

Taxon: <i>Lilium formosanum</i> Wallace	Family: Liliaceae
Common Name(s): Formosa lily Taiwanese lily	Synonym(s): <i>Lilium formosanum</i> var. <i>microphyllum</i> T.S.Liu & S.S.Ying <i>Lilium formosanum</i> var. <i>pricei</i> Stoker <i>Lilium longiflorum</i> var. <i>formosanum</i> Baker <i>Lilium philippinense</i> var. <i>formosanum</i> Grove <i>Lilium zairei</i> Mynett & Mackiewicz

Assessor: Chuck Chimera	Status: Approved	End Date: 25 Nov 2024
WRA Score: 18.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Geophyte, Naturalized Elsewhere, Environmental Weed, 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)	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	y = 2*multiplier (see Appendix 2), n = 0	y
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	y = 1, n = -1	n
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	y = 1, n = 0	y
408	Creates a fire hazard in natural ecosystems	y = 1, n = 0	n

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y = 1, n = 0	y
411	Climbing or smothering growth habit	y = 1, n = 0	n
412	Forms dense thickets	y = 1, n = 0	y
501	Aquatic	y = 5, n = 0	n
502	Grass	y = 1, n = 0	n
503	Nitrogen fixing woody plant	y = 1, n = 0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y = 1, n = 0	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)	y = 1, n = -1	y
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	y
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)	y = 1, n = -1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y = 1, n = -1	n
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
	Anisko, T. (2008). <i>When Perennials Bloom: An Almanac for Planning and Planting</i> . Timber Press, Portland, Oregon	"A number of superior but fairly similar seed strains have been selected in cultivation and given cultivar names, including 'Giant White', 'Kenya', and 'St. Louis'. In addition, <i>L. formosanum</i> has been hybridized with <i>L. longiflorum</i> in an effort to breed new types of Easter lilies." [Used in breeding programs, but not heavily domesticated]
	van Tuyl, J. M. et al. (2011). Some Basic Facts About the Genus <i>Lilium</i> . <i>Wild Crop Relatives: Genomic and Breeding Resources: Plantation and Ornamental Crops</i> , 161-183	[<i>Lilium formosanum</i> not among the heavily domesticated species] "Lilium has a long history of cultivation. Madonna lily (<i>L. candidum</i>) and Tiger lily (<i>L. tigrinum</i>) are believed to be the oldest domesticated floral species. The artistic and botanical evidences suggested that the wild Madonna lily (<i>L. candidum</i>) had become a garden plant during the Late Minoan period. However, little is known where and when a garden Madonna lily became sterile and vegetatively propagated by man and consequently a domesticated plant (Negbi and Negbi 2000). <i>L. candidum</i> most likely originated from the Middle Orient and the first record on cultivation of this species dates back to 3000 BC. Probably during the Iron Age, the Madonna lily was introduced into Egypt by Greek colonists. In southern Europe, the Madonna lily was introduced by the Romans and until the middle of the fifteenth century this was the only cultivated species in European gardens, but by the end of the sixteenth century other European species were introduced, e.g., Orange lily (<i>L. bulbiferum</i> L.) (Pelkonen et al. 2007) or in the Netherlands the so-called rye lily (Bos 1993). During the seventeenth and eighteenth centuries, <i>L. canadense</i> and <i>L. speciosum</i> were introduced into European gardens from North America and Asia (Woodcock and Stearn 1950). China is considered as a second center of origin of domesticated lilies. <i>L. tigrinum</i> is believed to be cultivated in China since ancient times (Haw 1986)."

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"	High
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). <i>Flora of China</i> . Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Grassy slopes, seashores; near sea level to 3500 m. Taiwan." [The climate of Taiwan is subtropical, with hot, humid summers and mild winters.]

Qsn #	Question	Answer
202	Quality of climate match data	High
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Grassy slopes, seashores; near sea level to 3500 m. Taiwan." [The climate of Taiwan is subtropical, with bot, humid summers and mild winters.]

