 186-194	[Higher elevation tropical climates; similar to temperate zones] "The populations of <i>L. philippinense</i> are nestled within a distinct phytogeographic zone that is characterized by high mountains and the dominance of <i>Pinus kesiya</i> (Merrill, 1904). This region, owing to extreme altitudinal variation, and a temperate temperature within a tropical realm, supports a wide range of unique vegetation assemblages."

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch . [Accessed 9 Dec 2024]	"Native Asia-Temperate EASTERN ASIA: Taiwan Asia-Tropical MALESIA: Philippines"

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes

Qsn #	Question	Answer
	Balangcod, T. D., Cuevas, V. C., Buot, I. E., & Balangcod, A. K. D. (2011). Geographic distribution of <i>Lilium philippinense</i> baker (Liliaceae) in the Cordillera central range, Luzon island, Philippines. <i>Taiwania</i> , 56(3), 186-194	"Descriptive analyses reveals that the populations are distributed at an altitudinal range of 754 and 2,155 m and geographically located between 16°27'90" and 17°15'55" latitude and 120°51'86" and 121°09'22" longitude. In addition, results of hierarchical cluster analyses and analysis of variance also show that elevation plays a major role in the distribution of this species."
	Steenis, C.G.G.J. van (ed.). <i>Flora Malesiana. Series I, Spermatophyta: Flowering plants. Volume 9.</i> Martinus Nijhoff/Dr. W. Junk Publishers. The Hague - Boston - London	"Ecol. Open grassy slopes in the pine region, 1100-2300 m." [Elevation range >1000 m, demonstrating environmental versatility]

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Steenis, C.G.G.J. van (ed.). <i>Flora Malesiana. Series I, Spermatophyta: Flowering plants. Volume 9.</i> Martinus Nijhoff/Dr. W. Junk Publishers. The Hague - Boston - London	"Distr. Taiwan and Malesia: Philippines: North Luzon (Bontoc, Benguet and Pangasinan Prov.). E c o l. Open grassy slopes in the pine region, 1100-2300 m."
	Balangcod, T. D., Cuevas, V. C., Buot, I. E., & Balangcod, A. K. D. (2011). Geographic distribution of <i>Lilium philippinense</i> baker (Liliaceae) in the Cordillera central range, Luzon island, Philippines. <i>Taiwania</i> , 56(3), 186-194	[Occurs in higher elevations of tropical regions, similar to temperate zones] "The populations of <i>L. philippinense</i> are nestled within a distinct phytogeographic zone that is characterized by high mountains and the dominance of <i>Pinus kesiya</i> (Merrill, 1904). This region, owing to extreme altitudinal variation, and a temperate temperature within a tropical realm, supports a wide range of unique vegetation assemblages."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Weakley, A.S., and Southeastern Flora Team. (2024). <i>Flora of the southeastern United States</i> Web App. University of North Carolina Herbarium, North Carolina Botanical Garden, Chapel Hill, U.S.A. https://fsus.ncbg.unc.edu/show-taxon-detail.php?taxonid=2711 . [Accessed 9 Dec 2024]	"This species is introduced at various locations in the Southeast, including FL and LA (Kartesz 1999), and has been documented from Richmond Co. NC (B.A. Sorrie, pers. comm.)."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Flora of North America Editorial Committee. (2003). <i>Flora of North America: North of Mexico, Volume 26.</i> Magnoliophyta: Liliidae: Liliales and Orchidales. Oxford University Press, Oxford, UK	" <i>Lilium philippinense</i> Baker (Philippine lily; Philippines) is similar to <i>L. formosanum</i> but with a thinner, longer floral tube. The delicately fragrant flower is white, occasionally streaked with green and red basally, and is the largest in the genus; the perianth parts are 18-25 cm and basally papillose. It is reported from one location in Kentucky (E. T. Browne Jr. and R. Athey 1992) and is becoming well established in parts of Florida, especially near Tallahassee."
	Spaulding, D. D., Kartesz, J. T., Horne, H. E., Finzel, B. J., & England, J. K. (2021). <i>Flora of Northern Alabama, part 5. Liliaceous Families.</i> <i>Phytoneuron</i> , 2021(30), 1-262	"Perennial herb from a bulb. Roadsides, fence rows, and other disturbed areas. Flowers July-August; rare throughout Alabama (Fig. 188). An endemic species of the Cordillera Central Range on Luzon Island in the Philippines (Balangcod et al. 2011). It is cultivated outdoors in warmer regions and has naturalized in the southeastern USA (Bailey 1929, Kartesz 2020)."

