Taxon: Xyris complanata R.Br. **Family:** Xyridaceae

Common Name(s): feathered yellow-eye
hatpins
yellow-eyed grass

Synonym(s): Xyris anceps Vahl
Xyris elongata Rudge
Xyris laevis R.Br.
Xyris malaccensis Steud.
Xyris scabra R.Br.
Xyris walkeri Wight ex Kunth

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 10 Mar 2018

WRA Score: 15.0 **Designation:** H(Hawai'i) **Rating:** High Risk

Keywords: Perennial Herbs, Environmental Weed, Disturbance-Adapted, Water-Dispersed, Prolific Seeder

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	n
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	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
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	n

Qsn #	Question	Answer Option	Answer
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle		
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	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	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	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
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		
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
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**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to southeastern Asia, Malesia, and Australia; in Hawai'i cultivated for use in flower arrangements at least in Hilo and sold as 'ahaniu" [No evidence of domestication]

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. 2018. Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. 2018. Personal Communication	NA

201	**Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"**	**High**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to southeastern Asia, Malesia, and Australia"
	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	"Wastelands, fields, moist sandy soil in coastal areas. Fujian, Hainan [Cambodia, India, Indonesia, Laos, Malaysia, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia]."

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	

203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	Phonsena, P., Chantaranothai, P., & Meesawat, A. (2013). Revision of Xyris L.(Xyridaceae) in Thailand. Thai Forest Bulletin (Botany) 41: 102-139	"Ecology.— Open, wet places in dry dipterocarp forest, lower montane oak forest and lower montane oak-pine forest, from sea level to 1600 m altitude" [Elevation exceeds 1000 m, demonstrating environmental versatility]

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	"Native to southeastern Asia, Malesia, and Australia; in Hawai'i cultivated for use in flower arrangements at least in Hilo and sold as 'ahaniu, now at least sparingly naturalized in wet muddy areas and on lava, ca. 500 m, in the vicinity of Mountain View and Glenwood, Hawai'i, and collected on Kaua'i in 1987 (Lorence & Flynn 5538, BISH). First reported as naturalized by Fosberg (1966b)."

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i cultivated for use in flower arrangements at least in Hilo and sold as 'ahaniu,"
	CABI. 2018. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	Introduced to Hawaii and West Bengal

301	Naturalized beyond native range	y
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i cultivated for use in flower arrangements at least in Hilo and sold as 'ahaniu, now at least sparingly naturalized in wet muddy areas and on lava, ca. 500 m, in the vicinity of Mountain View and Glenwood, Hawai'i, and collected on Kaua'i in 1987 (Lorence & Flynn 5538, BISH). First reported as naturalized by Fosberg (1966b)."

302	Garden/amenity/disturbance weed	
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Classified as a weed. Identified as an environmental weed in Hawaii. See 3.04] "References: United States of America-N- 101, United States of America-N-301, United States of America-N-839, Singapore-W-1290, United States of America-N-1292, Vietnam-A-87, Singapore-W-1839, Singapore-W-1977, Global--1324."

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	US Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for 48 Species on Kauai and Designation of Critical Habitat; Final Rule. 50 CFR Part 17. Federal Register Vol. 75, No. 70	[Classified as an environmental weed] "Xyris complanata is a clumping herb cultivated for use in floral arrangements. It is naturalized in Hawaii in wet muddy areas and on lava and can outcompete native vegetation"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

304	Environmental weed	y

Qsn #	Question	Answer
	Source(s)	**Notes**
	US Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for 48 Species on Kauai and Designation of Critical Habitat; Final Rule. 50 CFR Part 17. Federal Register Vol. 75, No. 70	[Identified as a competitor to native vegetation in montane wet ecosystems] "The nonnative plant threats to the species inhabiting the montane wet ecosystem include the understory and subcanopy species Andropogon glomeratus (bushy bluestem), Andropogon virginicus (broomsedge), Axonopus fissifolius, Clidemia hirta, Cyperus meyenianus, Erechtites valerianifolia (fireweed), Erigeron karvinskianus, Hedychium gardnerianum, Juncus planifolius, Kalanchoe pinnata, Lantana camara, Paspalum urvillei, Passiflora tarminiana, Rubus argutus, R. rosifolius, Sacciolepis indica, Setaria parviflora, and Xyris complanata (yellow-eyed grass), and the canopy species Morella faya (firetree) and Psidium cattleianum (HBMP 2007)." ... "Xyris complanata is a clumping herb cultivated for use in floral arrangements. It is naturalized in Hawaii in wet muddy areas and on lava and can outcompete native vegetation"