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Grassy slopes, seashores; near sea level to 3500 m. Taiwan." [Broad elevation range, demonstrating environmental versatility]
	Anisko, T. (2008). When Perennials Bloom: An Almanac for Planning and Planting. Timber Press, Portland, Oregon	"In the garden, <i>Lilium formosanum</i> prefers warm and sunny locations. It rarely succeeds in areas where summers are cool and wet. Taller plants may require staking. Allow the large seed capsules to remain on the plants and provide interest through the fall. <i>Lilium formosanum</i> self-seeds easily under favorable conditions. Plants are hardy to zones 5 or 6, but in colder climates they tend to be short-lived or even biennial. "
	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)	"This plant has an ability to adapt to a broad range of conditions and take advantage of natural and anthropogenic disturbances in both its native and naturalised range. Its native range is restricted to Taiwan where it grows from sea level to 3500 m (Liu and Ying 1978). In its native range it is often found growing in disturbed fields amongst tall grasses, on bare cliff walls prone to landslips and grassy highlands disturbed by strong winds above the forest limit (Hiramatsu et al. 2000a). It occurs naturally in areas where natural disturbances have occurred. Examples include tall grass fields on arable lands, forest margins and poorly vegetated steep rocky cliffs (Hiramatsu et al. 2001)."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Grassy slopes, seashores; near sea level to 3500 m. Taiwan." [The climate of Taiwan is subtropical, with bot, humid summers and mild winters.]
	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)	"LHI is an oceanic island with a sub-tropical climate, and altitudes up to 877 m in the southern mountains." ... "In the early 1980s, Formosa lily was described by Pickard (1983) as firmly established in the southern mountains of LHI. Today it is distributed throughout most vegetation types from the south to the north of the island. It is found across an altitudinal range from sea level up to 700 m and on the two major soil types found on the island, Calcaranite and Basalt."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes

Qsn #	Question	Answer
	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)	"Formosa lily is naturalised in New Zealand, Norfolk Island, Australia, South America (Randall 2002), Japan (Inagaki 2002) and South Africa (Walters 1983)"
	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 24 Nov 2024]	"Only found in cultivation"

301	Naturalized beyond native range	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)	"Formosa lily is naturalised in New Zealand, Norfolk Island, Australia, South America (Randall 2002), Japan (Inagaki 2002) and South Africa (Walters 1983), where it is found extensively in disturbed areas dominated by relatively tall grasses, as in its native habitat (Hiramatsu et al. 2000a). Formosa lily was introduced to Australia as an ornamental species, but is now invasive in many coastal and inland regions of Victoria, Queensland (Toowoomba and Maleny), New South Wales (including Blue Mountains and New England area) and LHI (Csurhes and Edwards 1998)."
	Coyne, P. (2011). Norfolk Island's Fascinating Flora. Petaurus Press, Belconnen ACT	" <i>Lilium formosanum</i> Formosan Lily Linnaeus named the lily genus, <i>Lilium</i> , in 1753 but this species was not named until 1891. Its specific name <i>formosanum</i> refers to its native range, the island of Taiwan, formerly called Formosa. It was first recorded on Norfolk Island in 1987, when it was considered 'rare'. Green (1994) did not include it for Norfolk Island but eleven years later de Lange et al. described it as 'now very widespread and abundant across Norfolk Island, where it may be found from sea level to the tops of Mt Bates and Mt Pitt, growing in tall rank grass and along tracksides'. It has numerous leaves 5-15 cm long and 3- 10 cm wide and stems up to 1 m tall. One to three trumpet-shaped flowers are borne on the stem, white but tinged purple on the outside."
	Csurhes, S. & Edwards, R. (1998). Potential environmental weeds in Australia: Candidate species for preventative control. Biodiversity Group, Environment Australia, Canberra, Australia	" <i>Lilium formosanum</i> is a bulbous geophyte native to Taiwan. It can be dispersed via wind or water. Carr et al. (1992) reported that the plant exists as rare or localised, medium to large, populations have invaded damp sclerophyll forest in Victoria. It has also naturalised in Queensland (Toowoomba and Maleny), New South Wales (Sydney) and on Lord Howe Island (Swarbrick and Skarratt 1994)."
	Orchard, A.E. (ed.). (1994). Flora of Australia. Vol. 49, Oceanic islands 1. Australian Government Publishing Service, Canberra	"Lord Howe Is. A native of Taiwan which has escaped from cultivation. First recorded on Lord Howe Is. in 1970, since then it has rapidly invaded the native vegetation in many areas (see J.Pickard, J. Biogeogr. 11: 198, 1984)."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Bereng, M. W. (2014). Understanding environmental factors influencing invasion of <i>Lilium formosanum</i> in Mpumalanga Province and models of its potential distribution in South Africa (Master's thesis, University of Pretoria (South Africa))	[Invades disturbed habitats. Potential impacts anticipated for the natural environment] "It is now a naturalized invasive plant in the midlands of KwaZulu-Natal and it is considered to invade anthropogenically disturbed habitats such as roadside verges, plantation edges and natural grasslands (Rodger et al. 2010). In South Africa, <i>L. formosanum</i> is an emerging invasive plant with signs of spread in provinces of South Africa such as KwaZulu-Natal, Limpopo and Mpumalanga. It is listed as a category 3 invasive plant species in terms of Conservation of Agricultural Resources Act No. 43 of 1983 (CARA). Category 3 species have shown potential of being invasive and further growing, propagation or trade of the plant is prohibited."

