

Taxon: *Guzmania monostachia* (L.) *Rusby ex Mez*

Family: Bromeliaceae

Common Name(s): Fuchs' bromeliad
strap-leaved guzmania
West Indian tufted airplant

Synonym(s): *Renelalmia monostachia* L.

Assessor: Chuck Chimera

Status: Approved

End Date: 27 Dec 2023

WRA Score: 7.0

Designation: H(HPWRA)

Rating: High Risk

Keywords: Epiphyte, Naturalized, Shade Tolerant, Self-Fertile, Wind-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y = -3, n = 0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	0 = low, 1 = intermediate, 2 = high (see Appendix 2)	High
202	Quality of climate match data	0 = low, 1 = intermediate, 2 = high (see Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y = 1, n = 0	y
204	Native or naturalized in regions with tropical or subtropical climates	y = 1, n = 0	y
205	Does the species have a history of repeated introductions outside its natural range?	y = -2, ? = -1, n = 0	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	y = 2*multiplier (see Appendix 2), n = 0	n
304	Environmental weed		
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		
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)	y = 1, n = 0	n
411	Climbing or smothering growth habit	y = 1, n = 0	y
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	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	y
705	Propagules water dispersed		
706	Propagules bird dispersed	y = 1, n = -1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y = 1, n = -1	n
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	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
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). <i>Flora Neotropica</i> , 14(2), 663-1492	[No evidence] "Epiphytic and sometimes terrestrial in forest, 2-2000 m alt"

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"	High
	Source(s)	Notes
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). <i>Flora Neotropica</i> , 14(2), 663-1492	"Guzmania monostachia var monostachia ... DISTRIBUTION. Epiphytic and sometimes terrestrial in forest, 2-2000 malt, southern Florida, West Indies, and Nicaragua to northern Brazil and Peru." ... "Guzmania monostachia var variegata ... on trees, in Big Cypress near Deep Lake, Collier County, Florida, United States." ... "Guzmania monostachia var alba ... Imbert to Guanatico, Puerto Plata, Republica Dominicana."
	Flora of North America Editorial Committee. (1993). <i>Flora of North America: Volume 22: Magnoliophyta: Alismatidae, Arecidae, Commelinidae(in Part), and Zingiberidae</i> . Oxford University Press, Oxford, UK	"Varieties 3 (2 in the flora): Mexico; West Indies; Central America; South America."

202	Quality of climate match data	High
	Source(s)	Notes
	Flora of North America Editorial Committee. (1993). <i>Flora of North America: Volume 22: Magnoliophyta: Alismatidae, Arecidae, Commelinidae(in Part), and Zingiberidae</i> . Oxford University Press, Oxford, UK	"Varieties 3 (2 in the flora): Mexico; West Indies; Central America; South America."

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Benzing, D. H. (2000). Bromeliaceae: Profile of an Adaptive Radiation. Cambridge University Press. Cambridge, UK	" <i>Guzmania monostachia</i> , the widest-ranging member of its sizable genus, exhibits exceptional ecological versatility, including tolerance for high to low exposures, assisted in part by facultative CAM (Medina et al. 1977; Maxwell et al. 1992, 1994, 1995)."
	LLIFLE. (2023). <i>Guzmania monostachia</i> . http://www.llifle.com/Encyclopedia/BROMELIADS/Family/Bromeliaceae/28731/Guzmania_monostachia . [Accessed 22 Dec 2023]	"Hardiness: It must be grown in a frost-free situation in open air in the tropical and humid subtropical climate countries, with temperatures which it is good to keep over the 14°C, best 20-24°C."
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). <i>Flora Neotropica</i> , 14(2), 663-1492	[Potentially broad elevation range in tropical latitudes] "Epiphytic and sometimes terrestrial in forest, 2-2000 malt, southern Florida, West Indies, and Nicaragua to northern Brazil and Peru."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2023). <i>Plants of Hawai'i</i> . http://www.plantsofhawaii.org.. [Accessed 22 Dec 2023]	"Island Status O'ahu Naturalized Maui Naturalized"
	Flora of North America Editorial Committee. (1993). <i>Flora of North America: Volume 22: Magnoliophyta: Alismatidae, Arecidae, Commelinidae(in Part), and Zingiberidae</i> . Oxford University Press, Oxford, UK	"Varieties 3 (2 in the flora): Mexico; West Indies; Central America; South America."

