Taxon: Iris ensata Thunb. **Family:** Iridaceae

Common Name(s): beaked iris
jade cicada flower
Japanese iris
Japanese water iris
sword leaf iris

Synonym(s): Iris ensata Thunb. var. pabularia
Iris kaempferi Siebold ex Lem.
Iris kaempferi Siebold ex Lem. var.
Iris kaempferi Siebold ex Lem. var.
Iris pabularia hort. ex Hasselbr.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 25 Jan 2023

WRA Score: -1.5 **Designation:** L **Rating:** Low Risk

Keywords: Rhizomatous Herb, Ornamental, Toxic Properties, Spreads Vegetatively, Water-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)	Low
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	n
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		
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed		
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	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	y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans		

Qsn #	Question	Answer Option	Answer
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
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	n
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
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/m2)	y=1, n=-1	n
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		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	**Is the species highly domesticated?**	**n**
	Source(s)	**Notes**
	Wu, Z. Y. & Raven, P. H. (eds.). (2000). Flora of China. Vol. 24 (Flagellariaceae through Marantaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Iris ensata is commonly cultivated in China in a wide range of forms, which have been included under var. hortensis Makino & Ne-moto."

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. (2023). 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"**	**Low**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 25 Jan 2023]	"Native Asia-Temperate SIBERIA: Russian Federation [Buryatia, Gorno-Altay, Tyva, Respublika, Chita, Aga Buryat, Irkutsk, Novosibirsk, Omsk] MIDDLE ASIA: Kazakhstan RUSSIAN FAR EAST: Russian Federation [Primorye, Amur, Sakhalin] CHINA: China [Zhejiang Sheng, Heilongjiang Sheng (n.), Jilin Sheng, Liaoning Sheng, Shandong Sheng] EASTERN ASIA: Korea, Japan [Hokkaidô, Honshu, Kyushu]"
	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	"This species grows naturally in a cold and wet climate. It has a disjunct distribution in East Asia, where its primary range comprises eastern Russia, the Korean peninsula, Japan and northeastern China (Zhao et al. 2000). Additionally, this species is also found on mountaintops of subtropical China, about 700 km from the edge of its northern distribution."

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 25 Jan 2023]	

203	**Broad climate suitability (environmental versatility)**	**y**

Qsn #	Question	Answer
	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	"Damp areas along rivers and near lakes; 400-1700 m." [Elevation range >1000 m]
	Xiao, Y. E., Jin, D., Jiang, K., Hu, Y. H., Tong, X., Mazer, S. J., & Chen, X. Y. (2019). Pollinator limitation causes sexual reproductive failure in ex situ populations of self-compatible Iris ensata. Plant Ecology & Diversity, 12(1), 21-35	"This species grows naturally in a cold and wet climate. It has a disjunct distribution in East Asia, where its primary range comprises eastern Russia, the Korean peninsula, Japan and northeastern China (Zhao et al. 2000). Additionally, this species is also found on mountaintops of subtropical China, about 700 km from the edge of its northern distribution. The region separating the two ranges is climatically suitable for the survival of I. ensata, even though it is at much lower elevation"
	Missouri Botanical Garden. (2023). Iris ensata. http://www.missouribotanicalgarden.org. [Accessed 25 Jan 2023]	"Zone: 4 to 9" [6 hardiness zones]
	WRA Specialist. (2023). Personal Communication	Broad climate range within temperate regions

204	Native or naturalized in regions with tropical or subtropical climates	n
	Source(s)	**Notes**
	Xiao, Y. E., Jin, D., Jiang, K., Hu, Y. H., Tong, X., Mazer, S. J., & Chen, X. Y. (2019). Pollinator limitation causes sexual reproductive failure in ex situ populations of self-compatible Iris ensata. Plant Ecology & Diversity, 12(1), 21-35	"This species grows naturally in a cold and wet climate. It has a disjunct distribution in East Asia, where its primary range comprises eastern Russia, the Korean peninsula, Japan and northeastern China (Zhao et al. 2000). Additionally, this species is also found on mountaintops of subtropical China, about 700 km from the edge of its northern distribution. The region separating the two ranges is climatically suitable for the survival of I. ensata, even though it is at much lower elevation"
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence to date

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	**Notes**
	Xiao, Y. E., Jin, D., Jiang, K., Hu, Y. H., Tong, X., Mazer, S. J., & Chen, X. Y. (2019). Pollinator limitation causes sexual reproductive failure in ex situ populations of self-compatible Iris ensata. Plant Ecology & Diversity, 12(1), 21-35	"Iris ensata Thunb. (Iridaceae), a perennial herb, is the ancestral species of numerous horticultural cultivars known as `Japanese irises` or `Hanashobu` (Hu and Xiao 2012)."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Crop, Herbal, Ornamental Dispersed by: Humans, Water, Escapee References: United States of America-N-101, China-W-297, United Kingdom-CN-314, Europe-ND-482, United Kingdom-N-519, India-A-712, United Kingdom-CN-812, Global-W-788, India-I-914, United Kingdom-N-1006, Europe-N-819, Global-CD-1611, India-A-1725, Canada-W-1977."