305	Congeneric weed	y
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Xyris indica" ... "Weed of: Orchards & Plantations" ... "References: Thailand-A-239, southeast Asia-W-191, Asia-W-204, Thailand-A-209, Thailand-A-359, Indonesia-A-188, Thailand-W-821, Thailand-W-822, Sri Lanka-AD-1195, south and southeast Asia- A-1320, Indonesia-A-87, Thailand-A-87, Vietnam-A-87, India-A-1936."
	Erickson, T.A. & Puttock, C.F. 2006. Hawai'i Wetland Field Guide: An Ecological And Identification Guide to Wetlands And Wetland Plants of the Hawaiian Islands. Bess Press Books, Honolulu, HI	"Xyris platylepis ... in the Hawaiian Islands it is only found on Hawaii. First collected in 1951, it now occurs as a garden escape in wet muddy areas and on lava, from 500 to 1370m elevation."

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence] "Perennial herbs, solitary or in small clumps. Leaves somewhat rigid, twisted, often falcate, linear, 10-30(-50) cm long, 1.5-4(-6) mm wide, margins minutely scabrous, dilated near base."

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

403	Parasitic	n
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Perennial herbs, solitary or in small clumps." [No evidence]

404	Unpalatable to grazing animals	

Qsn #	Question	Answer
	Source(s)	**Notes**
	WRA Specialist. 2018. Personal Communication	Unknown

405	Toxic to animals	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
	CABI. 2018. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	WRA Specialist. 2018. Personal Communication	Unknown

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] "Antifungal, antibacterial"
	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**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"now at least sparingly naturalized in wet muddy areas and on lava" [Unlikely. Not in fire prone habitats]
	Phonsena, P., Chantaranothai, P., & Meesawat, A. (2013). Revision of Xyris L.(Xyridaceae) in Thailand. Thai Forest Bulletin (Botany) 41: 102-139	"Open, wet places in dry dipterocarp forest, lower montane oak forest and lower montane oak-pine forest, from sea level to 1600 m altitude." [Probably not. Wet places are less likely to be fire prone]

Qsn #	Question	Answer
409	**Is a shade tolerant plant at some stage of its life cycle**	
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"now at least sparingly naturalized in wet muddy areas and on lava, ca. 500 m" [Unknown, but probably no. Occurs in open, & presumably high light environments]

410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y**
	Source(s)	**Notes**
	Tamura, R., Hashidoko, Y., Ogita, N., Limin, S. H., & Tahara, S. (2008). Requirement for particular seed-borne fungi for seed germination and seedling growth of Xyris complanata, a pioneer monocot in topsoil-lost tropical peatland in Central Kalimantan, Indonesia. Ecological Research, 23(3), 573-579	"Hawaii yellow-eyed grass (Xyris complanata: Xyridaceae) inhabits infertile, acidic peat soil in the rainy tropical zone in Southeast Asia"
	CABI. 2018. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"It is capable of growing in a variety of soils (including infertile and acidic peat soils) which, combined with its ability to produce a large number of dormant seeds, makes it potentially invasive." ... "Moreover, it thrives in wastelands, fields, moist sandy soil in coastal areas and is known to be tolerant of highly stressed, infertile soils (Sajo and Rudall, 1999), including acidic soils (Tamura et al., 2008) and saline soils (Wilson et al., 1985). Where it is naturalized on some of the Hawaiian Islands it favours wet muddy areas but can also be found on lava flows and along roadsides (Wagner et al., 1999; GBIF, 2015)."

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. Leaf sheath narrow, 3.5--7.5 cm; leaf blade linear, (5--)10--25(--40) cm × 1--3.5 mm, rigid, thick, striate when dry, margin thickened and with a stout vein, apex acute. Peduncle erect, 10--40(--60) cm × 1.2--2.5 mm, distinctly compressed, usually twisted leftward, margin with a stout, scabrous rib."