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	Notes
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. <i>Bishop Museum Occasional Papers</i> 107: 3-18	[Rarely cultivated] "Native from southern Florida to northern Brazil and Peru, where it grows epiphytically or terrestrially from near sea level to 2000 m elevation, <i>G monostachia</i> was previously uncollected in Hawai'i, although it has probably been in cultivation (albeit, rarely used) for some time."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Starr, F.& Starr, K. (2013). <i>New Plant Records from Maui and Hawai'i</i> . <i>Bishop Museum Occasional Papers</i> 114: 33-36	[East Maui] " <i>Guzmania monostachia</i> (L.) Rusby ex Mez New island record <i>Guzmania monostachia</i> (West indian tufted air plant) was first reported as naturalized in the state from o'ahu (Frohlich & lau 2010). This epiphyte is here reported as also being naturalized on Maui, where it was sparingly naturalized in a botanical garden. Material examined: MAUI: east Maui, enchanting Floral Gardens of Kula, spreading as an epiphyte, in association with various other botanical garden exotics, 2300 ft [701 m], 1 Mar 2012, Starr, Starr & Takeda 120301-02."
	Murphy, M. (2023). BIISC Plant Pono Specialist - Invasive Plant Prevention. personal communication. 09 Nov	[Hawaii Island. Unpublished] " <i>Guzmania monostachia</i> (Habit: Blanketing main trunks of trees and palms along the Honolii stream, Keaau Shipman Park, and many other locations in that area. 100s of individuals were observed, many of them actively fruiting.)"

Qsn #	Question	Answer
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	[Oahu] " <i>Guzmania monostachia</i> (L.) Rusby ex Mez New state record Native from southern Florida to northern Brazil and Peru, where it grows epiphytically or terrestrially from near sea level to 2000 m elevation, <i>G. monostachia</i> was previously uncollected in Hawai'i, although it has probably been in cultivation (albeit, rarely used) for some time. It can be distinguished by its flat green, spineless leaves and an inflorescence of a single, polystichous-flowered spike with only one flower per node, the fertile floral bracts green with brown longitudinal stripes, the sterile, upper floral bracts red to orange (or rarely white). The fruit is a 2-3 cm long capsule, containing wind-dispersed seeds with a white tuft of hairs (Smith & Downs 1977). This species was found sparingly naturalized in two locations in Nu'uuanu, growing epiphytically on several different tree species, occasionally dominating major and minor branches of large trees up to 12 m tall. Material examined. O'AHU: Nu'uuanu Valley on Kā'ohinani St, 0.5 m dia epiphyte, 14 oct 2008, D. Frohlich & A. Lau 2008101403."
	Oppenheimer, H. (2019). New Hawaiian plant records for 2018. Bishop Museum Occasional Papers 126: 3-9	[West Maui] " <i>Guzmania monostachia</i> (L.) Rusby ex Mez New island record First reported as an epiphyte on O'ahu (Frohlich & Lau 2010: 7), this species was found on Maui on a cliff in <i>Metrosideros/Diospyros</i> lowland forest, where it was obviously not under cultivation. Material examined. MAUI: West Maui, Wailuku Distr, Iao Valley, SW of Iao Needle above Kīnihāpai Stream, 415 m, 10 Sep 2013, Oppenheimer, K. Bustamente, & S. Perlman #H91301 (BISH)."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Murphy, M. (2023). BIISC Plant Pono Specialist - Invasive Plant Prevention. personal communication. 09 Nov	[Potential landscaping nuisance or weed] " <i>Guzmania monostachia</i> (Habit: Blanketing main trunks of trees and palms along the Honolii stream, Keaau Shipman Park, and many other locations in that area. 100s of individuals were observed, many of them actively fruiting.)"