301	Naturalized beyond native range	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Stace, C. (2010). New Flora of the British Isles. Third Edition. Cambridge University Press, Cambridge, UK	"I. ensata Thunb. (I. kaempferi Siebold ex Lem.) - Beaked Iris. Rhizomatous; leaves flat, 4-12mm wide, with prominent midrib; stems to 90cm, usually unbranched; flowers 8-15cm across, purple with yellow claws and base of blade of outer tepals; (2n=24, 40, 80). Intrd-surv; persistent in swamp; W Kent and Surrey; E Asia." [Survivor - an alien plant not naturalised, but long-persistent, usually a relic of planting]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Cited as naturalized] "Dispersed by: Humans, Water, Escapee References: United States of America-N-101, China-W-297, United Kingdom-CN-314, Europe-ND-482, United Kingdom-N-519, India-A-712, United Kingdom-CN-812, Global-W-788, India-I-914, United Kingdom-N-1006, Europe-N-819, Global-CD-1611, India-A-1725, Canada-W-1977."
	Hill, M., Baker, R., Broad, G., Chandler, P.J., Copp, G.H., Ellis, J., Jones, D., Hoyland, C., Laing, I., Longshaw, M., Moore, N., Parrott, D., Pearman, D., Preston, C., Smith, R.M. and Waters, R. (2005). Audit of non-native species in England. English Nature Research Reports Number 662, English Nature	No evidence of naturalization
	WRA Specialist. (2023). Personal Communication	Possibly, but evidence not corroborated in the cited literature.
	GBIF Secretariat (2023). Iris ensata Thunb..GBIF Backbone Taxonomy. Checklist dataset. https://www.gbif.org/species/5298900. [Accessed 25 Jan 2023]	Recorded as introduced in United States of America - Evidence of impact = No Recorded as introduced in United Kingdom of Great Britain and Northern Ireland - Evidence of impact = No

302	Garden/amenity/disturbance weed	n
	Source(s)	**Notes**
	GBIF Secretariat (2023). Iris ensata Thunb..GBIF Backbone Taxonomy. Checklist dataset. https://www.gbif.org/species/5298900. [Accessed 25 Jan 2023]	Recorded as introduced in United States of America - Evidence of impact = No Recorded as introduced in United Kingdom of Great Britain and Northern Ireland - Evidence of impact = No

303	Agricultural/forestry/horticultural weed	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Banday, M., Mir, M. R., Reshi, R. R., Baqual, F. M., Khan, L. K., & Naqash, F. (2017). Floristic composition and phytosociology of weed flora of mulberry (Morus sp.) gardens of Kashmir Valley. Int J Pure Appl Sci, 5(6), 1304-1311	[Identified as a weed of unspecified impacts] "Mulberry (Morus spp.L), the only food to silkworm (Bombyx mori L.) which is reared to produce silk, faces stiff competition with numerous weeds. These affect the plant adversely resulting in decrease in mulberry foliage both quantitatively and qualitatively. Keeping this in view, the present study was carried out to identify the weed species found throughout the year in mulberry farms of Kashmir. Various phytosociological parameters like Density, Frequency, Basal Area and Importance Value Index (IVI) were also calculated, based on the data collected in the spring season, which is the main period of silkworm rearing in Kashmir. A total of 98 species belonging to 38 families were identified with Asteraceae being the most dominant family (16.32 %) in terms of number of species. About 49% of the weed species identified was perennials followed by annuals (45%) and biennials (6%). In terms of the phytosociological data collected, Trifolium repens and Medicago sativa dominated the scene with an IVI of 63.59 and 61.19, respectively. Keeping in view the importance of mulberry plant and severity of weed infestation in the region, appropriate measures are required to ward off the crop from these unwanted plants to improve leaf yield in the region."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Identified as a weed in mulberry cultivation. Impacts unquantified.

