

Taxon: <i>Woodwardia orientalis</i> Sw.	Family: Blechnaceae
Common Name(s): mother fern Oriental chain fern	Synonym(s):

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 7 Nov 2016
WRA Score: 3.0	Designation: L	Rating: Low Risk

Keywords: Greenhouse Escape, Ornamental, Shade-Tolerant, Rooting Bulbils, Wind-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	?
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed		
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut		
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		
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
	Pyner, T. (2015). <i>Woodwardia</i> in cultivation. <i>Plantsman</i> . September 2015: 184-191	[No evidence of domestication, but species identify may be in question] "It is now known that <i>W. orientalis</i> is a fertile allotetraploid species derived from a sterile hybrid between diploid <i>W. prolifera</i> and a second, as yet uncertain, species (Takamiya et al. 1992). Most plants in cultivation appear to be <i>W. prolifera</i> . True <i>W. orientalis</i> is possibly grown and I am currently searching fern collections for plants that may be it."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2016. 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. & Hong, D.Y. (eds.). 2013. <i>Flora of China</i> . Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Roadsides, mountain slopes; ca. 500 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangxi, ?Taiwan, Zhejiang [Japan, Philippines]."

202	Quality of climate match data	High
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. <i>Flora of China</i> . Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Roadsides, mountain slopes; ca. 500 m."
	Monrovia. (2016). Crested Oriental Chain Fern - <i>Woodwardia orientalis</i> . http://www.monrovia.com/plant-catalog/plants/3096/crested-oriental-chain-fern/ . [Accessed 7 Nov 2016]	"USDA Hardiness Zone: 8 - 10 "

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Roadsides, mountain slopes; ca. 500 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangxi, ?Taiwan, Zhejiang [Japan, Philippines]."

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	Pyner, T. (2015). <i>Woodwardia</i> in cultivation. <i>Plantsman</i> . September 2015: 184-191	"It is now known that <i>W. orientalis</i> is a fertile allotetraploid species derived from a sterile hybrid between diploid <i>W. prolifera</i> and a second, as yet uncertain, species (Takamiya et al. 1992). Most plants in cultivation appear to be <i>W. prolifera</i> . True <i>W. orientalis</i> is possibly grown and I am currently searching fern collections for plants that may be it."
	Dave's Garden. (2016). Oriental Chain Fern - <i>Woodwardia orientalis</i> . http://davesgarden.com/guides/pf/go/82776/ . [Accessed 7 Nov 2016]	"Regional This plant has been said to grow in the following regions: Spring, Texas"
	Imada, C.T., Staples, G.W. & Herbst, D.R. 2005. Annotated Checklist of Cultivated Plants of Hawai'i. http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/ . [Accessed 4 Nov 2016]	" <i>Woodwardia orientalis</i> Swartz (Confirmed) Common Names: Oriental chain fern First Collected: 1989 Locations: Harold L. Lyon Arboretum (Confirmed)"

301	Naturalized beyond native range	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
	Wagner, W.L., Herbst, D.R. & Lorence, D.H. 2016. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/ . [Accessed 7 Nov 2016]	No evidence to date

Qsn #	Question	Answer
	Galera, H., & Ratyńska, H. (1999). Greenhouse weeds in the Botanical Garden of PAS in Warsaw-Powsin. Acta Societatis Botanicorum Poloniae, 68(3), 227-236	Table 2. Cont. D. Greenhouse-escapes ... Woodwardia orientalis ... S-slots in concrete
302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
305	Congeneric weed	
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	Woodwardia areolata cited as a weed, but no evidence of impacts found
401	Produces spines, thorns or burrs	n
	Source(s)	Notes

Qsn #	Question	Answer
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Rhizome decumbent, dark brown, stout, densely scaly; scales dark brown, lanceolate, 1–4 cm, entire, membranous, apex fibriform. Stipes close, 20–55 cm, 3–6 mm in diam., base densely scaly; upper part of stipe and rachis sparsely covered with brown, broadly lanceolate scales; lamina deeply bipinnatifid, brown or slightly green when dry, ovate, 35–45(–70) × 15–45 cm, leathery, glabrous, base rounded-truncate, apex acuminate; pinnae 6–8 pairs, shortly stalked, lanceolate; lower and middle pinnae 10–30 × 4–9 cm, deeply pinnatifid to 2–3(–4) mm from costa, base asymmetrical with 1 basiscopic lobe lacking, apex acuminate, basal pinnae shortened; lobes 10–18 pairs, close, oblique, oblong, 3–5.5(–7) × 0.8–1(–1.3) cm, usually broadest at base, margin cuspidately serrulate, apex acute or acuminate; veins obvious, anastomosing to form 1 row of areoles along costae and 2 or 3 rows of discrete, polygonal areoles, remainder free to margin, simple or forked. Small bulbils borne on adaxial surfaces of pinna lobes or not. Sori occupying costular areoles, crescent-shaped or elliptic, sunken in rimmed depressions; indusia dark brown, thickly papery. 2n = 136."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Rhizome decumbent, dark brown, stout, densely scaly; scales dark brown, lanceolate, 1–4 cm, entire, membranous, apex fibriform." [Blechnaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	The National Gardening Association. (2016). Oriental Chain Fern (<i>Woodwardia orientalis</i>). http://garden.org/plants/view/131606/Oriental-Chain-Fern-Woodwardia-orientalis/ . [Accessed 7 Nov 2016]	"Deer Resistant Rabbit Resistant"
	Dancing Oaks Nursery. (2016). <i>Woodwardia orientalis</i> . http://www.dancingoaks.com/home/dok/page_3423_47/page_3423_47/woodwardia_orientalis.html . [Accessed 7 Nov 2016]	[Possibly Yes. Reported to be deer resistant] " Also in Deer Resistant"