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence
	CABI. (2023). CABI Compendium Invasive Species. https://www.cabidigitallibrary.org/product/qi . [Accessed 27 Dec 2023]	No evidence

304	Environmental weed	
	Source(s)	Notes
	Oppenheimer, H. (2019). New Hawaiian plant records for 2018. Bishop Museum Occasional Papers 126: 3-9	[No impacts reported, but could potentially compete with or exclude native epiphytes, or weigh down and otherwise impact native host trees] "First reported as an epiphyte on O'ahu (Frohlich & Lau 2010: 7), this species was found on Maui on a cliff in <i>Metrosideros/Diospyros</i> lowland forest, where it was obviously not under cultivation."

305	Congeneric weed	
	Source(s)	Notes

Qsn #	Question	Answer
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	[<i>Guzmania lindenii</i> is in early stages of naturalization, but species could have potential to suppress native epiphytic cover] "Originally located by the Hawaiian Trail and Mountain Club during a scheduled hike on the Bowman Trail (Kalihi Valley), <i>G. lindenii</i> was noted in only one population near the summit ridge at ca 800 m elevation, within about a 20 m radius, in lowland wet ohia forest. over 150 plants of all size classes were observed, mostly growing epiphytically, occasionally forming dense coverings on tree branches. Four mature plants were found, all growing on or near ground level, each weighing roughly 20 pounds. It is possible that plants were weighing down branches, ending up on the ground by the time they were mature. Mature plants in this population were heavily set with fruits, and we estimate one plant can produce greater than 30,000 seeds per inflorescence. This species is likely moth or nectar-feeding bat-pollinated in its native range but are self-fertile as well. Due to the heavy fruit set it is likely this population is self-fertile (H. Luther, pers. comm., 2008). Because of its potential for further environmental impact in Hawai'i, as well as its relative rarity in cultivation, this species is a good candidate for addition to the state noxious weed list."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). <i>Flora Neotropica</i> , 14(2), 663-1492	[No evidence] "Plant stemless, flowering 2-4 dm high. Leaves many in a dense rosette, obscurely punctulate-lepidote, soon glabrous; sheaths broadly ovate, brownish; blades ligulate, 2 cm wide, acute, yellow-green, paler below. Scape erect, much shorter than the leaves, 4-8 mm in diameter, glabrous; scape-bracts ovate, acute, imbricate, pale-green. Inflorescence of a single elongate polystichous-flowered spike, cylindric, acute, 8-15 cm long, 2-3 cm in diameter, sterile toward the apex; axis straight, glabrous. Floral bracts imbricate, ovate, acute, membranous, the fertile ones pale and usually with conspicuous brown longitudinal stripes, about equaling the flowers, the sterile bright red or rarely white; flowers erect, white, 23-29 mm long. Sepals joined equally for about one fourth their length, 18 mm long, obovate, broadly obtuse, even, coriaceous; petals agglutinated for most of their length, the lobes elliptic, obtuse; stamens included, filaments pseudo-adnate to the petals for most of their length. Capsule cylindric, 2-3 cm long; coma white."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Acevedo-Rodríguez, P. & Strong, M.T. (2005). Monocotyledons and Gymnosperms of Puerto Rico and the Virgin Islands. <i>Contributions from the United States National Herbarium</i> 52: 1-415	"Epiphytic, or sometimes terrestrial, acaulescent herb."

404	Unpalatable to grazing animals	
	Source(s)	Notes

Qsn #	Question	Answer
	Benzing, D. H. (2000). Bromeliaceae: Profile of an Adaptive Radiation. Cambridge University Press. Cambridge, UK	"At least 21 species produce forage suitable for domesticated or wild animals. Monkeys eat the young inflorescences and drink water impounded by numerous species including <i>Aechmea tessmannii</i> , <i>A. tillandsioides</i> , <i>A. zebrina</i> , <i>Guzmania acuminata</i> , <i>G. eduardii</i> , <i>G. melinonis</i> and <i>G. monostachia</i> , and many forest people in turn eat these primates (Fig. 14.3A)."
	Simmen, B., & Sabatier, D. (1996). Diets of some French Guianan primates: food composition and food choices. <i>International Journal of Primatology</i> , 17, 661-693	"Table 1. Plant Species and Corresponding Food Categories Exploited by Three Guianan Primate Species" [Unknown. The young leaves of an unidentified species of <i>Guzmania</i> are reported to be consumed by tufted capuchins (<i>Cebus apella</i>)]