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
	GBIF Secretariat (2023). Iris ensata Thunb..GBIF Backbone Taxonomy. Checklist dataset. https://www.gbif.org/species/5298900. [Accessed 25 Jan 2023]	Recorded as introduced in United States of America - Evidence of impact = No Recorded as introduced in United Kingdom of Great Britain and Northern Ireland - Evidence of impact = No

305	Congeneric weed	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Gervazoni, P. et al. (2020). The alien invasive yellow flag (Iris pseudacorus L.) in Argentinian wetlands: assessing geographical distribution through different data sources. Biological Invasions, 22(11), 3183-3193	"The yellow flag, Iris pseudacorus L. (Iridaceae) is an emergent perennial wetland plant native to the Palearctic region and has been dispersed worldwide as an ornamental plant. In the introduced range, it is highly invasive in natural and artificial waterbodies. Currently, this species is difficult to manage and continues to spread, causing significant environmental impacts. The aims of this study were to assess the geographical range of I. pseudacorus in Argentina by compiling data from literature, collections, citizen science and field surveys. An exhaustive review of herbarium collections and literature was conducted and a database with reports obtained through citizen science was obtained and used to design routes for field surveys. 114 records of I. pseudacorus were obtained, mainly in humid and disturbed areas. The oldest records date from 1931 and 1933, and the number of reported localities showed a gradual increase with time. Fifteen records of the weed were from protected areas, four of which have international conservation status. This study shows that I. pseudacorus is increasing in distribution in Argentina and that citizen science can be used to document the distribution of invasive alien plant species. Taking into account that the number of records obtained from herbarium collections was greater than the number of records from literature, this study shows the value of these as database that allows historical reconstructions. This study is part of a collaborative Global South alliance between Argentina, South Africa and New Zealand, determining the extent of I. pseudacorus invasion in the southern hemisphere and generating management strategies for its control."
	Dickinson, R. & Royer, F. (2014). Weeds of North America. University of Chicago Press, Chicago	[Iris pseudacorus] "Yellow flag is an aggressive ornamental plant that displaces native species by forming impenetrable stands. It is poisonous to livestock. Symptoms include moderate to severe bouts of abdominal pain, gastroenteritis, nausea, vomiting, diarrhea, spasms, staggering, and paralysis."

401	Produces spines, thorns or burrs	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	[No evidence] "Rhizomes creeping, thick. Leaves linear, 30–80 cm × 5–12 mm, midvein distinct on both surfaces, apex acuminate. Flowering stems 25–100 cm, solid, 1–3-leaved; spathes 3, lanceolate, unequal, 4.5–7.5 × 0.8–1.2 cm, leathery, 2-flowered, veins dis-tinct, raised, basal spathe shorter, apex usually acute, apical spathe longer, apex usually obtuse. Flowers dark reddish purple, 9–10 cm in diam.; pedicel 1.5–3.5 cm. Perianth tube 1.5–2 cm; outer segments obovate, mottled yellow at center, 7–8.5 × 3–3.5 cm; inner segments erect, narrowly lanceolate, ca. 5 cm × 5–6 mm. Stamens ca. 3.5 cm; anthers purple. Ovary cylindric, 1.5–2 cm × ca. 3 mm. Style branches purple, ca. 5 cm × 7–10 mm. Capsule ellipsoid, 4.5–5.5 × 1.5–1.8 cm, 6-ribbed, apex shortly beaked. Seeds maroon-brown, semiorbicular, flat."

Qsn #	Question	Answer
402	**Allelopathic**	
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown. No evidence found

403	**Parasitic**	**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 (or shrubs or annuals), with rhizomes, bulbs, or corms." [Generic description. No evidence in family Iridaceae]

404	**Unpalatable to grazing animals**	
	Source(s)	**Notes**
	NC State Extension. (2023). Iris ensata. https://plants.ces.ncsu.edu/plants/iris-ensata/. [Accessed 25 Jan 2023]	"Resistance To Challenges: Deer"

405	**Toxic to animals**	**y**
	Source(s)	**Notes**
	NC State Extension. (2023). Iris ensata. https://plants.ces.ncsu.edu/plants/iris-ensata/. [Accessed 25 Jan 2023]	"Problems: Problem for Cats Problem for Dogs Problem for Horses Poison Severity: Low Poison Symptoms: CAUSES ONLY LOW TOXICITY IF EATEN. SKIN IRRITATION MINOR, OR LASTING ONLY FOR A FEW MINUTES. Nausea, salivation, vomiting, abdominal pain, lethargy, diarrhea, elevated temperature following ingestion; skin irritation upon contact with seeds, rootstock, or cell sap. Poison Toxic Principle: Pentacylic terpenoids (zeorin, missourin and missouriensin), Irisin, iridin, or irisine Causes Contact Dermatitis: Yes Poison Part: Roots, Sap/Juice, Seeds"