405	Toxic to animals	n
	Source(s)	Notes
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

Qsn #	Question	Answer
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence [<i>Woodwardia unigemmata</i> used medicinally]
406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	OnlinePlantGuide.com. (2016). <i>Woodwardia orientalis</i> /Mother Fern. http://www.onlineplantguide.com/Plant-Details/3338/ . [Accessed 7 Nov 2016]	"Susceptible to insects and diseases: No"
407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence
408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"in moist, brightly shaded areas." [No evidence]
409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Monrovia. (2016). Crested Oriental Chain Fern - <i>Woodwardia orientalis</i> . http://www.monrovia.com/plant-catalog/plants/3096/crested-oriental-chain-fern/ . [Accessed 4 Nov 2016]	"Light Needs: Full shade to partial sun"
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Sunny Gardens. (2016). <i>Woodwardia orientalis</i> . https://www.sunnygardens.com/garden_plants/woodwardia/woodwardia_3019.php . [Accessed 8 Nov 2016]	"They love wet soil and high humidity, and are happiest at the water's edge."
	OnlinePlantGuide.com. (2016). <i>Woodwardia orientalis</i> /Mother Fern. http://www.onlineplantguide.com/Plant-Details/3338/ . [Accessed 7 Nov 2016]	"This fern, like most favors a fertile, moist soil that contains a generous amount of humus."

Qsn #	Question	Answer
411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Rhizome decumbent, dark brown, stout, densely scaly; scales dark brown, lanceolate, 1–4 cm, entire, membranous, apex fibriform. Stipes close, 20–55 cm, 3–6 mm in diam., base densely scaly; upper part of stipe and rachis sparsely covered with brown, broadly lanceolate scales; lamina deeply bipinnatifid, brown or slightly green when dry, ovate, 35–45(–70) × 15–45 cm, leathery, glabrous, base rounded-truncate, apex acuminate; pinnae 6–8 pairs, shortly stalked, lanceolate; lower and middle pinnae 10–30 × 4–9 cm, deeply pinnatifid to 2–3(–4) mm from costa, base asymmetrical with 1 basiscopic lobe lacking, apex acuminate, basal pinnae shortened; lobes 10–18 pairs, close, oblique, oblong, 3–5.5(–7) × 0.8–1(–1.3) cm, usually broadest at base, margin cuspidately serrulate, apex acute or acuminate; veins obvious, anastomosing to form 1 row of areoles along costae and 2 or 3 rows of discrete, polygonal areoles, remainder free to margin, simple or forked."
412	Forms dense thickets	
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Roadsides, mountain slopes; ca. 500 m." [Unknown. Related taxa can form dense cover]
501	Aquatic	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Plants terrestrial, of moderate to large size." [Generic description]
502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 3 Nov 2016]	"Family: Blechnaceae Subfamily: Woodwardioideae"
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 3 Nov 2016]	"Family: Blechnaceae Subfamily: Woodwardioideae"

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Rhizome decumbent, dark brown, stout, densely scaly; scales dark brown, lanceolate, 1–4 cm, entire, membranous, apex fibriform. Stipes close, 20–55 cm, 3–6 mm in diam., base densely scaly; upper part of stipe and rachis sparsely covered with brown, broadly lanceolate scales; lamina deeply bipinnatifid, brown or slightly green when dry, ovate, 35–45(–70) × 15–45 cm, leathery, glabrous, base rounded-truncate, apex acuminate; pinnae 6–8 pairs, shortly stalked, lanceolate; lower and middle pinnae 10–30 × 4–9 cm, deeply pinnatifid to 2–3(–4) mm from costa, base asymmetrical with 1 basiscopic lobe lacking, apex acuminate, basal pinnae shortened;"

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence] "Roadsides, mountain slopes; ca. 500 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangxi, ?Taiwan, Zhejiang [Japan, Philippines]."