405	Toxic to animals	n
	Source(s)	Notes
	Quattrocchi, U. (2012). <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	No evidence of toxicity in genus

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	LLIFLE. (2023). <i>Guzmania monostachia</i> . http://www.llifle.com/Encyclopedia/BROMELIADS/Family/Bromeliaceae/28731/Guzmania_monostachia . [Accessed 27 Dec 2023]	"Pest & diseases: It is susceptible to scale, trips and mosquitos that will sometimes breed in the pools of water that are trapped between the leaves. Mealybugs infestations are also a frequent problem."
	Krupar, S., Naranjo, A. A., Godden, G., & Cellinese, N. (2023). The Fate of <i>Guzmania monostachia</i> in Florida Rests with Humans. <i>Diversity</i> , 15(4), 525	[Possibly, but not specifically identified as impacting <i>Guzmania monostachia</i>] "However, bromeliads in South Florida have experienced rapid population declines recently due to human-related impacts such as habitat loss, poaching, and extensive damage by an invasive bromeliad-eating weevil from Mexico, <i>Metamasius callizona</i> Chevrolat, whose presence in Florida was first documented in 1989. Within its native range, <i>M. callizona</i> is known mainly as an occasional pest in shaded greenhouses, and observations of infestations on naturally occurring bromeliads are sparse [4]. In contrast, infestations on naturally occurring bromeliads in South Florida are common, and damage to individual plants is also more severe [5]. It is unclear why impacts to Floridian bromeliad populations have been so extensive, although a biological agent (e.g., a parasitoid wasp) may control populations of <i>M. callizona</i> within its native range [6]."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Quattrocchi, U. (2012). <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	No evidence of toxicity in genus

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Acevedo-Rodríguez, P. & Strong, M.T. (2005). Monocotyledons and Gymnosperms of Puerto Rico and the Virgin Islands. <i>Contributions from the United States National Herbarium</i> 52: 1-415	[No evidence. Does not occur in fire prone habitats] "Moist and wet forests, ranging from near sea level to above 900 m."

Qsn #	Question	Answer
409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Benzing, D. H. (2000). Bromeliaceae: Profile of an Adaptive Radiation. Cambridge University Press. Cambridge, UK	"Guzmania monostachia, the widest-ranging member of its sizable genus, exhibits exceptional ecological versatility, including tolerance for high to low exposures, assisted in part by facultative CAM (Medina et al. 1977; Maxwell et al. 1992, 1994, 1995)." ... "Guzmania monostachia may differ regionally on some or all of these counts. Florida's small population routinely occupies shady habitats, whereas others farther south often experience less diminished sunlight."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	Notes
	LLIFLE. (2023). <i>Guzmania monostachia</i> . http://www.llifle.com/Encyclopedia/BROMELIADS/Family/Bromeliaceae/28731/Guzmania_monostachia . [Accessed 27 Dec 2023]	"This bromeliad grows as an epiphyte or saxicolous and requires a well-drained, aerated, porous and moisture-retentive substratum which is rich of organic substance, but best results are obtained when it is grown epiphytically and roots are covered with moss or coarse crushed tree fern fibre encased in a container or wired to the surfaces of boulders, rough bark, rock walls, or tree branches. Living among the branches of the south American rainforests bromeliads need very little root space so do not place in too large a pot. Root rot can be a problem if the soil is too moist. Continue to depot annually in the spring until the bromeliad fills a 10-15 cm pot. Small pots can induce blooms in mature plants."

411	Climbing or smothering growth habit	y
	Source(s)	Notes
	Murphy, M. (2023). BIISC Plant Pono Specialist - Invasive Plant Prevention. personal communication. 09 Nov	"Guzmania monostachia (Habit: Blanketing main trunks of trees and palms along the Honolii stream, Keaau Shipman Park, and many other locations in that area. 100s of individuals were observed, many of them actively fruiting.)"
	LLIFLE. (2023). <i>Guzmania monostachia</i> . http://www.llifle.com/Encyclopedia/BROMELIADS/Family/Bromeliaceae/28731/Guzmania_monostachia . [Accessed 27 Dec 2023]	[Smothering epiphytic habit] "It is quite uncommon in tropical rain forests and cloud forest, but can be found in locally abundant colonies often completely covering the branches of a tree, more commonly throughout the middle to upper canopy but also rather close to the ground; will survive on the ground for a while if it falls from tree."