406	**Host for recognized pests and pathogens**	**n**
	Source(s)	**Notes**
	Missouri Botanical Garden. (2023). Iris ensata. http://www.missouribotanicalgarden.org. [Accessed 25 Jan 2023]	"No serious insect or disease problems. Wet conditions in winter may cause root rots. Watch for thrips."
	NC State Extension. (2023). Iris ensata. https://plants.ces.ncsu.edu/plants/iris-ensata/. [Accessed 25 Jan 2023]	"Particularly Resistant To (Insects/Diseases/Other Problems): deer, wet soil; generally no diseases or insect pests"

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

Qsn #	Question	Answer
	NC State Extension. (2023). Iris ensata. https://plants.ces.ncsu.edu/plants/iris-ensata/. [Accessed 25 Jan 2023]	[Possibly problem for susceptible individuals, or if ingested] "Poison Severity: Low Poison Symptoms: CAUSES ONLY LOW TOXICITY IF EATEN. SKIN IRRITATION MINOR, OR LASTING ONLY FOR A FEW MINUTES. Nausea, salivation, vomiting, abdominal pain, lethargy, diarrhea, elevated temperature following ingestion; skin irritation upon contact with seeds, rootstock, or cell sap. Poison Toxic Principle: Pentacylic terpenoids (zeorin, missourin and missouriensin), Irisin, iridin, or irisine Causes Contact Dermatitis: Yes"

408	Creates a fire hazard in natural ecosystems	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	"Damp areas along rivers and near lakes; 400-1700 m. Heilong-jiang, Jilin, Liaoning, Shandong, Zhejiang [Japan, Korea, Russia]." [No evidence. Does not occur in fire prone or high fire risk habitats]
	Xiao, Y., Tian, Q., Zhou, X., Chen, X., & Hu, Y. (2010). Reproductive ecology of Iris ensata (Iridaceae). Acta Botanica Yunnanica, 32(2), 93-102	"We concluded that I. ensata can adapt to the wet and cold mountain climates very well, and Tianmu Mountain may be one of origin and refuge places of this plant during the glacial epoch." [No evidence. Not in a fire prone ecosystem or habitat]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	**Notes**
	Missouri Botanical Garden. (2023). Iris ensata. http://www.missouribotanicalgarden.org. [Accessed 25 Jan 2023]	"Sun: Full sun to part shade"
	NC State Extension. (2023). Iris ensata. https://plants.ces.ncsu.edu/plants/iris-ensata/. [Accessed 25 Jan 2023]	"This is a perennial beardless iris native to Asia from Siberia to Japan in the herbaceous perennial Iridaceae family. Japanese Irises prefer a sunny site but tolerate partial shade. "

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	**Notes**
	Missouri Botanical Garden. (2023). Iris ensata. http://www.missouribotanicalgarden.org. [Accessed 25 Jan 2023]	"Loves acidic, organically rich, saturated, moisture-retentive soils. During the growing season, it thrives in standing water (up to 6" deep). However in winter, it is intolerant of both standing water and boggy soils where rhizomes may rot. In order to meet these somewhat unusual seasonal cultural requirements, plants may be grown in pots that are sunk half way in water during the growing season but then removed to dryer ground for fall and winter. Japanese iris grows surprisingly well in garden soils, albeit less vigorously, as long as it receives consistent moisture."

Qsn #	Question	Answer
	Gardenia. (2023). Iris ensata (Japanese Iris). https://www.gardenia.net/plant-variety/iris-ensata-japanese-iris. [Accessed 25 Jan 2023]	"Soil Type Clay, Loam, Sand Soil pH Acid, Neutral Soil Drainage Poorly Drained" "Japanese Irises will grow successfully in ordinary garden soils or perennial borders as long as they receive adequate moisture, especially during their growing season."
	NC State Extension. (2023). Iris ensata. https://plants.ces.ncsu.edu/plants/iris-ensata/. [Accessed 25 Jan 2023]	"They are best grown on water edges in damp, rich, acidic soil with abundant moisture during the growing season."

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	"Rhizomes creeping, thick. Leaves linear, 30–80 cm × 5–12 mm, midvein distinct on both surfaces, apex acuminate. Flow-ering stems 25–100 cm, solid, 1–3-leaved; spathes 3, lanceolate, unequal, 4.5–7.5 × 0.8–1.2 cm, leathery, 2-flowered, veins dis-tinct, raised, basal spathe shorter, apex usually acute, apical spathe longer, apex usually obtuse."