Qsn #	Question	Answer
	Weakley, A.S., and Southeastern Flora Team. (2024). Flora of the southeastern United States Web App. University of North Carolina Herbarium, North Carolina Botanical Garden, Chapel Hill, U.S.A. https://fsus.ncbg.unc.edu/show-taxon-detail.php?taxonid=2711 . [Accessed 9 Dec 2024]	* <i>Lilium philippinense</i> Baker. Philippine Lily. Phen: Jul-Aug. Hab: Roadsides, disturbed areas, escaped from cultivation. Dist: Native of the Philippines. This species is introduced at various locations in the Southeast, including FL and LA (Kartesz 1999), and has been documented from Richmond Co. NC (B.A. Sorrie, pers. comm.)."
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2024). Plants of Hawai'i. http://www.plantsofhawaii.org . [Accessed 9 Dec 2024]	No evidence to date

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Inkson, T., Smith, M. & Strachan, I. (2018). Garden Escapes & Other Weeds in Bushland and Reserves. A responsible gardening guide for the Sydney Region. Sydney Weeds Committees	"Other Problematic Bulbous & Succulent Weeds" [Includes <i>Lilium philippinense</i> , but no impacts have been described]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence
	CABI. (2024). CABI Compendium Invasive Species. https://www.cabidigitallibrary.org/product/qi . [Accessed 9 Dec 2024]	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
	CABI. (2024). CABI Compendium Invasive Species. https://www.cabidigitallibrary.org/product/qi . [Accessed 9 Dec 2024]	No evidence

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
	CABI. (2024). CABI Compendium Invasive Species. https://www.cabidigitallibrary.org/product/qi . [Accessed 9 Dec 2024]	No evidence
	WRA Specialist. (2024). Personal Communication	No evidence. Potentially if it establishes, particularly in montane forests.

305	Congeneric weed	y
	Source(s)	Notes
	Warner, S., Grice, A. C., & Duggin, J. A. (2006). Ecology of <i>Lilium formosanum</i> Wallace and implications for management. Proceedings of the 15th Australian Weeds Conference, eds C. Preston, J.H. Watts and N.D. Crossman, pp. 180-183. (Weed Management Society of South Australia, Adelaide)	[<i>Lilium formosanum</i>] "On LHI, Formosa lily is commonly found in light gaps in otherwise closed forest. It also occurs in more open cliff and ledge communities. These habitats support a number of rare or threatened endemic species, so it is possible that it competes with these plants for resources."

Qsn #	Question	Answer
	Cussan, J. L. (2006). Eradication of invasive alien plants on Lord Howe Island, NSW using three Asparagus species (<i>Asparagus asparagoides</i> (L.) Druce, <i>A. plumosus</i> Baker and <i>A. aethiopicus</i> L.) as a case study. <i>Plant Protection Quarterly</i> 21(3): 117-121	[<i>Lilium formosanum</i>] "The two other listed noxious weeds, Taiwan lily (<i>Lilium formosanum</i> Wallace) and Crofton weed (<i>Ageratina adenophora</i> (Spreng.) R.M.King & H.Rob.) are so widespread and numerous, including in totally inaccessible areas, that eradication is not planned for these species at this stage."
	Herrando-Moraira, S., Nualart, N., Herrando-Moraira, A., Chung, M. Y., Chung, M. G., & López-Pujol, J. (2019). Climatic niche characteristics of native and invasive <i>Lilium lancifolium</i> . <i>Scientific reports</i> , 9(1), 14334	[<i>Lilium lancifolium</i>] "Regarding its introduction in these neophyte areas, <i>L. lancifolium</i> has often been recorded as a garden escape in North America; indeed, it was already mentioned as escaping in 1856 by the celebrated American naturalist HD Thoreau in Massachusetts ⁶⁰ . In the north-eastern portion of the United States of America and in SE Canada it has become naturalized, usually occurring in ruderalized places (roadsides, railways, abandoned or vacant lots in urban areas, cemetery prairies, etc. ⁶¹). The species, indeed, seems to be still expanding in North America, as it has recently naturalized in Texas ⁶² . In Oceania the species, in contrast, seems to behave already as an aggressive weed. In New Zealand, it is listed as an environmental weed at national level ⁶³ , with the first records dating from the 1950s ⁶⁴ . In Australia, <i>L. lancifolium</i> is also recognized at nation level as an invasive ^{65,66} ; it was first recorded as naturalized in Victoria in 1985 ⁶⁷ , and later in 2004 in New South Wales ⁶⁸ . In Europe, the species is relatively widely naturalized in Fennoscandia and the Baltic states (e.g. ⁶⁹ It has also been reported in Austria as an adventive ^{71,72} , although it seems that this species at present only occurs in this country as cultivated (C Tschisner, Inatura Museum, Austria, pers. comm.). The species has also been cited in central Italy ⁷³ even though these authors are not sure of its spontaneity, and in the mountains near Tirana, Albania ⁷⁴ ."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Steenis, C.G.G.J. van (ed.). <i>Flora Malesiana. Series I, Spermatophyta: Flowering plants. Volume 9.</i> Martinus Nijhoff/Dr. W. Junk Publishers. The Hague - Boston - London	"Bulb subglobose, whitish, c. 3 1/2 - 4 cm Ø; scales unknown. Stem 30-90 cm high, smooth, green or mottled with purple, producing roots above the bulb. Leaves alternate, 30-40, linear, attenuate, with up to 7 veins of which 1 or 3 are more conspicuous, 8-17 cm by 2-4 mm. Flowers 1 or 2, white, with green and reddish outside towards the base, horizontal, (10-)14-25 cm long, infundibuliform, the tube (in dried material) 8-12 mm Ø. Perianth segments not clawed, spreading distally; nectariferous furrow papillose. Filaments linear in dried material, 13-17 cm; anthers 5-15 mm long; pollen yellow. Style 10 1/2-16 cm; stigma deeply 3-lobed. Capsule c. 5 cm long."