412	Forms dense thickets	n
	Source(s)	Notes
	LLIFLE. (2023). <i>Guzmania monostachia</i> . http://www.llifle.com/Encyclopedia/BROMELIADS/Family/Bromeliaceae/28731/Guzmania_monostachia . [Accessed 27 Dec 2023]	[Primarily a dense, smothering epiphyte] "It is quite uncommon in tropical rain forests and cloud forest, but can be found in locally abundant colonies often completely covering the branches of a tree, more commonly throughout the middle to upper canopy but also rather close to the ground; will survive on the ground for a while if it falls from tree."

Qsn #	Question	Answer
501	Aquatic	n
	Source(s)	Notes
	Acevedo-Rodríguez, P. & Strong, M.T. (2005). Monocotyledons and Gymnosperms of Puerto Rico and the Virgin Islands. Contributions from the United States National Herbarium 52: 1-415	"Epiphytic, or sometimes terrestrial, acaulescent herb."
502	Grass	n
	Source(s)	Notes
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). Flora Neotropica, 14(2), 663-1492	Tillandsioideae (Bromeliaceae)
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). Flora Neotropica, 14(2), 663-1492	Tillandsioideae (Bromeliaceae)
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Acevedo-Rodríguez, P. & Strong, M.T. (2005). Monocotyledons and Gymnosperms of Puerto Rico and the Virgin Islands. Contributions from the United States National Herbarium 52: 1-415	"Epiphytic, or sometimes terrestrial, acaulescent herb. Leaves numerous, in a dense rosette, entire, 20-50 cm long, the inner ones shorter, minutely punctulate-lepidote; sheaths conspicuous, broader than the blades, ovate-elliptic or ovate-oblong; blades linear-attenuate, 1.5-3 cm wide, acute to acuminate, green."
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Krupar, S., Naranjo, A. A., Godden, G., & Cellinese, N. (2023). The Fate of <i>Guzmania monostachia</i> in Florida Rests with Humans. Diversity, 15(4), 525	[Widely distributed. Threatened by future sea level rise within part of native range] "The combined results suggest that human activity is and will remain the largest threat to <i>G. monostachia</i> in Florida, and conservation efforts should focus on preserving existing habitats that will remain above sea level and explore possibilities for assisted migration." ... "In comparison to other <i>Guzmania</i> , <i>G. monostachia</i> has the broadest distribution, with populations in northern South America, Central America, the Caribbean, and South Florida [3]."
602	Produces viable seed	y
	Source(s)	Notes
	Cascante-Marin, A., De Jong, M., Borg, E. D., Oostermeijer, J. G. B., Wolf, J. H., & den Nijs, J. C. (2006). Reproductive strategies and colonizing ability of two sympatric epiphytic bromeliads in a tropical premontane area. International Journal of Plant Sciences, 167(6), 1187-1195	"A higher and more continuous seed production in <i>G. monostachia</i> is possible because of a shorter time from flowering to seed dispersal (8-9 vs. 16-20 mo), along with the production of more flowers (29 vs. 22) and naturally pollinated fruits per inflorescence (89% vs. 79% fruit set) and more seeds per fruit (321 vs. 240). Both species showed a high occurrence of spontaneous autogamy that matched the highly selfing condition estimated using microsatellite markers. In all, <i>G. monostachia</i> displayed the reproductive traits of a pioneer species."

Qsn #	Question	Answer
	LLIFLE. (2023). <i>Guzmania monostachia</i> . http://www.llifle.com/Encyclopedia/BROMELIADS/Family/Bromeliaceae/28731/Guzmania_monostachia . [Accessed 22 Dec 2023]	"Propagation: When the flower spike fades (6 weeks or more after it appears), pups appear near the base of the plants. When the offsets are 7.5 cm tall, they are ready to be repotted. Be sure to provide high humidity for a month after propagating the offsets. It may also be grown from seed: remove seeds from inflorescence and lay them uncovered on a bed of crushed tree fern fibres; keep constantly but moderately moist. Starting from the seed, 5-6 years are needed for the blossoming, whilst at least 3 years are needed by division. The wide scale reproduction for commercial purposes is done by micro-propagation."