412	Forms dense thickets	
	Source(s)	**Notes**
	Gardner, C. & Musgrave, T. (2022). Wild Edens. Octopus Publishing Group, London	[Reported to form dense stands in native range. Unknown if plants exclude other vegetation] "Near Wakkanai on the northern tip or Hokkaido lowland bogs are extensive and filled with angelicas showing off plate-sized white umbels, stands of Filipendula camtschatica. dense stands of Iris ensata and stout Veratrum stamineum."
	Hu, S. T., Hannaway, D. B., & Youngberg, H. W. (1992). Forage Resources of China. Pudoc, Wageningen	Iris ensata may form a small meadow grassland association which is distributed on the lowlands of heavy, alkaline soil where the surface soil is always wet. The main component species are: Artemisia anethifolia, Chloris virgata, lnula britannica, Leymus chinense, and Plantago asiatica. The coverage is 30-40% with plant height of 30 cm." [No evidence]

501	Aquatic	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	"Damp areas along rivers and near lakes"
	MacKinnon, N. B. (2002). The Gardener's Book of Charts, Tables and Lists: A Complete Gardening Guide. Capital Books, Sterling, Virginia	[Not truly aquatic, but thrives in wet areas in proximity to aquatic habitats] "Japanese iris (lris kaempheri and Iris ensata) flourish in shallow water and at the margins of streams and ponds. They will also tolerate dryer, acid soils."

502	Grass	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 25 Jan 2023]	Subgenus: Limniris Section: Limniris Family: Iridaceae Subfamily: Iridoideae Tribe: Irideae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2023). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 25 Jan 2023]	Subgenus: Limniris Section: Limniris Family: Iridaceae Subfamily: Iridoideae Tribe: Irideae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	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	"Rhizomes creeping, thick. Leaves linear, 30–80 cm × 5–12 mm, midvein distinct on both surfaces, apex acuminate." [Rhizomatous]
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. (2010). Guidance for addressing the Australian Weed Risk Assessment questions. Plant Protection Quarterly, 25(2): 56-74	"This question relates to perennial plants with tubers, corms or bulbs. This question is specifically to deal with plants that have specialized organs and should not include plants merely with rhizomes/ stolons"

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	[No evidence] "Damp areas along rivers and near lakes; 400-1700 m. Heilong-jiang, Jilin, Liaoning, Shandong, Zhejiang [Japan, Korea, Russia]. Iris ensata is commonly cultivated in China in a wide range of forms, which have been included under var. hortensis Makino & Nemoto."

602	Produces viable seed	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Xiao, Y., Tian, Q., Zhou, X., Chen, X., & Hu, Y. (2010). Reproductive ecology of Iris ensata (Iridaceae). Acta Botanica Yunnanica, 32(2), 93-102	"Abstract : By investigating and experimenting pollination pattern, reproduction mode, fruit and seed dispersal, seed dormancy and germination, characters of reproduction ecology of Iris ensata were researched in one nature population of Tianmu Mountain, Zhejiang Province from 2006 to 2008. Results were as follows. (1) The natural population of I. ensata was in the spatial pattern of aggregation distribution. Its population regeneration was almost built upon asexual reproduction with 0.756 percent contribution. (2) Artificial pollination indicated that the fruit set and seed set of self pollination were much lower than cross pollination (P<0.05). The flower of I. ensata being covered by a mesh had no seed setting, and the fruit set rate of self-pollination between the same or different petal of the flower were 10% and 20% with 0 and 4+1 (n=2) seed per fruit respectively. However, the fruit set rate of geitonogamy and xenogamy were 80% and 100% respectively, and seeds per fruit were 59±7 (n=8) and 64±9 (n=10) respectively. The pollen-ovule ratio was 1277±270 (n=10), which further indicated that the pollination type of I. ensata was mainly xenogamy. (3) Apis mellifica was the effective pollinator with the frequency of 0.019 each flower in one minute, and the ratio of visiting the same flower was about 3.5%. (4) The seed number was estimated about 368 per square meter in nature. Fruits and seeds of I. ensata were persistent and the seed had no deep physiological dormancy. Light was needed during seed germination and the seed germination rate was 94.9±0.7% after 60 days cold moist stratification. (5) We concluded that I. ensata can adapt to the wet and cold mountain climates very well, and Tianmu Mountain may be one of origin and refuge places of this plant during the glacial epoch. The species of I. ensata takes the adaptation strategy of k type, and they possess the mechanisms of natural sustaining renovation in natural population. Some of those mechanisms are being disturbed more or less by human activities now. "