402	Allelopathic	
	Source(s)	Notes
	Balangcod, T. D., Cuevas, V. C., Buot, I. E., & Balangcod, A. K. D. (2011). Geographic distribution of <i>Lilium philippinense</i> baker (Liliaceae) in the Cordillera central range, Luzon island, Philippines. <i>Taiwania</i> , 56(3), 186-194	[No evidence when growing with other vegetation] "Benguet lilies, as the species is popularly known, grow half-concealed among closely associated Gramineae species such as <i>Themeda triandra</i> , <i>Imperata cylindrica</i> and <i>Miscanthus sinensis</i> , making them difficult to locate during their vegetative phase (Fig. 1)."
	WRA Specialist. (2024). Personal Communication	Unknown. No evidence found

Qsn #	Question	Answer
403	Parasitic	n
	Source(s)	Notes
	Steenis, C.G.G.J. van (ed.). Flora Malesiana. Series I, Spermatophyta: Flowering plants. Volume 9. Martinus Nijhoff/Dr. W. Junk Publishers. The Hague - Boston - London	"Erect, usually glabrous herbs." [Liliaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Wilson Bros Gardens. (2024). Philippine Lily. https://www.wilsonbrosgardens.com/lilium-philippinense-philippine-lily.html . [Accessed 9 Dec 2024]	"Resistances: Deer, Disease, Heat, Humidity, Insect" [Reported to be resistant to deer. Potentially unpalatable]

405	Toxic to animals	y
	Source(s)	Notes
	McKenzie, R. (2020). Australia's Poisonous Plants, Fungi and Cyanobacteria: A Guide to Species of Medical and Veterinary Importance. CSIRO Publishing, Clayton South, VIC	"All <i>Lilium</i> species and hybrids should be considered potentially poisonous to cats."
	PictureThis. (2024). Philippine lily. <i>Lilium philippinense</i> . https://www.picturethisai.com/wiki/Lilium_philippinense.html . [Accessed 9 Dec 2024]	"This lily is a favorite among local florists because it provides excellent focal points for flower arrangements. However, they are harmful to cats, so exercise caution if you have pets." ... "Toxic to Pets Toxicity"

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Whiteside, J. O. (1966). A Revised List Of Plant Diseases In Rhodesia. <i>Kirkia</i> , 5(2), 87-196	" <i>Lilium philippinense</i> Bak.—Japanese Lily Bud Rot: <i>Phytophthora parasitica</i> D"
	Wilson Bros Gardens. (2024). Philippine Lily. https://www.wilsonbrosgardens.com/lilium-philippinense-philippine-lily.html . [Accessed 9 Dec 2024]	"Resistances: Deer, Disease, Heat, Humidity, Insect"
	WRA Specialist. (2024). Personal Communication	Known to harbor fungal pathogens and viruses affecting lilies but not significant as a pest reservoir.