Qsn #	Question	Answer
	Rolfe, J. (2008). New exotic plant records and range extensions for naturalised plants in the southern North Island. Wellington Botanical Society Bulletin 51: 31-50	[Pest of unspecified impacts] "Notes: Casual, Spontaneous Occurrence. Several plants growing along a bulldozed track. <i>Lilium formosanum</i> can become a pest (Ewen Cameron pers. comm.) so the site should be surveyed to determine extent of the infestation and, if it cannot be eradicated, efforts should be made to contain it. In December 2006, I found and destroyed two plants in Hayward Scenic Reserve about 2 km from the Gracefield site."

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	Queensland Government. (2024). Weeds of Australia - <i>Lilium formosanum</i> . https://keyserver.lucidcentral.org/weeds/data/media/Html/lilium_formosanum.htm . [Accessed 25 Nov 2024]	"Formosan lily (<i>Lilium formosanum</i>) is regarded as a major environmental weed on Lord Howe Island and Norfolk Island, and as an environmental weed in Victoria, New South Wales and Queensland."
	Syliver, B., Ribeiro, N., Cavane, E., & Salimo, M. (2020). Abundance, distribution and ecological impacts of invasive plant species in Maputo Special Reserve, Mozambique. <i>International Journal of Biodiversity and Conservation</i> , 12 (4), 305-315	"Table 2. Invasive plant species in agriculture land stratum." [Includes <i>Lilium formosanum</i> . Impacts have not been described in this publication]
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Orchards & Plantations"
	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)	[Environmental weed] "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."

304	Environmental weed	y
	Source(s)	Notes
	Queensland Government. (2024). Weeds of Australia - <i>Lilium formosanum</i> . https://keyserver.lucidcentral.org/weeds/data/media/Html/lilium_formosanum.htm . [Accessed 25 Nov 2024]	"Formosan lily (<i>Lilium formosanum</i>) is regarded as a major environmental weed on Lord Howe Island and Norfolk Island, and as an environmental weed in Victoria, New South Wales and Queensland."
	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)	"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."
	Cussan, J. L. (2006). Eradication of invasive alien plants on Lord Howe Island, NSW using three <i>Asparagus</i> 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	"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."

305	Congeneric weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	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. ⁶⁹⁻⁷¹). 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
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). <i>Flora of China</i> . Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Bulb subglobose or broadly ellipsoid, 2--4 cm in diam.; scales white or tinged yellow, lanceolate-ovate to lanceolate. Stem sometimes tinged purple-red, 20--55 cm, smooth or papillose. Leaves scattered, linear or narrowly lanceolate, 2.5--15 cm × 4--13 mm. Flowers solitary or sometimes several in a subumbel, fragrant, funnelform, with a slender tube gradually expanding toward apex. Tepals white, tinged purple-red abaxially; outer ones oblanceolate, 11.5--14.5 × 2.1--2.3 cm; inner ones spatulate, to 3 cm wide; nectaries green, rarely indistinctly papillose on both surfaces. Filaments ca. 10 cm, with minute protuberances near base. Style ca. 6.5 cm. Capsule 7--9 × ca. 2 cm."

402	Allelopathic	n
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). <i>Flora of China</i> . Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Herbs perennial, bulbiferous. Bulb of many imbricate, fleshy scales, without tunic. Stem erect, leafy. Leaves alternate, rarely whorled, sessile or subsessile, usually linear to linear-lanceolate."