603	Hybridizes naturally	
	Source(s)	Notes
	Smith, L. B., & Downs, R. J. (1977). <i>Tillandsioideae</i> (Bromeliaceae). <i>Flora Neotropica</i> , 14(2), 663-1492	Unknown. No evidence found

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Flora of North America Editorial Committee. (1993). <i>Flora of North America: Volume 22: Magnoliophyta: Alismatidae, Arecidae, Commelinidae(in Part), and Zingiberidae</i> . Oxford University Press, Oxford, UK	"Florida plants of this taxon appear to be self fertilizing."
	Cascante-Marin, A., De Jong, M., Borg, E. D., Oostermeijer, J. G. B., Wolf, J. H., & den Nijs, J. C. (2006). Reproductive strategies and colonizing ability of two sympatric epiphytic bromeliads in a tropical premontane area. <i>International Journal of Plant Sciences</i> , 167(6), 1187-1195	"In <i>Guzmania</i> , naturally pollinated fruits developed fewer seeds compared with those from autonomous selfing (321 vs. 349 seeds), while the opposite occurred in <i>Tillandsia</i> (240 vs. 209 seeds) (fig. 5B). In all, these results indicate high self-compatibility in both species and place <i>Guzmania</i> as the species with the higher seed production in natural conditions."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Cascante-Marin, A., De Jong, M., Borg, E. D., Oostermeijer, J. G. B., Wolf, J. H., & den Nijs, J. C. (2006). Reproductive strategies and colonizing ability of two sympatric epiphytic bromeliads in a tropical premontane area. <i>International Journal of Plant Sciences</i> , 167(6), 1187-1195	"In <i>Guzmania</i> , naturally pollinated fruits developed fewer seeds compared with those from autonomous selfing (321 vs. 349 seeds), while the opposite occurred in <i>Tillandsia</i> (240 vs. 209 seeds) (fig. 5B). In all, these results indicate high self-compatibility in both species and place <i>Guzmania</i> as the species with the higher seed production in natural conditions."
	Krupar, S., Naranjo, A. A., Godden, G., & Cellinese, N. (2023). The Fate of <i>Guzmania monostachia</i> in Florida Rests with Humans. <i>Diversity</i> , 15(4), 525	"Morphological and observation-based evidence, including the close proximity of the gynoecium and androecium within a largely closed corolla, muted bract coloration, and apparent lack of pollinator visitation [9], suggests that Floridian plants may be exclusively autogamous and, consequently, genetically distinct, whereas outcrossing individuals with brighter flower color and hummingbird-mediated pollination have been observed in South America [10,11]."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Cascante-Marin, A., De Jong, M., Borg, E. D., Oostermeijer, J. G. B., Wolf, J. H., & den Nijs, J. C. (2006). Reproductive strategies and colonizing ability of two sympatric epiphytic bromeliads in a tropical premontane area. <i>International Journal of Plant Sciences</i> , 167(6), 1187-1195	"Genets of <i>G. monostachia</i> , the species with higher recruitment, may reach the reproductive stage faster because of a higher growth rate (6 vs. 13 yr). In addition, in established genets, new asexual ramets develop and reproduce annually, whereas in <i>T. fasciculata</i> , the slower offshoot development implies at least 3 yr to disperse a new batch of seeds."