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	McKenzie, R. (2020). Australia's Poisonous Plants, Fungi and Cyanobacteria: A Guide to Species of Medical and Veterinary Importance. CSIRO Publishing, Clayton South, VIC	"All <i>Lilium</i> species and hybrids should be considered potentially poisonous to cats."
	PictureThis. (2024). Philippine lily. <i>Lilium philippinense</i> . https://www.picturethisai.com/wiki/Lilium_philippinense.html . [Accessed 9 Dec 2024]	"Toxic to Pets - Toxicity" [Possibly toxic to humans if ingested]

Qsn #	Question	Answer
408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Balangcod, T. D., Cuevas, V. C., Buot, I. E., & Balangcod, A. K. D. (2011). Geographic distribution of <i>Lilium philippinense</i> baker (Liliaceae) in the Cordillera central range, Luzon island, Philippines. <i>Taiwania</i> , 56(3), 186-194	No evidence of fire risk or hazard within native range. Highly unlikely given habit and habitat

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	PictureThis. (2024). Philippine lily. <i>Lilium philippinense</i> . https://www.picturethisai.com/wiki/Lilium_philippinense.htm l. [Accessed 9 Dec 2024]	"Full sun - Sunlight"
	Balangcod, T. D., Cuevas, V. C., Buot, I. E., & Balangcod, A. K. D. (2011). Geographic distribution of <i>Lilium philippinense</i> baker (Liliaceae) in the Cordillera central range, Luzon island, Philippines. <i>Taiwania</i> , 56(3), 186-194	"It prefers a well-drained soil and inhabits primarily rock surfaces at high elevations although some populations are found in slightly shaded hillsides."
	Wilson Bros Gardens. (2024). Philippine Lily. https://www.wilsonbrosgardens.com/lilium-philippinense-philippine-lily.html . [Accessed 9 Dec 2024]	"The plant grows well in full sun to part shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	Notes
	Balangcod, T. D., Cuevas, V. C., Buot, I. E., & Balangcod, A. K. D. (2011). Geographic distribution of <i>Lilium philippinense</i> baker (Liliaceae) in the Cordillera central range, Luzon island, Philippines. <i>Taiwania</i> , 56(3), 186-194	"It prefers a well-drained soil and inhabits primarily rock surfaces at high elevations although some populations are found in slightly shaded hillsides."
	PictureThis. (2024). Philippine lily. <i>Lilium philippinense</i> . https://www.picturethisai.com/wiki/Lilium_philippinense.htm l. [Accessed 9 Dec 2024]	"Plant at a suitable depth for anchoring, ensuring well-draining soil, indirect light, and moderate watering for optimal growth."
	Wilson Bros Gardens. (2024). Philippine Lily. https://www.wilsonbrosgardens.com/lilium-philippinense-philippine-lily.html . [Accessed 9 Dec 2024]	"Soil Type: Loam, Sand, Silt (Limestone) Soil Drainage: Well Drained Moist Soil pH: 7.0 - 7.5 (Neutral to Alkaline)"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wilson, E. H. (1925). <i>The Lilies of Eastern Asia: A Monograph</i> . Dulau & Company Limited, London	"Open grassy slopes in the pine region, 1100-2300 m." [No evidence, but a related species is reported to be able to form dense stands]
	Auckland Council. (2024). <i>Lilium formosanum</i> - Formosa lily. https://www.tiakitamakimaurau.nz/protect-and-restore-our-environment/pests-in-auckland/pest-search/lilfor/ . [Accessed 9 Dec 2024]	[Related species forms dense stands] "Forms dense stands. Competes with native plant species such as harakeke."

Qsn #	Question	Answer
412	Forms dense thickets	n
	Source(s)	Notes
	Auckland Council. (2024). <i>Lilium formosanum</i> - Formosa lily. https://www.tiakitamakaurau.nz/protect-and-restore-our-environment/pests-in-auckland/pest-search/lilfor/ . [Accessed]	[Related species forms dense stands] "Forms dense stands. Competes with native plant species such as harakeke."
	WRA Specialist. (2024). Personal Communication	No evidence of dense thicket formation, although a related species with similar growth form and habitat is reported to form dense stands in Australia

501	Aquatic	n
	Source(s)	Notes
	Steenis, C.G.G.J. van (ed.). <i>Flora Malesiana. Series I, Spermatophyta: Flowering plants. Volume 9.</i> Martinus Nijhoff/Dr. W. Junk Publishers. The Hague - Boston - London	[Terrestrial] "Open grassy slopes in the pine region, 1100-2300 m."