603	Hybridizes naturally	n
	Source(s)	**Notes**
	Shimizu, K., Miyabe, Y., Nagaike, H., Yabuya, T., & Adachi, T. (1999). Production of somatic hybrid plants between Iris ensata Thunb. and I. germanica. Euphytica, 107(2), 105-113	[Attempts at artificial hybrids have met with some success. No evidence of natural hybrids] "In the genus Iris, I. ensata Thunb. has been extensively developed as ornamental plants in Japan and is used as cut flowers, potted plants and also as garden plants.Most efforts in the breeding of this species have so far been directed primarily to the utilization of intraspecific variation because of the high degree of the cross-incompatibility of the plant with other species (Tomino, 1963; Sakurai & Tomino, 1969; Yabuya & Yamagata, 1980a, b; Yabuya, 1984). However, the cross-incompatibility was overcome by utilization of embryo culture or improvement of environmental and crossing conditions, and interspecific hybrids between I. ensata and its related species such as I. laevigata Fisch. and I. pseudacorus L. (Lawrence & Randolph, 1959) were produced (Yabuya & Yamagata, 1980b; Yabuya, 1984)."

Qsn #	Question	Answer
	Xiao, Y. E., Yu, F. Y., & Zhou, X. F. (2021). A new natural hybrid of Iris (Iridaceae) from Chongqing, China. PhytoKeys, 174, 1-12	[Natural hybrids documented in genus] "A newly discovered natural hybrid, Iris × ampliflora Y.E. Xiao, F.Y. Yu & X.F. Chen (Iridaceae: subgenus Limniris section Lophiris) from Chongqing, China, is described and illustrated. This hybrid is morphologically similar to I. japonica Thunb. and I. wattii Baker, but can be distinguished by its giant leaves and large purple flowers. Phylogenetic trees based on cpDNA data support the separation of I. × ampliflora from other closely related species in the section Lophiris. According to its morphological features, molecular systematic evidence and chromosome data, we speculate that I. × ampliflora [31 chromosomes] likely is a new hybrid between I. japonica [2n = 32] and I. wattii [2n = 30]."

604	Self-compatible or apomictic	y
	Source(s)	**Notes**
	Xiao, Y. E., Jin, D., Jiang, K., Hu, Y. H., Tong, X., Mazer, S. J., & Chen, X. Y. (2019). Pollinator limitation causes sexual reproductive failure in ex situ populations of self-compatible Iris ensata. Plant Ecology & Diversity, 12(1), 21-35	"Flowers hand-pollinated with pollen from geitonogamous pollinations set seeds, indicating that I. ensata is self-compatible. Bagged flowers, however, produced no seeds in any population, indicating that I. ensata exhibits no agamospermy or spontaneous autogamy."
	Xiao, Y., Tian, Q., Zhou, X., Chen, X., & Hu, Y. (2010). Reproductive ecology of Iris ensata (Iridaceae). Acta Botanica Yunnanica, 32(2), 93-102	[Capable of selfing with reduced fruit and seed set] "Artificial pollination indicated that the fruit set and seed set of self pollination were much lower than cross pollination ($P<0.05$). The flower of I. ensata being covered by a mesh had no seed setting, and the fruit set rate of self-pollination between the same or different petal of the flower were 10% and 20% with 0 and 4+1 (n=2) seed per fruit respectively. However, the fruit set rate of geitonogamy and xenogamy were 80% and 100% respectively, and seeds per fruit were 59±7 (n=8) and 64±9 (n=10) respectively. The pollen-ovule ratio was 1277±270 (n=10), which further indicated that the pollination type of I. ensata was mainly xenogamy."

605	Requires specialist pollinators	n
	Source(s)	**Notes**
	Xiao, Y., Tian, Q., Zhou, X., Chen, X., & Hu, Y. (2010). Reproductive ecology of Iris ensata (Iridaceae). Acta Botanica Yunnanica, 32(2), 93-102	"Apis mellifica was the effective pollinator with the frequency of 0.019 each flower in one minute, and the ratio of visiting the same flower was about 3.5%."