Qsn #	Question	Answer
404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Jungle. (2024). Lilium Formosanum: A Guide to Cultivating Taiwan's Elegant Lily. https://jungle.biz.id/lilium-formosanum-a-guide-to-cultivating-taiwans-elegant-lily/ . [Accessed 25 Nov 2024]	"Are Lilium formosanum deer-resistant? Unfortunately, Lilium formosanum is not deer-resistant. To protect your plants, consider using deer repellents or fencing."
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 Lilium species and hybrids should be considered potentially poisonous to cats."
	PictureThis. (2024).Formosa lily. Lilium formosanum. https://www.picturethisai.com/wiki/Lilium_formosanum.html . [Accessed 25 Nov 2024]	"Formosa lily is highly toxic to humans, dogs, and cats upon ingestion of any part of the plant. Symptoms can include severe gastrointestinal and neurological distress in humans, profound physical distress in cats, and vomiting, diarrhea, or kidney failure in dogs. Immediate veterinary or medical care is crucial for affected individuals."
406	Host for recognized pests and pathogens	
	Source(s)	Notes
	NC State Extension. (2024). Lilium formosanum. https://plants.ces.ncsu.edu/plants/lilium-formosanum/ . [Accessed 25 Nov 2024]	"Insects, Diseases, and Other Plant Problems: Aphids, bulb rot and Botrytis."
	Missouri Botanical Garden. (2024). Lilium formosanum. https://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=282155 . [Accessed 25 Nov 2024]	"It is generally pest free, but potential diseases include: (1) lily mosaic virus (prompt control of aphids which vector the disease is highly recommended, since there is no cure once infection occurs), (2) bulb rot (particularly in wet, poorly-drained soils), and (3) Botrytis. Taller plants may need staking if grown in too much shade (stems weaken) or in locations exposed to strong winds. May be short-lived."
407	Causes allergies or is otherwise toxic to humans	y
	Source(s)	Notes
	PictureThis. (2024).Formosa lily. Lilium formosanum. https://www.picturethisai.com/wiki/Lilium_formosanum.html . [Accessed 25 Nov 2024]	"Formosa lily is highly toxic to humans, dogs, and cats upon ingestion of any part of the plant. Symptoms can include severe gastrointestinal and neurological distress in humans, profound physical distress in cats, and vomiting, diarrhea, or kidney failure in dogs. Immediate veterinary or medical care is crucial for affected individuals. "
408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Benson, D., & McDougall, L. (2005). Ecology of Sydney plant species: part 10, Monocotyledon families Lemnaceae to Zosteraceae. <i>Cunninghamia</i> 9(1): 16-204	"Resprouted after fire (1/1994) at Lane Cove, secondary juvenile period about 9 months (P. Kubiak pers. comm.)." [No evidence of increased fire risk reported]
	WRA Specialist. (2024). Personal Communication	No evidence. Unlikely given habit and habitat
409	Is a shade tolerant plant at some stage of its life cycle	

Qsn #	Question	Answer
	Source(s)	Notes
	PictureThis. (2024).Formosa lily. <i>Lilium formosanum</i> . https://www.picturethisai.com/wiki/Lilium_formosanum.html . [Accessed 25 Nov 2024]	"Full sun Sunlight"
	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)	"On LHI, Formosa lily is commonly found in light gaps in otherwise closed forest. It also occurs in more open cliff and ledge communities."
	NC State Extension. (2024). <i>Lilium formosanum</i> . https://plants.ces.ncsu.edu/plants/lilium-formosanum/ . [Accessed 25 Nov 2024]	"This lily does best in full sun but will tolerate some shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Jury, A. (2013). <i>Lilium formosanum</i> . Waikato Times. 15 Mar2013	"As with lilies in general, <i>Lilium formosanum</i> prefers full sun, but is not fussy about soil types. In fact, it is not fussy about much at all and gently seeds down through our open woodland areas, flowering freely in late summer."
	NC State Extension. (2024). <i>Lilium formosanum</i> . https://plants.ces.ncsu.edu/plants/lilium-formosanum/ . [Accessed 25 Nov 2024]	"Soil Texture: Clay Loam (Silt) Sand Soil pH: Acid (<6.0) Neutral (6.0-8.0)"
	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)	"Today it is distributed throughout most vegetation types from the south to the north of the island. It is found across an altitudinal range from sea level up to 700 m and on the two major soil types found on the island, Calcaranite and Basalt."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Herbs perennial, bulbiferous. Bulb of many imbricate, fleshy scales, without tunic. Stem erect, leafy. Leaves alternate, rarely whorled, sessile or subsessile, usually linear to linear-lanceolate."