502	Grass	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch . [Accessed 9 Dec 2024]	"Family: Liliaceae Subfamily: Lilioideae Tribe: Lilieae"

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2024). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch . [Accessed 9 Dec 2024]	"Family: Liliaceae Subfamily: Lilioideae Tribe: Lilieae"

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y
	Source(s)	Notes
	Steenis, C.G.G.J. van (ed.). <i>Flora Malesiana. Series I, Spermatophyta: Flowering plants. Volume 9.</i> Martinus Nijhoff/Dr. W. Junk Publishers. The Hague - Boston - London	"Bulb subglobose, whitish, c. 3½-4 cm 0; scales unknown. Stem 30-90 cm high, smooth, green or mottled with purple, producing roots above the bulb."
	Balangcod, T. D., Cuevas, V. C., Buot, I. E., & Balangcod, A. K. D. (2011). Geographic distribution of <i>Lilium philippinense</i> baker (Liliaceae) in the Cordillera central range, Luzon island, Philippines. <i>Taiwania</i> , 56(3), 186-194	" <i>Lilium philippinense</i> Baker is one among three bulbous species of the genus <i>Lilium</i> found in the Cordillera Central Range (CCR) and mostly used for horticultural purposes."

601	Evidence of substantial reproductive failure in native habitat	n
-----	--	---

Qsn #	Question	Answer
	Source(s)	Notes
	Balangcod, T. D., Cuevas, V. C., Buot, I. E., & Balangcod, A. K. D. (2011). Geographic distribution of <i>Lilium philippinense</i> baker (Liliaceae) in the Cordillera central range, Luzon island, Philippines. <i>Taiwania</i> , 56(3), 186-194	[Reproducing, but threatened in native range] "Threats to this species are attributed to habitat loss which is caused by natural events such as soil erosion and anthropogenic activities such as road widening, over collection and land conversion. With these threats, the natural populations of this species are declining and therefore require immediate conservation strategies before they become totally extinct."

602	Produces viable seed	y
	Source(s)	Notes
	Wilson, E. H. (1925). <i>The Lilies of Eastern Asia: A Monograph</i> . Dulau & Company Limited, London	"It is a delicate and charming Lily with a phenomenally long trumpet but lacks constitution and needs to be continually raised afresh from seeds or scales . It flowers in a few months from seed and might be treated as a greenhouse annual."
	Balangcod, T. D., Cuevas, V. C., Buot, I. E., & Balangcod, A. K. D. (2011). Geographic distribution of <i>Lilium philippinense</i> baker (Liliaceae) in the Cordillera central range, Luzon island, Philippines. <i>Taiwania</i> , 56(3), 186-194	"The anthers emit an enthralling fragrance at anthesis which occurs only once a year, usually from late May until late July, after which their capsules mature and start dehiscing their seeds from August to September (Balangcod, 2009)."
	Balangcod, T. D., Cuevas, V. C., & Balangcod, A. K. D. (2011). Cultivation and conservation of <i>Lilium philippinense</i> (Liliaceae), the Philippine endemic Benguet Lily. <i>Gardens' Bulletin</i> , Singapore, 63(1&2), 395-407	"Under greenhouse conditions, seed and bulb germination show only 27.63% and 16.67% success, respectively. The apparently acute sensitivity of this species to environmental factors such as soil pH, light, humidity, air and soil temperature, and possibilities for ex situ cultivation, are discussed."

603	Hybridizes naturally	
	Source(s)	Notes
	Wilson, E. H. (1925). <i>The Lilies of Eastern Asia: A Monograph</i> . Dulau & Company Limited, London	"Stories of hybrids between it and <i>L. longiflorum</i> var . <i>eximium</i> Baker, were circulated but if any were raised they have long since disappeared ."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Crang, R. E. (1969). Pollination Effects on Style Degradation in <i>Lilium philippinense</i> . <i>Transactions of the American Microscopical Society</i> , 88(2), 294-299	"Plants of self-compatible <i>Lilium philippinense</i> Baker, each bearing an average of three flowers, were selected as they approached anthesis."

605	Requires specialist pollinators	y
	Source(s)	Notes
	Flora of North America Editorial Committee. (2003). <i>Flora of North America: North of Mexico, Volume 26. Magnoliophyta: Liliidae: Liliales and Orchadales</i> . Oxford University Press, Oxford, UK	"Nectar is offered especially from the sepal nectaries to reward insect pollinators, and also hummingbirds in North America. Phylogenetic analysis (M. W. Skinner 1988) suggests that the original pendent lilies to colonize North America were butterfly pollinated, and other pollination syndromes involving moths and hummingbirds evolved in situ via pollinator mediation."
	NurseryPeople.com. (2024). <i>Lilium philippinense</i> 'Philippine Lily' (Philippine Lily). https://nurserypeople.com/plants/lilium-philippinense-philippine-lily-philippine-lily . [Accessed 9 Dec 2024]	"The flowers are fragrant and attract pollinators like bees and butterflies."