Qsn #	Question	Answer
412	**Forms dense thickets**	**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	"Wastelands, fields, moist sandy soil in coastal areas." [No evidence]
	US Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for 48 Species on Kauai and Designation of Critical Habitat; Final Rule. 50 CFR Part 17. Federal Register Vol. 75, No. 70	"Xyris complanata is a clumping herb cultivated for use in floral arrangements. It is naturalized in Hawaii in wet muddy areas and on lava and can outcompete native vegetation" [Competes with native plants, but no description of dense stands or monocultures]
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence from Hawaiian Islands] "now at least sparingly naturalized in wet muddy areas and on lava, ca. 500 m, in the vicinity of Mountain View and Glenwood, Hawai'i, and collected on Kaua'i in 1987 (Lorence & Flynn 5538, BISH)."

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	[Terrestrial herb] "Wastelands, fields, moist sandy soil in coastal areas."

502	Grass	n
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 6 Mar 2018]	"Family: Xyridaceae"

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	"Herbs perennial. Leaf sheath narrow, 3.5--7.5 cm; leaf blade linear, (5--)10--25(--40) cm × 1--3.5 mm, rigid, thick, striate when dry, margin thickened and with a stout vein, apex acute." [Xyridaceae]

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	**Notes**
	Carr, A. 2015. Plant of the Month - January. Xyris complanata. https://sunshinesgap.files.wordpress.com/2015/07/01-xyris-complanata.pdf. [Accessed 6 Mar 2018]	"It has fibrous roots and leaves crowded at the base."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Perennial herbs, solitary or in small clumps. Leaves somewhat rigid, twisted, often falcate, linear, 10-30(-50) cm long, 1.5-4(-6) mm wide, margins minutely scabrous, dilated near base."

Qsn #	Question	Answer
601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Rao, M.L.V. & Bhat, G.K. 2011. Xyris complanata. The IUCN Red List of Threatened Species 2011: e.T194170A8887620. http://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T194170A8887620.en. [Accessed 7 Mar 2018]	"Xyris complanata is a widespread species but in India it is known only from Kerala. Athough there is no information on the population status of this species or threats to the species in India even though it is used in medicine and research, it is assessed as Least Concern due to its pantropical distribution."

602	Produces viable seed	y
	Source(s)	**Notes**
	CABI. 2018. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"Because of the buoyancy of its seeds and its preference for moist environments, it is likely that X. complanata is dispersed by water."
	Phonsena, P., Chantaranothai, P., & Meesawat, A. (2013). Revision of Xyris L.(Xyridaceae) in Thailand. Thai Forest Bulletin (Botany) 41: 102-139	"Capsule dark brown, obovoid, 5–6 by 2.5–3 mm. Seeds reddish-brown, translucent, ovoid, ribbed, ca 0.6 mm long, 0.3–0.4 mm diam., 14–15 dark brown longitudinal ridges and 2–4 transverse ridges."
	Tamura, R., Hashidoko, Y., Ogita, N., Limin, S. H., & Tahara, S. (2008). Requirement for particular seed-borne fungi for seed germination and seedling growth of Xyris complanata, a pioneer monocot in topsoil-lost tropical peatland in Central Kalimantan, Indonesia. Ecological Research, 23(3), 573-579	"During the rainy season, X. complanata actively flowers and produces large numbers of tiny, football-shaped seeds that are approximately 0.2 × 0.3 mm in size (Yahiro 1997). At the end of the rainy season (March-April), it dispersed the seeds over the wet soil and effectively deposit to the seed bank in the soil. A portion of the seeds germinates irregularly on the surface of the moist, acidic soil to maintain its pure communities."

603	Hybridizes naturally	
	Source(s)	**Notes**
	Flora of North America Editorial Committee. 2000, Flora of North America: North of Mexico, Volume 22. Oxford University Press, Oxford, UK	[Unknown. Hybridization documented in genus] "Xyris stricta forms a complex with X. ambigua and possibly arose as an independently breeding hybrid of X. ambigua and X. laxifolia within whose ranges it grows."