412	Forms dense thickets	y
	Source(s)	Notes
	Auckland Council. (2024). <i>Lilium formosanum</i> - Formosa lily. https://www.tiakitamakimakaurau.nz/protect-and-restore-our-environment/pests-in-auckland/pest-search/lilfor/ . [Accessed 25 Nov 2024]	"Forms dense stands. Competes with native plant species such as harakeke."

501	Aquatic	n
	Source(s)	Notes

Qsn #	Question	Answer
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Grassy slopes, seashores; near sea level to 3500 m. Taiwan."
502	Grass	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	Liliaceae
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	Liliaceae
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Bulb subglobose or broadly ellipsoid, 2--4 cm in diam.; scales white or tinged yellow, lanceolate-ovate to lanceolate. Stem sometimes tinged purple-red, 20--55 cm, smooth or papillose. Leaves scattered, linear or narrowly lanceolate, 2.5--15 cm × 4--13 mm."
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Grassy slopes, seashores; near sea level to 3500 m. Taiwan." [No evidence]
602	Produces viable seed	y
	Source(s)	Notes
	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,	"The success of many plants as invaders has been linked to their high seed production, high seed viability, efficient dispersal and persistent seed banks. This paper describes the results of a study of the seed production, seed viability and germination of the invasive geophyte <i>Lilium formosanum</i> on Lord Howe Island. Seed production and levels of seed viability are high but the soil seed bank is transient. Management of this species should focus on curtailing seed production and removing established plants rather than extinguishing the seed bank."
603	Hybridizes naturally	
	Source(s)	Notes

Qsn #	Question	Answer
	Kamenetsky, R., & Okubo, H. (Eds.). (2012). Ornamental geophytes: from basic science to sustainable production. CRC Press, Boca Raton, FL	"Based on isozyme diversity, Hiramatsu et al. (2001) revealed that <i>L. formosanum</i> is a derivative species from <i>L. longiflorum</i> in the southern distribution area. The two species can be crossed to obtain viable F ₁ seeds. Cultivars of an interspecific hybrid of <i>L. formosanum</i> x <i>L. longiflorum</i> . (= <i>L. xformolongi</i>) have been incorporated into the year-round cultivation system of the Easter lily in Japan and it is marketed in the summer season (Imanishi 2005)."
	Saruwatari, H., Shuto-Nakano, Y., Nakano, K., Hiramatsu, M., Ozaki, Y., & Okubo, H. (2008). Interspecific lily hybrids with the ability to flower precociously and to produce multiple flower stalks from <i>Lilium formosanum</i> . Journal of the Japanese Society for Horticultural Science, 77(3), 312-317	" <i>Lilium formosanum</i> Wallace has remarkable traits such as 'precocious flowering' ability, i.e., it reaches anthesis within 12 months from seed germination, with multiple shooting of flower stalks. To verify the possibility of the usefulness of these traits in lily breeding, nine combinations of interspecific crosses (<i>L. formosanum</i> as the seed parent; <i>L. auratum</i> , <i>L. speciosum</i> , <i>L. regale</i> , 'Lollypop', 'Pink Tiger', 'Zaza', 'Le Reve', 'Marco Polo', and 'African Queen' as pollen parents) were carried out with cut-style pollination and ovary-slice culture. Germination was observed in all nine interspecific crosses and 53 hybrids were obtained. Thirty (56.6%) of the 53 hybrids and two self-pollinated progenies of <i>L. formosanum</i> reached anthesis within 24 months from germination through ovaryslice culture. Multiple shooting of flower stalks was recognized in 11 (36.7%) of those flowered hybrids. Four hybrids, the pollen parents of which were Asiatic hybrid lilies with colored flowers, expressed 'precocious flowering' ability, multiple shooting of flower stalks, and entirely colored flowers simultaneously. These results suggest the possibility of breeding new types of cultivars with triple favorable traits from the cross between <i>L. formosanum</i> and Asiatic hybrid lilies with colored flowers."