Qsn #	Question	Answer
	LLIFLE. (2023). <i>Guzmania monostachia</i> . http://www.llifle.com/Encyclopedia/BROMELIADS/Family/Bromeliaceae/28731/Guzmania_monostachia . [Accessed 27 Dec 2023]	"Propagation: When the flower spike fades (6 weeks or more after it appears), pups appear near the base of the plants. When the offsets are 7.5 cm tall, they are ready to be repotted. Be sure to provide high humidity for a month after propagating the offsets. "
607	Minimum generative time (years)	>3
	Source(s)	Notes
	LLIFLE. (2023). <i>Guzmania monostachia</i> . http://www.llifle.com/Encyclopedia/BROMELIADS/Family/Bromeliaceae/28731/Guzmania_monostachia . [Accessed 22 Dec 2023]	"Starting from the seed, 5-6 years are needed for the blossoming, whilst at least 3 years are needed by division."
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Pennington, H., Lingareddy, P., & Bodine, E. N. (2023). Modeling the Population Demographics & Viability of Imperiled <i>Guzmania monostachia</i> Populations. <i>Spora: A Journal of Biomathematics</i> , 9(1), 49-59	"Seed dispersal. The seeds of a <i>G. monostachia</i> are dispersed via wind [5, 12]. As an epiphyte, <i>G. monostachia</i> seeds must land on another plant (typically a tree) in order to germinate."
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. <i>Bishop Museum Occasional Papers</i> 107: 3-18	"Native from southern Florida to northern Brazil and Peru, where it grows epiphytically or terrestrially from near sea level to 2000 m elevation, <i>G. monostachia</i> was previously uncollected in Hawai'i, although it has probably been in cultivation (albeit, rarely used) for some time."
703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Cascante-Marin, A., De Jong, M., Borg, E. D., Oostermeijer, J. G. B., Wolf, J. H., & den Nijs, J. C. (2006). Reproductive strategies and colonizing ability of two sympatric epiphytic bromeliads in a tropical premontane area. <i>International Journal of Plant Sciences</i> , 167(6), 1187-1195	"Seed dispersal. The seeds of a <i>G. monostachia</i> are dispersed via wind [5, 12]. As an epiphyte, <i>G. monostachia</i> seeds must land on another plant (typically a tree) in order to germinate."
704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Cascante-Marin, A., De Jong, M., Borg, E. D., Oostermeijer, J. G. B., Wolf, J. H., & den Nijs, J. C. (2006). Reproductive strategies and colonizing ability of two sympatric epiphytic bromeliads in a tropical premontane area. <i>International Journal of Plant Sciences</i> , 167(6), 1187-1195	"Seed dispersal. The seeds of a <i>G. monostachia</i> are dispersed via wind [5, 12]. As an epiphyte, <i>G. monostachia</i> seeds must land on another plant (typically a tree) in order to germinate."
705	Propagules water dispersed	
	Source(s)	Notes

Qsn #	Question	Answer
	LLIFLE. (2023). <i>Guzmania monostachia</i> . http://www.llifle.com/Encyclopedia/BROMELIADS/Family/Bromeliaceae/28731/Guzmania_monostachia . [Accessed 27 Dec 2023]	"It is quite uncommon in tropical rain forests and cloud forest, but can be found in locally abundant colonies often completely covering the branches of a tree, more commonly throughout the middle to upper canopy but also rather close to the ground; will survive on the ground for a while if it falls from tree." ... "When the flower spike fades (6 weeks or more after it appears), pups appear near the base of the plants. When the offsets are 7.5 cm tall, they are ready to be repotted." [It may be possible that the wind-dispersed seeds or vegetative pups are dispersed by water in wet, terrestrial habitats]

706	Propagules bird dispersed	n
	Source(s)	Notes
	Cascante-Marin, A., De Jong, M., Borg, E. D., Oostermeijer, J. G. B., Wolf, J. H., & den Nijs, J. C. (2006). Reproductive strategies and colonizing ability of two sympatric epiphytic bromeliads in a tropical premontane area. <i>International Journal of Plant Sciences</i> , 167(6), 1187-1195	"Seed dispersal. The seeds of a <i>G. monostachia</i> are dispersed via wind [5, 12]. As an epiphyte, <i>G. monostachia</i> seeds must land on another plant (typically a tree) in order to germinate."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Acevedo-Rodríguez, P. & Strong, M.T. (2005). Monocotyledons and Gymnosperms of Puerto Rico and the Virgin Islands. <i>Contributions from the United States National Herbarium</i> 52: 1-415	"Capsule elliptic-cylindrical, 2-4 cm long, pointed; seeds with whitish comose hairs, ca. 2 cm long." [Possible that hairs could stick to clothing, fur or feathers]

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Cascante-Marin, A., De Jong, M., Borg, E. D., Oostermeijer, J. G. B., Wolf, J. H., & den Nijs, J. C. (2006). Reproductive strategies and colonizing ability of two sympatric epiphytic bromeliads in a tropical premontane area. <i>International Journal of Plant Sciences</i> , 167(6), 1187-1195	"Seed dispersal. The seeds of a <i>G. monostachia</i> are dispersed via wind [5, 12]. As an epiphyte, <i>G. monostachia</i> seeds must land on another plant (typically a tree) in order to germinate."