Qsn #	Question	Answer
	Le Roux, J. J., et al. (2020). Biotic interactions as mediators of biological invasions: insights from South Africa. <i>Biological Invasions in South Africa</i> , 35, 387-427	[Probably Yes. Related species requires specialized pollinators] "Another alien plant in South Africa that requires specialist pollinators is the Formosa Lily, <i>Lilium formosanum</i> . In its native range in Taiwan, the lily is pollinated by the Long-tongued <i>Convolvulus</i> Hawkmoth, <i>Agrius convolvuli</i> . In South Africa, the species experiences reduced pollination in small populations, but self-fertilization sufficiently compensates for this, alleviating any potential Allee effect (Rodger et al. 2013). In denser populations in South Africa, <i>L. formosanum</i> is readily pollinated by <i>A. convolvuli</i> , since this hawkmoth is native to much of the Old World, including South Africa (Rodger et al. 2010). This example illustrates how the wide native range distributions of pollinators may facilitate reproductive success of an alien species."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	<i>Lilium philippinense</i> , like the related <i>Lilium formosanum</i> , primarily reproduces through the formation of bulbs, which is a form of asexual reproduction; meaning it can spread vegetatively by producing new bulbs from the parent bulb, effectively creating a clump over time.

607	Minimum generative time (years)	1
	Source(s)	Notes
	Wilson, E. H. (1925). <i>The Lilies of Eastern Asia: A Monograph</i> . Dulau & Company Limited, London	"It is a delicate and charming Lily with a phenomenally long trumpet but lacks constitution and needs to be continually raised afresh from seeds or scales . It flowers in a few months from seed and might be treated as a greenhouse annual."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Weakley, A.S., and Southeastern Flora Team. (2024). <i>Flora of the southeastern United States</i> Web App. University of North Carolina Herbarium, North Carolina Botanical Garden, Chapel Hill, U.S.A. https://fsus.ncbg.unc.edu/show-taxon-detail.php?taxonid=2711 . [Accessed 10 Dec 2024]	" <i>Lilium philippinense</i> Baker. Philippine Lily. Phen: Jul-Aug. Hab: Roadsides, disturbed areas, escaped from cultivation." [Possibly. Suggests dispersal may be facilitated by movement of vehicles, equipment, or other human activity]
	Benson, D., & McDougall, L. (2005). Ecology of Sydney plant species: part 10, Monocotyledon families Lemnaceae to Zosteraceae. <i>Cunninghamia</i> 9(1): 16-204	[This description of <i>Lilium formosanum</i> may be shared by <i>Lilium philippinense</i>] "Prolific seeder and germinator (Anon 1991); seed wind-dispersed along roadsides possibly assisted by turbulence from heavy vehicles (A. Rodd pers. comm. 1994). Bulbs dispersed by gravity and water."