604	Self-compatible or apomictic	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)	"A high degree of self-fertilisation has been reported (Inagaki 2002, Shii 1983, Rambuda and Johnson 2004) whereby plants produced from self-pollination displayed no inbreeding depression, better growth, more shoots, higher resource allocation to bulbs and a longer flowering season, compared with cross-pollination."
	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	"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)."

605	Requires specialist pollinators	y
	Source(s)	Notes
	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	"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."

Qsn #	Question	Answer
606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Auckland Council. (2024). Lilium formosanum - Formosa lily. https://www.tiakitamakaurau.nz/protect-and-restore-our-environment/pests-in-auckland/pest-search/lilfor/ . [Accessed 25 Nov 2024]	"Seeds dispersed by wind and water. Vegetative spread from bulbs. Human-mediated dispersal through accidental transport and deliberate plantings."
	Queensland Government. (2024). Weeds of Australia - Lilium formosanum. https://keyserver.lucidcentral.org/weeds/data/media/Html/lilium_formosanum.htm . [Accessed 25 Nov 2024]	"This species reproduces by seed and also vegetatively by bulbs."
	Benson, D., & McDougall, L. (2005). Ecology of Sydney plant species: part 10, Monocotyledon families Lemnaceae to Zosteraceae. <i>Cunninghamia</i> 9(1): 16-204	"Vegetative Spread: Clump-forming"

Qsn #	Question	Answer
607	Minimum generative time (years)	1
	Source(s)	Notes
	Benson, D., & McDougall, L. (2005). Ecology of Sydney plant species: part 10, Monocotyledon families Lemnaceae to Zosteraceae. <i>Cunninghamia</i> 9(1): 16-204	"juvenile period about 9 months (P. Kubiak pers. comm.)"
	Kamenetsky, R., & Okubo, H. (Eds.). (2012). Ornamental geophytes: from basic science to sustainable production. CRC Press, Boca Raton, FL	"Unlike other Lilium species, L. formosanum flowers within 12 months from seed germination and does not require special temperature control during its annual cycle (Hi ramatsu et al. 2002). This trait can be used for breeding in order to establish the cultivars reproduced by seeds and to avoid possible virus transmission through conventional vegetative propagation (Saruwatari et al. 2008)."

Qsn #	Question	Answer
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Sydney Weeds Network. (2024). Formosa lily - Lilium formosanum. https://sydneyweeds.org.au/weeds/formosa-lily/ . [Accessed 25 Nov 2024]	"Dispersal: Seeds, bulbs and bulb scales spread by water, wind, humans, contaminated soil (earthmoving equipment, car tyres etc) and garden refuse dumping."
	Benson, D., & McDougall, L. (2005). Ecology of Sydney plant species: part 10, Monocotyledon families Lemnaceae to Zosteraceae. <i>Cunninghamia</i> 9(1): 16-204	"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."
	Bereng, M. W. (2014). Understanding environmental factors influencing invasion of Lilium formosanum in Mpumalanga Province and models of its potential distribution in South Africa (Master's thesis, University of Pretoria (South Africa))	"The high abundance close to the two towns was attributed to the assumption that L. formosanum invasion spread from the two towns where it was cultivated and is now spreading into natural and disturbed areas along roads."
	Queensland Government. (2024). Weeds of Australia - Lilium formosanum. https://keyserver.lucidcentral.org/weeds/data/media/Html/lilium_formosanum.htm . [Accessed 25 Nov 2024]	[Dispersed as garden waste. Also thrives in disturbed habitats] "This species reproduces by seed and also vegetatively by bulbs. The winged seeds are dispersed by wind and water, and the seeds and bulbs may be spread in dumped garden waste."

Qsn #	Question	Answer
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Anisko, T. (2008). When Perennials Bloom: An Almanac for Planning and Planting. Timber Press, Portland, Oregon	"In the garden, Lilium formosanum prefers warm and sunny locations."
	Queensland Government. (2024). Weeds of Australia - Lilium formosanum. https://keyserver.lucidcentral.org/weeds/data/media/Html/lilium_formosanum.htm . [Accessed 25 Nov 2024]	"Widely cultivated as a garden ornamental, particularly in the temperate regions of Australia."

Qsn #	Question	Answer
	WRA Specialist. (2024). Personal Communication	Often cultivated for its striking appearance and pleasant fragrance. Native to Taiwan, this lily species is prized for its tall stems, trumpet-shaped white flowers with a touch of purple or pink on the outer side, and ease of cultivation.