602	Produces viable seed	y
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Small bulbils borne on adaxial surfaces of pinna lobes or not. Sori occupying costular areoles, crescent-shaped or elliptic, sunken in rimmed depressions; indusia dark brown, thickly papery."
	Lloyd, R. M., & Klekowski Jr, E. J. (1970). Spore germination and viability in Pteridophyta: evolutionary significance of chlorophyllous spores. <i>Biotropica</i> , 2(2): 129-137	"TABLE 1. Summary of spore germination and viability in ferns." [Woodwardia orientalis - Days to germination = (2)5; Length of viability (days) = 200]

603	Hybridizes naturally	
	Source(s)	Notes
	Pyner, T. (2015). Woodwardia in cultivation. <i>Plantsman</i> . September 2015: 184-191	[Unknown] "It is now known that W. orientalis is a fertile allotetraploid species derived from a sterile hybrid between diploid W. prolifera and a second, as yet uncertain, species (Takamiya et al. 1992). Most plants in cultivation appear to be W. prolifera. True W. orientalis is possibly grown and I am currently searching fern collections for plants that may be it."

604	Self-compatible or apomictic	
	Source(s)	Notes

Qsn #	Question	Answer
	Peck, C. J. (1985). Reproductive biology of isolated fern gametophytes. PhD Dissertation. Iowa State University, Ames, Iowa	"Homosporous ferns produce a single kind of spore which gives rise to a gametophyte that is viewed as potentially bisexual. Theoretically, a single gametophyte of a homosporous fern could self-fertilize to establish a new population."
	Nayar, B., & Kaur, S. (1971). Gametophytes of Homosporous Ferns. Botanical Review, 37(3), 295-396	"Obligate apogamy (Stone, 1969) is reported in some species of Woodwardia (<i>W. martinezii</i> Maxon ex Weath) and facultative apogamy (Duncan, 1941) in some species of Doodia [<i>D. caudata</i> (Cav.) R. Br.]. Regeneration of prothalli is not common."

605	Requires specialist pollinators	n
	Source(s)	Notes
	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	"Also assume [no] for fern, grass, and sedge taxa even if direct evidence is lacking."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"...produces numerous tiny bulbs scattered over the upper surface of the blade."
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Small bulbils borne on adaxial surfaces of pinna lobes or not."

607	Minimum generative time (years)	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. May be able to reproduce vegetatively prior to sexual maturity

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Roadsides, mountain slopes; ca. 500" [Possible that spores could be carried on equipment, shoes, etc. but unlikely]

Qsn #	Question	Answer
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"It is cultivated in pots or in gardens in moist, brightly shaded areas."
703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. Spores could potentially contaminate soil or potting media of any plants growing in the vicinity of reproductive age individuals
704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	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 group includes tumbling plants and fern spores."
705	Propagules water dispersed	
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Roadsides, mountain slopes; ca. 500 m." [Possibly if growing in riparian areas]
706	Propagules bird dispersed	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2013. Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Small bulbils borne on adaxial surfaces of pinna lobes or not. Sori occupying costular areoles, crescent-shaped or elliptic, sunken in rimmed depressions; indusia dark brown, thickly papery." [No evidence, although related taxon may be bird-dispersed in the Azores]
707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Possibly, but unlikely. Although spores may potentially adhere to animal fur or feet, the primary vector of dispersal is wind & maybe water.
708	Propagules survive passage through the gut	

Qsn #	Question	Answer
	Source(s)	Notes
	Arosa, M. L., Quintanilla, L. G., Ramos, J. A., Ceia, R., & Sampaio, H. (2009). Spore maturation and release of two evergreen Macaronesian ferns, <i>Cladonia macrocarpa</i> and <i>Woodwardia radicans</i> , along an altitudinal gradient. <i>American Fern Journal</i> , 99(4), 260-272	[Related taxon survives gut passage if consumed by bullfinches. Unknown for other animals] "In short, many droppings contained high amounts of viable (able to germinate) spores of <i>C. macrocarpa</i> and <i>W. radicans</i> and thus may provide a vehicle for dispersal."

801	Prolific seed production (>1000/m²)	y
	Source(s)	Notes
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. <i>Plant Protection Quarterly</i> , 25(2): 56-74	"Assume [yes] for fern taxa unless contradictory evidence exists."

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes
	Lloyd, R. M., & Klekowski Jr, E. J. (1970). Spore germination and viability in Pteridophyta: evolutionary significance of chlorophyllous spores. <i>Biotropica</i> , 2(2): 129-137	"TABLE 1. Summary of spore germination and viability in ferns." [Woodwardia orientalis - Days to germination = (2)5; Length of viability (days) = 200]

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species.

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. <i>A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places</i> . Bishop Museum Press, Honolulu, HI	[Unknown] "It is cultivated in pots or in gardens in moist, brightly shaded areas."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Able to grow in temperate to subtropical climates
- Reported as a greenhouse escape in Poland
- Shade tolerant
- Reproduces by spores and vegetatively by adventitious bulbils
- Spores dispersed by wind & possibly water
- Intentionally propagated
- Presumably prolific spore production

Low Risk Traits

- No reported of naturalization or invasiveness to date
- Cultivated, but not reported as naturalized, in Hawaiian Islands
- Unarmed (no spines, thorns or burrs)
- Non-toxic
- Ornamental

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

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

Outcome = Accept (Low Risk)