Qsn #	Question	Answer
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Balangcod, T. D., Cuevas, V. C., Buot, I. E., & Balangcod, A. K. D. (2011). Geographic distribution of <i>Lilium philippinense</i> baker (Liliaceae) in the Cordillera central range, Luzon island, Philippines. <i>Taiwania</i> , 56(3), 186-194	" <i>Lilium philippinense</i> Baker is one among three bulbous species of the genus <i>Lilium</i> found in the Cordillera Central Range (CCR) and mostly used for horticultural purposes. It is one of the spectacular displays found in nature with its pure white, tubular flowers, sometimes tinge with a reddish color at the base of the corolla."
	Weakley, A.S., and Southeastern Flora Team. (2024). Flora of the southeastern United States Web App. University of North Carolina Herbarium, North Carolina Botanical Garden, Chapel Hill, U.S.A. https://fsus.ncbg.unc.edu/show-taxon-detail.php?taxonid=2711 . [Accessed 9 Dec 2024]	" <i>Lilium philippinense</i> Baker. Philippine Lily. Phen: Jul-Aug. Hab: Roadsides, disturbed areas, escaped from cultivation. Dist: Native of the Philippines. This species is introduced at various locations in the Southeast, including FL and LA (Kartesz 1999), and has been documented from Richmond Co. NC (B.A. Sorrie, pers. comm.)."
703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	Possibly. The seeds are lightweight and can spread easily through wind or agricultural activity, potentially contaminating produce fields.
704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Napaldet, J. T. (2017). Morpho-anatomical characterization of Benguet lily (<i>Lilium philippinense</i> Baker). <i>Thailand Natural History Museum Journal</i> , 11(2), 47-56	"Numerous seeds are contained in the capsule ranging from few hundreds to a thousand. The seeds are oblong, brown and light-weight surrounded by thin brown film indicating wind dispersal."
705	Propagules water dispersed	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	Possibly. While accidental water dispersal (hydrochory) could theoretically occur if seeds or bulbs are carried by streams or heavy rain in its mountainous habitats, this is not a primary dispersal mechanism for the species. The plant's adaptations are more aligned with wind-based dispersal due to its high-altitude environment.
706	Propagules bird dispersed	n
	Source(s)	Notes
	Napaldet, J. T. (2017). Morpho-anatomical characterization of Benguet lily (<i>Lilium philippinense</i> Baker). <i>Thailand Natural History Museum Journal</i> , 11(2), 47-56	"The seeds are oblong, brown and light-weight surrounded by thin brown film indicating wind dispersal."
	WRA Specialist. (2024). Personal Communication	No evidence. Its primary dispersal mechanism involves wind-dispersed seeds, which are lightweight and adapted to air transport. The seeds do not have fleshy or attractive structures, such as fruits or arils, that would entice birds to consume them and subsequently disperse them via excretion.
707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Napaldet, J. T. (2017). Morpho-anatomical characterization of Benguet lily (<i>Lilium philippinense</i> Baker). <i>Thailand Natural History Museum Journal</i> , 11(2), 47-56	"The seeds are oblong, brown and light-weight surrounded by thin brown film indicating wind dispersal."

Qsn #	Question	Answer
	WRA Specialist. (2024). Personal Communication	No evidence. Not adapted for dispersal through external attachment to animals (epizoochory). Its seeds lack specialized structures such as hooks, barbs, or sticky surfaces that would enable them to cling to the fur, feathers, or skin of animals.

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Napaldet, J. T. (2017). Morpho-anatomical characterization of Benguet lily (<i>Lilium philippinense</i> Baker). Thailand Natural History Museum Journal, 11(2), 47-56	"Fruit is a septicidal capsule from compound ovary of 3 carpels with axile placentation. After fertilization and senescence of the perianth and stamens, the capsule is visibly linear and green. The locule of the capsule broadens as the ovules mature making the involute septa more prominent. The septa are deeper, midway into the capsule, at every other interval making the capsule look like trilobed (see Fig. 3). The length of the capsule varies from 4 to 10 cm but the diameter is relatively stable at around 2 cm. At maturity, the capsule dries, turns brown along with the entire plant, then dehiscence starting from apex downward releasing the seeds. Numerous seeds are contained in the capsule ranging from few hundreds to a thousand. The seeds are oblong, brown and light-weight surrounded by thin brown film indicating wind dispersal."
	WRA Specialist. (2024). Personal Communication	There is no evidence to suggest that <i>Lilium philippinense</i> seeds are adapted to survive gut passage through animals. The seeds lack the protective, hard coatings or specialized traits typically found in plants that rely on animal ingestion (endozoochory) for dispersal.

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Napaldet, J. T. (2017). Morpho-anatomical characterization of Benguet lily (<i>Lilium philippinense</i> Baker). Thailand Natural History Museum Journal, 11(2), 47-56	"Numerous seeds are contained in the capsule ranging from few hundreds to a thousand. The seeds are oblong, brown and light-weight surrounded by thin brown film indicating wind dispersal." [Unknown. In natural habitats, if multiple <i>Lilium philippinense</i> plants are growing densely within a square meter, their combined seed output could potentially reach or exceed 1,000 seeds/m2]

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Balangcod, T. D., Cuevas, V. C., & Balangcod, A. K. D. (2011). Cultivation and conservation of <i>Lilium philippinense</i> (Liliaceae), the Philippine endemic Benguet Lily. Gardens' Bulletin, Singapore, 63(1&2), 395-407	"Germination from seeds is influenced by different factors such as dormancy, seed size, exposure to environmental factors and other factors that are inherent in the plant. Lily seeds have different types of germination depending on the species. <i>Lilium philippinense</i> exhibits an epigeal type of germination. In this study, seeds and bulbs of <i>L. philippinense</i> were exposed to a uniform set of environmental conditions in a greenhouse. There was low germination percentage for both seeds and bulbs. Lilies display a unique characteristic in terms of germination capacity. According to Elwes (1880), this is inherent to temperate species where germination from seeds in <i>Lilium</i> would show alternating dormancy and seedling initiation for three or more years."