604	Self-compatible or apomictic	
	Source(s)	**Notes**
	Ramirez, N., & Brito, Y. (1990). Reproductive biology of a tropical palm swamp community in the Venezuelan llanos. American Journal of Botany, 77(10): 1260-1271	[Unknown. Self-compatible & self-incompatible species have been documented in genus] "Fruit set after cross-fertilization in self-compatible plants in general was higher than that after self-fertilization; the opposite occurred in Caperonia pallustris and Xyris laxifolia. Seed production was similar in cross- and self-pollinated flowers..." ... "TABLE 4. Automatic self-pollination indices for self-compatible and self-incompatible species in a palm swamp community" [* Xyris laxifolia var. delta classified as self-compatible; Xyris savanensis classified as self-incompatible]

605	Requires specialist pollinators	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	"POLLINATION. No nectar is produced by the flowers of the Xyridaceae, and pollinating bees are attracted by pollen or imitated pollen masses (Vogel 1981); only Orectanthe is ornithophilous. S. Renner (pers. comm.) found Xyris sp. in Minas Gerais (Brazil) buzzed and pollinated by females of an anthophorid Exomalopsis sp."

606	Reproduction by vegetative fragmentation	n
	Source(s)	**Notes**
	CABI. 2018. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"X. complanata propagates by seed, which is produced in large quantities." [No evidence]

607	Minimum generative time (years)	1
	Source(s)	**Notes**
	CABI. 2018. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	[Short-lived perennial. Likely flowers in first growing season] "X. complanata is a perennial, tufted grass-like herb that grows up to 90 cm." ... "Phonsena et al. (2013) note that in Thailand X. complanata flowers all year round, but especially from October to December. In the monsoonal zones of Australia, it flowers between May and July, with flowers usually opening from mid-morning (10.00 h) and persisting until late afternoon (16.00 h) (Doust and Conn, 1994). Moreover, old flowers may persist for another day after anthesis." ... "Xyris species are short-lived (Kral, 1998)."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	**Notes**
	CABI. 2018. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	[Possible that minute seeds, produced in large numbers, could be dispersed in mud stuck to footwear or vehicles] "X. complanata is recognized as a pioneer plant in wet, adverse, open land, where it is capable of producing large numbers of minute seeds for regeneration and survival (Tamura et al., 2008). It grows in marshes, moist depressions, drainage ditches, along streams and in other wet places (Cook, 1996). Moreover, it thrives in wastelands, fields, moist sandy soil in coastal areas"

702	Propagules dispersed intentionally by people	y
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i cultivated for use in flower arrangements at least in Hilo and sold as 'ahaniu"
	Erickson, T.A. & Puttock, C.F. 2006. Hawai'i Wetland Field Guide: An Ecological And Identification Guide to Wetlands And Wetland Plants of the Hawaiian Islands. Bess Press Books, Honolulu, HI	"The long-stalked cone-like heads have been sold locally in dry bouquets since the 1950s."

Qsn #	Question	Answer
703	**Propagules likely to disperse as a produce contaminant**	
	Source(s)	**Notes**
	CABI. 2018. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"Seeds in the dried flower heads which are used in flower arrangements can be dispersed when bouquets are either transported or eventually discarded."
	Erickson, T.A. & Puttock, C.F. 2006. Hawai'i Wetland Field Guide: An Ecological And Identification Guide to Wetlands And Wetland Plants of the Hawaiian Islands. Bess Press Books, Honolulu, HI	"The long-stalked cone-like heads have been sold locally in dry bouquets since the 1950s." [Potentially Yes]

704	**Propagules adapted to wind dispersal**	
	Source(s)	**Notes**
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	"DISPERSAL. Seeds are shaken or fall from dehiscing capsules, particularly as aging bracts and sepals spread away from the fruit or as old scapes topple. These seeds are often buoyant, thus are left in drifts on the surface or are mixed with small sand particles and silt or homogenized peat in a shallow patina. If the substrate is moist, germination can take place within 2 weeks (in Xyris) and young seedlings can form a veritable turf on open seepage wherever there are clearings. On the other hand, since abundant moisture triggers germination, if conditions are dry, Xyris seeds can remain dormant for indefinite periods. I have kept dry seed without refrigeration for up to 10 years and still had good germination in greenhouse fiats. I have run no such tests on seeds of the other genera."
	Tamura, R., Hashidoko, Y., Ogita, N., Limin, S. H., & Tahara, S. (2008). Requirement for particular seed-borne fungi for seed germination and seedling growth of Xyris complanata, a pioneer monocot in topsoil-lost tropical peatland in Central Kalimantan, Indonesia. Ecological Research, 23(3), 573-579	"During the rainy season, X. complanata actively flowers and produces large numbers of tiny, football-shaped seeds that are approximately 0.2 × 0.3 mm in size (Yahiro 1997)." [Small seed size may allow for short dispersal by wind, but no special adaptations for wind dispersal are evident]