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Cascante-Marin, A., De Jong, M., Borg, E. D., Oostermeijer, J. G. B., Wolf, J. H., & den Nijs, J. C. (2006). Reproductive strategies and colonizing ability of two sympatric epiphytic bromeliads in a tropical premontane area. <i>International Journal of Plant Sciences</i> , 167(6), 1187-1195	"A higher and more continuous seed production in <i>G. monostachia</i> is possible because of a shorter time from flowering to seed dispersal (8-9 vs. 16-20 mo), along with the production of more flowers (29 vs. 22) and naturally pollinated fruits per inflorescence (89% vs. 79% fruit set) and more seeds per fruit (321 vs. 240). Both species showed a high occurrence of spontaneous autogamy that matched the highly selfing condition estimated using microsatellite markers. In all, <i>G. monostachia</i> displayed the reproductive traits of a pioneer species."
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. <i>Bishop Museum Occasional Papers</i> 107: 3-18	[A related species, <i>Guzmania lindenii</i> , seeds prolifically] "Mature plants in this population were heavily set with fruits, and we estimate one plant can produce greater than 30,000 seeds per inflorescence."

802	Evidence that a persistent propagule bank is formed (>1 yr)	y

Qsn #	Question	Answer
	Source(s)	Notes
	Zotz, G. (2013). A Longer Story Than Expected: Seeds Of Several Species (Tillandsioideae) Remain Viable For Up To Two Years. <i>Journal of the Bromeliad Society</i> , 63(1), 83-87	"Mature seeds of <i>Guzmania lingulata</i> , <i>Guzmania monostachia</i> , <i>Tillandsia fasciculata</i> , <i>Tillandsia flexuosa</i> , <i>Vriesea gladioliflora</i> , <i>Vriesea sanguinolenta</i> and <i>Vriesea viridifolia</i> were collected from natural populations in Panama." ... "The majority of the seven species showed no reduction in germination response after one year of storage (Fig. 1). Even in <i>V. sanguinolenta</i> , the species showing the greatest decline in germination rate after storage, an estimated 50% of all seeds successfully germinated after one year."

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species. Non-target effects may be difficult to avoid given the primarily epiphytic nature of this plant.

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	LLIFLE. (2023). <i>Guzmania monostachia</i> . http://www.llifle.com/Encyclopedia/BROMELIADS/Family/Bromeliaceae/28731/Guzmania_monostachia . [Accessed 27 Dec 2023]	[Unknown] "When the flower spike fades (6 weeks or more after it appears), pups appear near the base of the plants. When the offsets are 7.5 cm tall, they are ready to be repotted. Be sure to provide high humidity for a month after propagating the offsets."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	Unknown. Naturalized on multiple islands, with no evidence of limiting factors.

Summary of Risk Traits:

Guzmania monostachia is an epiphytic, and sometimes terrestrial bromeliad native to moist and wet forests of Southern Florida, Nicaragua to Peru, and Brazil, Bahamas, Greater Antilles, and Trinidad & Tobago. It is sometimes cultivated as an ornamental, and is now naturalized on the islands of Maui, Oahu, and Hawaii. With an ability to spread both vegetatively and by wind-dispersed seeds, and to densely colonize host trees, this plant has the potential to impact both landscaping as well as native forest communities.

High Risk / Undesirable Traits

Broad elevation range in tropical climates

Native to and able to spread in regions with tropical climates

Naturalized on Oahu, Maui, and Hawaii

A potential landscaping and environmental weed.

Shade tolerant.

Able to form dense cover on host trees, potentially weighing them down or competing with other epiphytic vegetation.

Reproduces by seeds and vegetatively.

Self-fertile

Dispersed by wind (seeds) and through intentional cultivation.

Seeds can remain viable for >1 year.

Low Risk Traits

Unarmed (no spines, thorns, or burrs)

Non-toxic

Reaches maturity in 5-6 years from seed.