Qsn #	Question	Answer
	Warner, S., Grice, A. C., Duggin, J. A., & Gross, C. L. (2008). Seed dynamics of the invasive geophyte <i>Lilium formosanum</i> on Lord Howe Island-lots of seeds but they don't live long. Proceedings of the 16th Australian Weeds Conference, eds R.D. van Klinken, V.A. Osten, F.D. Panetta and J.C. Scanlan, pp. 174-176. Queensland Weeds Society,	[Possibly No. Related species does not produce long lived seeds] "Seed longevity in the soil seed bank A 3-way ANOVA revealed that duration of burial (P = 0.158) and soil type (P = 1.000) were not significant, but burial depth was significant (P = 0.041). By three months, seed bags buried below the litter contained no viable seed. However, the percentages of seeds buried at 2 cm that were viable at three months and 10 months were 0.06% (± 0.002) and 0.02% (± 0.001), respectively, with nil viable seed present at the 5-month exhumation. In the accelerated ageing test, viability had fallen to below 50% within 1.8 (± 5.4) days. This puts the seed into a transient seed bank category, having a maximum survival rate after 20 days of 50% (Long 2007)."

803	Well controlled by herbicides	y
	Source(s)	Notes
	Cook et al. (2018). New South Wales Weed Control Handbook - A guide to weed control in non-crop, aquatic and bushland situations 7th Edition. State of New South Wales through Department of Industry	[Herbicides to control <i>Lilium formosanum</i> would likely be effective on <i>Lilium philippinense</i>] "Chemical and Concentration: Glyphosate 360 g/L with Metsulfuronmethyl 600 g/kg Various products Rate: 2 L glyphosate plus 15 g metsulfuron-methyl per 100 L of water Comments: Spot spray application between flowering and fruiting. Chemical and Concentration: Metsulfuron-methyl 600 g/kg Brush-off® Rate: 10-20 g metsulfuron-methyl in 100 L of water plus surfactant Comments: Spot spray application between flowering and fruiting Chemical and Concentration: Picloram 44.7 g/kg + Aminopyralid 4.47 g/L Vigilant II ® Rate: Undiluted Comments: Cut stump application. Apply a 3-5 mm layer of gel across the cut surface on the rhizome"

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Sydney Weeds Network. (2024). Formosa lily - <i>Lilium formosanum</i> . https://sydneyweeds.org.au/weeds/formosa-lily/ . [Accessed 10 Dec 2024]	"Control: Difficult. Hand dig, ensuring all scales are removed. Best done before flowering. Extensive follow-up required. Remove and bag seed heads (capsules). Foliar sprays ineffective." [Similar to <i>Lilium formosanum</i> , <i>Lilium philippinense</i> can regrow after damage to its above-ground vegetative parts, primarily because it relies on its underground bulb for storage and regeneration. The bulb serves as a reservoir of nutrients and energy, allowing the plant to produce new shoots and leaves even if the above-ground parts are damaged or destroyed by herbivory, environmental factors, or human activity.]

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	Unknown

Summary of Risk Traits:

Lilium philippinense, commonly known as the Benguet lily or Philippine lily, is a species of lily native to the high-altitude regions of Taiwan and the northern Philippines, particularly in the Cordillera Mountains. It is well-known for its elegant, trumpet-shaped white flowers and is prized for its ornamental beauty.

While prized as an ornamental plant, *Lilium philippinense* has escaped from cultivation and naturalized in the southeastern United States and shares several traits with other invasive *Lilium* species. These include wind-dispersed seeds, and bulbs that allow it to persist in unfavorable conditions, which could allow it to invade and compete with other desirable vegetation. To date, it is reported to be cultivated, but not naturalized, or invasive, in the Hawaiian Islands.

High Risk / Undesirable Traits

Grows and can spread in high elevation regions with tropical climates

Naturalized in the southeastern USA

Other *Lilium* species are invasive

Reported to be toxic to animals and potentially humans

A geophyte, with bulbs able to persist in the soil from season to season

Reproduces by seed

Self-fertile

Able to spread vegetatively from dispersal or fragmentation of bulbs

Reaches maturity in under one year

Seeds dispersed by wind and intentional cultivation

Tolerates mechanical damage and can regrow from underground bulbs

Low Risk Traits

Unarmed (no spines, thorns, or burrs)

Grows best in high light environments (dense shade may inhibit spread)

Herbicides may provide effective control