705	**Propagules water dispersed**	**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	
	CABI. 2018. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	"Because of the buoyancy of its seeds and its preference for moist environments, it is likely that X. complanata is dispersed by water."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"now at least sparingly naturalized in wet muddy areas and on lava, ca. 500 m"

706	**Propagules bird dispersed**	**n**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	[No evidence] "Seeds are shaken or fall from dehiscing capsules, particularly as aging bracts and sepals spread away from the fruit or as old scapes topple. These seeds are often buoyant, thus are left in drifts on the surface or are mixed with small sand particles and silt or homogenized peat in a shallow patina."

707	Propagules dispersed by other animals (externally)	
	Source(s)	**Notes**
	CABI. 2018. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	[Possible that small seeds may adhere to animals in mud] "X. complanata is recognized as a pioneer plant in wet, adverse, open land, where it is capable of producing large numbers of minute seeds for regeneration and survival (Tamura et al., 2008). It grows in marshes, moist depressions, drainage ditches, along streams and in other wet places (Cook, 1996). Moreover, it thrives in wastelands, fields, moist sandy soil in coastal areas"

708	Propagules survive passage through the gut	
	Source(s)	**Notes**
	WRA Specialist. 2018. Personal Communication	Unknown if plants & seeds are consumed

801	Prolific seed production (>1000/m2)	y
	Source(s)	**Notes**
	Tamura, R., Hashidoko, Y., Ogita, N., Limin, S. H., & Tahara, S. (2008). Requirement for particular seed-borne fungi for seed germination and seedling growth of Xyris complanata, a pioneer monocot in topsoil-lost tropical peatland in Central Kalimantan, Indonesia. Ecological Research, 23(3), 573-579	"A primary strategy of Xyris complanata for acquiring their niche is to produce thousands of tiny seeds and to deposit them to seed bank in the soil."

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	**Notes**
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	"On the other hand, since abundant moisture triggers germination, if conditions are dry, Xyris seeds can remain dormant for indefinite periods. I have kept dry seed without refrigeration for up to 10 years and still had good germination in greenhouse fiats. I have run no such tests on seeds of the other genera."
	Tamura, R., Hashidoko, Y., Ogita, N., Limin, S. H., & Tahara, S. (2008). Requirement for particular seed-borne fungi for seed germination and seedling growth of Xyris complanata, a pioneer monocot in topsoil-lost tropical peatland in Central Kalimantan, Indonesia. Ecological Research, 23(3), 573-579	"this monocot plant produces a large number of dormant seeds to make a large deposit to seed bank in the soil."

803	Well controlled by herbicides	

Qsn #	Question	Answer
	Source(s)	**Notes**
	CABI. 2018. Invasive Species Compendium. Wallingford , UK: CAB International. www.cabi.org/isc	[Possibly No] "In a screening of eleven herbicides in the DuPuis Reserve in south Florida for control of the exotic invasive grasses Panicum repens and Paspalum notatum, Thayer (2000) found that there were no effects on the Xyris species present in the P. notatum trial plots. These plots had been burned previous to the application of herbicides in order to break apical dormancy."

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	
	Source(s)	**Notes**
	WRA Specialist. 2018. Personal Communication	Unknown

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	[Unknown] "in Hawai'i cultivated for use in flower arrangements at least in Hilo and sold as 'ahaniu, now at least sparingly naturalized in wet muddy areas and on lava, ca. 500 m, in the vicinity of Mountain View and Glenwood, Hawai'i, and collected on Kaua'i in 1987 (Lorence & Flynn 5538, BISH). First reported as naturalized by Fosberg (1966b)."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Elevation range exceeds 1000 m, demonstrating environmental versatility
• Thrives in tropical climates
• Naturalized on Kauai & Hawaii islands (Hawaiian Islands)
• Identified as a threat to native vegetation in montane wet ecosystems
• Other Xyris species are invasive weeds
• Tolerates many soil types
• Reproduces by seeds
• Reaches maturity rapidly
• Seeds dispersed by water, intentionally by people & possibly by other vectors
• Prolific seed production (1000s of seeds)
• Forms a persistent seed bank

Low Risk Traits
• Unarmed (no spines, thorns, or burrs)
• Non-toxic
• Ornamental
• Not reported to spread vegetatively