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	Possibly. The seeds of <i>Lilium formosanum</i> 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
	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)	"Formosa lily produces a large number of light weight winged seeds, which are easily dispersed by wind."
	Queensland Government. (2024). Weeds of Australia - <i>Lilium formosanum</i> . https://keyserver.lucidcentral.org/weeds/data/media/Html/lilium_formosanum.htm . [Accessed 25 Nov 2024]	"This species reproduces by seed and also vegetatively by bulbs. The winged seeds are dispersed by wind and water, and the seeds and bulbs may be spread in dumped garden waste."

705	Propagules water dispersed	y
	Source(s)	Notes
	Smale, M. C. (1995). Some new plant records from Whale Island (Moutuhora). New Zealand Botanical Society Newsletter 39: 10	" <i>Lilium formosanum</i> (an adventive lily from Taiwan) - a small population grows just above high water mark on the beach at Boulder Bay (lodged in NZFRI). It was not present in December 1980 when the author last visited Moutuhora. Interestingly, the first record of this garden escape in New Zealand came from nearby Whakatane in 1972 (Healy & Edgar 1980); bulbs have presumably floated across the sea and been deposited at high water during a storm. A weedy adventive such as this is not a desirable addition to the island's flora, given the island's status as a wildlife refuge, and should be removed."
	Benson, D., & McDougall, L. (2005). Ecology of Sydney plant species: part 10, Monocotyledon families Lemnaceae to Zosteraceae. <i>Cunninghamia</i> 9(1): 16-204	"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."
	Queensland Government. (2024). Weeds of Australia - <i>Lilium formosanum</i> . https://keyserver.lucidcentral.org/weeds/data/media/Html/lilium_formosanum.htm . [Accessed 25 Nov 2024]	"This species reproduces by seed and also vegetatively by bulbs. The winged seeds are dispersed by wind and water, and the seeds and bulbs may be spread in dumped garden waste."

Qsn #	Question	Answer
706	Propagules bird dispersed	n
	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)	"Formosa lily produces a large number of light weight winged seeds, which are easily dispersed by wind."
	Queensland Government. (2024). Weeds of Australia - <i>Lilium formosanum</i> . https://keyserver.lucidcentral.org/weeds/data/media/Html/lilium_formosanum.htm . [Accessed 25 Nov 2024]	"This species reproduces by seed and also vegetatively by bulbs. The winged seeds are dispersed by wind and water, and the seeds and bulbs may be spread in dumped garden waste."

707	Propagules dispersed by other animals (externally)	n
	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)	"Formosa lily produces a large number of light weight winged seeds, which are easily dispersed by wind." [No evidence of external dispersal]

708	Propagules survive passage through the gut	n
	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)	"Formosa lily produces a large number of light weight winged seeds, which are easily dispersed by wind." [No evidence]
	Queensland Government. (2024). Weeds of Australia - <i>Lilium formosanum</i> . https://keyserver.lucidcentral.org/weeds/data/media/Html/lilium_formosanum.htm . [Accessed 25 Nov 2024]	"This species reproduces by seed and also vegetatively by bulbs. The winged seeds are dispersed by wind and water, and the seeds and bulbs may be spread in dumped garden waste." [No evidence]

801	Prolific seed production (>1000/m2)	y
	Source(s)	Notes
	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,	"The capsular fruits contain up to 1500 light, winged seeds that are readily dispersed by wind. Along with apparent high seed production, these dispersal traits may contribute to its invasiveness." ... "The mean (\pm SE) number of seeds per capsule was 913 (\pm 39, n = 88), with a mean of 2.6 (\pm 0.2, n = 88) capsules per plant and 5.4 (\pm 0.6, n = 40) plants m ⁻² . These figures yield annual seed production estimates of 2374 and 12,685 per plant and m ⁻² , respectively."