Qsn #	Question	Answer
606	**Reproduction by vegetative fragmentation**	**y**
	Source(s)	**Notes**
	Xiao, Y. E., Jiang, K., Tong, X., Hu, Y. H., & Chen, X. Y. (2015). Population genetic structure of Iris ensata on sky-islands and its implications for assisted migration. Conservation Genetics, 16(5), 1055-1067	"Iris ensata also has strong clonal growth abilities. However, the slanting rhizomes are short, usually less than 10 cm, and thus the shoots generally clump together forming a phalanx- like structure."
	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	"Rhizomes creeping, thick." [Can spread by rhizomes]
	Xiao, Y., Tian, Q., Zhou, X., Chen, X., & Hu, Y. (2010). Reproductive ecology of Iris ensata (Iridaceae). Acta Botanica Yunnanica, 32(2), 93-102	"The natural population of I. ensata was in the spatial pattern of aggregation distribution. Its population regeneration was almost built upon asexual reproduction with 0.756 percent contribution."

607	**Minimum generative time (years)**	**3**
	Source(s)	**Notes**
	Gardenseeker.co.uk. (2023). Iris ensata - Iris Kaempferii - Japanese Iris. https://www.gardenseeker.co.uk/bulbs/iris/iris_ensata.html. [Accessed]	"Young plants normally take three years to flower."

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	**n**
	Source(s)	**Notes**
	Xiao, Y. E., Jin, D., Jiang, K., Hu, Y. H., Tong, X., Mazer, S. J., & Chen, X. Y. (2019). Pollinator limitation causes sexual reproductive failure in ex situ populations of self-compatible Iris ensata. Plant Ecology & Diversity, 12(1), 21-35	"In natural populations of I. ensata, the diameter of a genet is generally less than 5 m (Xiao et al. 2015), and seeds are usually dispersed only a short distance (ca. 0.5 m)."
	Xiao, Y. E., Jiang, K., Tong, X., Hu, Y. H., & Chen, X. Y. (2015). Population genetic structure of Iris ensata on sky-islands and its implications for assisted migration. Conservation Genetics, 16(5), 1055-1067	"The seeds have corky taste and are dispersed by water currents (Arnold 2000; Meerow et al. 2007)."

702	**Propagules dispersed intentionally by people**	**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	"Iris ensata is commonly cultivated in China in a wide range of forms, which have been included under var. hortensis Makino & Ne-moto."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Crop, Herbal, Ornamental"

703	**Propagules likely to disperse as a produce contaminant**	**n**
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Water, Escapee"

Qsn #	Question	Answer
	Xiao, Y. E., Jiang, K., Tong, X., Hu, Y. H., & Chen, X. Y. (2015). Population genetic structure of Iris ensata on sky-islands and its implications for assisted migration. Conservation Genetics, 16(5), 1055-1067	"The seeds have corky taste and are dispersed by water currents (Arnold 2000; Meerow et al. 2007)."

704	Propagules adapted to wind dispersal	n
	Source(s)	**Notes**
	Xiao, Y. E., Jin, D., Jiang, K., Hu, Y. H., Tong, X., Mazer, S. J., & Chen, X. Y. (2019). Pollinator limitation causes sexual reproductive failure in ex situ populations of self-compatible Iris ensata. Plant Ecology & Diversity, 12(1), 21-35	"In natural populations of I. ensata, the diameter of a genet is generally less than 5 m (Xiao et al. 2015), and seeds are usually dispersed only a short distance (ca. 0.5 m)."
	Xiao, Y. E., Jiang, K., Tong, X., Hu, Y. H., & Chen, X. Y. (2015). Population genetic structure of Iris ensata on sky-islands and its implications for assisted migration. Conservation Genetics, 16(5), 1055-1067	"The seeds have corky taste and are dispersed by water currents (Arnold 2000; Meerow et al. 2007)."

705	Propagules water dispersed	y
	Source(s)	**Notes**
	Xiao, Y. E., Jiang, K., Tong, X., Hu, Y. H., & Chen, X. Y. (2015). Population genetic structure of Iris ensata on sky-islands and its implications for assisted migration. Conservation Genetics, 16(5), 1055-1067	"The seeds have corky taste and are dispersed by water currents (Arnold 2000; Meerow et al. 2007)."

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	Xiao, Y. E., Jiang, K., Tong, X., Hu, Y. H., & Chen, X. Y. (2015). Population genetic structure of Iris ensata on sky-islands and its implications for assisted migration. Conservation Genetics, 16(5), 1055-1067	"The seeds have corky taste and are dispersed by water currents (Arnold 2000; Meerow et al. 2007)."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	**Notes**
	Xiao, Y. E., Jin, D., Jiang, K., Hu, Y. H., Tong, X., Mazer, S. J., & Chen, X. Y. (2019). Pollinator limitation causes sexual reproductive failure in ex situ populations of self-compatible Iris ensata. Plant Ecology & Diversity, 12(1), 21-35	"In natural populations of I. ensata, the diameter of a genet is generally less than 5 m (Xiao et al. 2015), and seeds are usually dispersed only a short distance (ca. 0.5 m)."
	Xiao, Y. E., Jiang, K., Tong, X., Hu, Y. H., & Chen, X. Y. (2015). Population genetic structure of Iris ensata on sky-islands and its implications for assisted migration. Conservation Genetics, 16(5), 1055-1067	"The seeds have corky taste and are dispersed by water currents (Arnold 2000; Meerow et al. 2007)."