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

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,	"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
	Auckland Council. (2024). <i>Lilium formosanum</i> - Formosa lily. https://www.tiakitamakimakaurau.nz/protect-and-restore-our-environment/pests-in-auckland/pest-search/lilfor/ . [Accessed 25 Nov 2024]	"Certified Handler/Experienced agrichemical user: Foliar spray with 5g metsulfuron-methyl per 10L of water and 20ml penetrant."
	Benson, D., & McDougall, L. (2005). Ecology of Sydney plant species: part 10, Monocotyledon families Lemnaceae to Zosteraceae. <i>Cunninghamia</i> 9(1): 16-204	"Control by spraying with 1: 70-100 glyphosate between flowering and fruiting period or 1: 1 using wiper or weed wand (NSW Agriculture Environmental Weed Control Permit: www.northcoastweeds.org.au)."
	Sydney Weeds Network. (2024). Formosa lily - <i>Lilium formosanum</i> . https://sydneyweeds.org.au/weeds/formosa-lily/ . [Accessed 25 Nov 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."
	Ensbey, R. (2004). Noxious and environmental weed control handbook. 2004-2005. A guide to weed control in non-crop, aquatic and bushland situations. NSW Agriculture	"Tiger Lily - <i>Lilium formosanum</i> Non-chemical options: Physical removal will be difficult because of bulb-like underground parts of the plant. Chemical: Glyphosate Various trade names 360 g/L; Rate: Spot/Boom: 1 L in 1 L of water; Comments: Wiping application Chemical: PER 4169; Rate: Spot/Boom: 1 L in 70-100 L of water; Comments: Foliar application between flowering and fruiting."
	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	Chemical and Concentration: Glyphosate 360 g/L with Metsulfuron-methyl 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

Qsn #	Question	Answer
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Kubiak, P. J. (2009). Fire responses of bushland plants after the January 1994 wildfires in northern Sydney. <i>Cunninghamia</i> , 11(1): 131-165	"Appendix 1. Observations on fire responses (after 100% leaf scorch) of vascular plants in the Lane Cove River (LCR) (observations mainly Jan 1994 - Oct 1999) and Narrabeen Lagoon (NL) (Mar - Oct 1994) catchments, following the fires of January 1994." [" <i>Lilium formosanum</i> - R = majority of adult plants resprouted after the fires]
	Sydney Weeds Network. (2024). Formosa lily - <i>Lilium formosanum</i> . https://sydneyweeds.org.au/weeds/formosa-lily/ . [Accessed 25 Nov 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."
	Ensby, R. (2004). Noxious and environmental weed control handbook. 2004-2005. A guide to weed control in non-crop, aquatic and bushland situations. NSW Agriculture	"Tiger Lily - <i>Lilium formosanum</i> Non-chemical options: Physical removal will be difficult because of bulb-like underground parts of the plant."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Auckland Council. (2024). <i>Lilium formosanum</i> - Formosa lily. https://www.tiakitamakimakaurau.nz/protect-and-restore-our-environment/pests-in-auckland/pest-search/lilfor/ . [Accessed 25 Nov 2024]	"Biocontrol - Biocontrol is currently not available for this species."

Summary of Risk Traits:

Lilium formosanum, commonly known as the Formosa lily or Taiwan lily, is a perennial flowering plant native to Taiwan. It belongs to the Liliaceae family and is admired for its tall, slender stems and large, fragrant, trumpet-shaped white flowers, often tinged with purple on the outside.

While prized as an ornamental plant, *Lilium formosanum* is considered invasive in some regions, particularly in parts of Australia (especially Lord Howe Island and Norfolk Island) and New Zealand. Its ability to grow in a wide range of conditions, combined with prolific seed production, wind-dispersed seeds, and bulbs that allow it to persist in unfavorable conditions, allow it to outcompete native flora. In these areas, it has naturalized in disturbed habitats, roadsides, and open grasslands, threatening native biodiversity. Efforts to manage its spread often involve manual removal and the discouragement of its cultivation in areas prone to invasion. 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 regions with tropical climates
- Broad climate suitability and elevation range
- Naturalized in New Zealand, Norfolk Island, Australia, South America, Japan and South Africa
- A disturbance adapted weed that can potentially invade agricultural sites or natural areas
- An environmental weed in Australia, threatening native biodiversity on Lord Howe Island and Norfolk Island
- Other *Lilium* species are invasive
- Reported to be toxic to animals and humans
- Tolerates many soil types (not limited by substrate)
- Reported to form dense stands that can exclude other vegetation
- 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 9-12 months from seeds
- Seeds, bulbs and bulb scales spread by water, wind, humans, contaminated soil (earthmoving equipment, car tires etc) and garden refuse dumping.
- Capable of prolific seed production
- Tolerates mechanical damage and fire

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