708	Propagules survive passage through the gut	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Xiao, Y. E., Jin, D., Jiang, K., Hu, Y. H., Tong, X., Mazer, S. J., & Chen, X. Y. (2019). Pollinator limitation causes sexual reproductive failure in ex situ populations of self-compatible Iris ensata. Plant Ecology & Diversity, 12(1), 21-35	"In natural populations of I. ensata, the diameter of a genet is generally less than 5 m (Xiao et al. 2015), and seeds are usually dispersed only a short distance (ca. 0.5 m)."
	Xiao, Y. E., Jiang, K., Tong, X., Hu, Y. H., & Chen, X. Y. (2015). Population genetic structure of Iris ensata on sky-islands and its implications for assisted migration. Conservation Genetics, 16(5), 1055-1067	"The seeds have corky taste and are dispersed by water currents (Arnold 2000; Meerow et al. 2007)."

801	Prolific seed production (>1000/m2)	n
	Source(s)	**Notes**
	Xiao, Y., Tian, Q., Zhou, X., Chen, X., & Hu, Y. (2010). Reproductive ecology of Iris ensata (Iridaceae). Acta Botanica Yunnanica, 32(2), 93-102	"The seed number was estimated about 368 per square meter in nature. "

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	**Notes**
	Xiao, Y., Tian, Q., Zhou, X., Chen, X., & Hu, Y. (2010). Reproductive ecology of Iris ensata (Iridaceae). Acta Botanica Yunnanica, 32(2), 93-102	"Fruits and seeds of I. ensata were persistent and the seed had no deep physiological dormancy. Light was needed during seed germination and the seed germination rate was 94.9±0.7% after 60 days cold moist stratification."

803	Well controlled by herbicides	y
	Source(s)	**Notes**
	DiTomaso, J. M., Kyser, G. B., Oneto, et al. (2013). Weed Control in Natural Areas in the Western United States. Weed Research and Information Center, University of California, Davis, CA	Iris pseudacorus is effectively controlled with 2,4-D, Glyphosate (Rodeo, Aquamaster) and Imazapyr (Habitat). Iris ensata would presumably be effectively controlled as well if needed.

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	**Notes**
	DiTomaso, J. M., Kyser, G. B., Oneto, et al. (2013). Weed Control in Natural Areas in the Western United States. Weed Research and Information Center, University of California, Davis, CA	[Unknown. Another Iris species may be controlled using mechanical means, which are similar to the effects of mutilation or cultivation] "Mechanical removal of yellowflag iris in sensitive aquatic areas may cause extensive disturbance that facilitates the establishment of other weedy plants. Nevertheless, physical and mechanical methods may be effective in controlling small populations of yellowflag iris. However, it is necessary to remove the entire plant and rhizome system. Repeated mowing is not often considered effective for iris control, but may eventually weaken the plant."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	

Qsn #	Question	Answer
	Source(s)	**Notes**
	WRA Specialist. (2023). Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits
• Broad climate suitability (in temperate regions)
• Possibly naturalized or persisting elsewhere (but no evidence in the Hawaiian Islands to date).
• Identified as one of several weeds in mulberry cultivation (but no negative impacts have been described).
• Other Iris species are invasive weeds.
• Toxic to animals (if eaten).
• Potentially toxic and may cause dermatitis in people.
• Reported to form dense stands within native range.
• Occurs on margins of aquatic habitats. Could potentially invade similar habitats in the Hawaiian Islands.
• Reproduces by seeds and clonally by rhizomes.
• Self-fertile (with reduced fruit and seed set).
• Seeds dispersed by water, and through intentional cultivation.

Low Risk Traits
• Primarily occurs in cool, temperate regions (may only be a risk to cooler, higher elevations of tropical island ecosystems).
• Widely cultivated in a range of forms, with no specific evidence of negative impacts where introduced.
• Unarmed (no spines, thorns, or burrs)
• Grows best in partially shaded to high light environments (dense shade may inhibit spread).
• Herbicides may provide effective control.