

<b>Taxon:</b> <i>Guzmania lindenii</i> (André) Mez	<b>Family:</b> Bromeliaceae
<b>Common Name(s):</b>	<b>Synonym(s):</b>

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Approved	<b>End Date:</b> 20 Dec 2023
<b>WRA Score:</b> 8.0	<b>Designation:</b> H(HPWRA)	<b>Rating:</b> High Risk

**Keywords:** Epiphyte, Naturalized, Self-Fertile, Wind-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	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	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
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

Qsn #	Question	Answer Option	Answer
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		
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)		
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 <sup>2</sup> )	y = 1, n = -1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)		
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
	<b>Source(s)</b>	<b>Notes</b>
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). Flora Neotropica, 14(2), 663-1492	No evidence

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

103	Does the species have weedy races?	
	<b>Source(s)</b>	<b>Notes</b>
	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
	<b>Source(s)</b>	<b>Notes</b>
	Riffle, R.L. (1998). The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	"native to the Andean regions of northern and central Peru at elevations of well over a mile."
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). Flora Neotropica, 14(2), 663-1492	"northern Peru."

202	Quality of climate match data	High
	<b>Source(s)</b>	<b>Notes</b>
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). Flora Neotropica, 14(2), 663-1492	"northern Peru."

203	Broad climate suitability (environmental versatility)	n
	<b>Source(s)</b>	<b>Notes</b>
	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	"Guzmnias are intolerant of lower temperatures, which is a problem only at higher elevations in Hawai'i."
	KewScience. (2023). Plants of the World Online - <i>Guzmania lindenii</i> . <a href="http://powo.science.kew.org">http://powo.science.kew.org</a> . [Accessed 14 Dec 2023]	"The native range of this species is Peru. It is an epiphyte and grows primarily in the wet tropical biome."

Qsn #	Question	Answer
204	Native or naturalized in regions with tropical or subtropical climates	y
	<b>Source(s)</b>	<b>Notes</b>
	Riffle, R.L. (1998). The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	"native to the Andean regions of northern and central Peru at elevations of well over a mile."
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	[Oahu] "Originally located by the Hawaiian Trail and Mountain Club during a scheduled hike on the Bowman Trail (Kalihi Valley), G. lindenii was noted in only one population near the summit ridge at ca 800 m elevation, within about a 20 m radius, in lowland wet 'ōhi'a forest. over 150 plants of all size classes were observed, mostly growing epiphytically, occasionally forming dense coverings on tree branches."

205	Does the species have a history of repeated introductions outside its natural range?	n
	<b>Source(s)</b>	<b>Notes</b>
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	"A native of northern Peru, where it grows as a low epiphyte but also terrestrially in shady wet forest between 1000-1500 m elevation, G. lindenii is rare in cultivation and in the wild. It is not known to be naturalized anywhere else in the world."
	Riffle, R.L. (1998). The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	No evidence

301	Naturalized beyond native range	y
	<b>Source(s)</b>	<b>Notes</b>

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 lindenii</i> (André) Mez New state record A native of northern Peru, where it grows as a low epiphyte but also terrestrially in shady wet forest between 1000-1500 m elevation. <i>G. lindenii</i> is rare in cultivation and in the wild. It is not known to be naturalized anywhere else in the world. It is highly sought after by bromeliad enthusiasts, and notoriously difficult to grow (H. Luther, pers. comm., 2008), possibly due to a poor habitat match in most home gardens compared to the species' native habitat. This species grows to ca 1 m tall (3.00-4.35 m when flowering) and is most easily recognized by its spineless, 70 cm long, 7-8 cm wide linear leaves, which are reddish at the base, green toward the apex, and are crossbanded with irregular greenish lines. The scape is stout and erect, and its bracts are imbricate and patterned as the leaves. The inflorescence is compound, 2.00-3.35 m tall, tripinnate at base and bipinnate above, the axes green, striate, and glabrous. The petals are white, the tube exceeding the sepals, the stamens shorter than the petals but exerted from the tube (Smith & Downs 1977). The fruit is a capsule, containing small seeds with a brown plumose appendage, which are easily wind dispersed. 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 'ohi'a 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. Material examined. O'AHU: Kalihi Valley, Bowman Trail, 240 m from Pu'u Kahua'uli (UTM 621803, 2365128), 2.5 m tall bromeliad growing near soil level, area dominated by 3-4 m tall <i>Metrosideros polymorpha</i> , trees loaded with native mosses, ferns, and liverworts, 800 m, 9 Nov 2008, A. Lau & C. Imada 2008110902."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Murphy, M. (2023). BIISC Plant Pono Specialist - Invasive Plant Prevention. personal communication. 09 Nov	[Possibly. A related species is a 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

304	Environmental 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	[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 'ōhi'a 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 mothor 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."

305	Congeneric 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.)"
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	[Sparingly naturalized. No impacts reported at time of publication, but see Murphy (2023). pers. comm.] " <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."
	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. <a href="https://www.cabidigitallibrary.org/product/qi">https://www.cabidigitallibrary.org/product/qi</a> . [Accessed 15 Dec 2023]	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	Notes

Qsn #	Question	Answer
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). Flora Neotropica, 14(2), 663-1492	[No evidence] "Plant stemless, flowering 3-4.35 m high. Leaves 20-30 in a dense rosette, erect to decurved, to 7 dm long, dark green toward apex, reddish brown toward base, crossbanded with bundles of fine irregular dark lines; sheaths elliptic-ovate, densely punctulate-lepidote; blades linear, acute, 7-8 cm wide. Scape erect, to 1 m high, exceeding the leaves, very stout; scape-bracts erect, densely imbricate, ovate, triangular-acute, finely cross-banded. Inflorescence tripinnate at base, elsewhere bipinnate, slender, interrupted, 2-3.35 m long; axes green, striate, glabrous; primary bracts broadly triangular or elliptic with triangular apices, erect or suberect, distinctly shorter than the branches, even, green, finely banded; branches not over 10 cm long with one few spikes; spikes ovoid or ellipsoid, strobilate, to 6 cm long, long-stipitate. Floral bracts very broadly ovate or elliptic, rounded, equaling the sepals, green; flowers sessile, 20 mm long, glabrous. Sepals free, elliptic, acute, 13 mm long; petals white, the tube exceeding the sepals, blades spreading to reflexed, lanceolate, acute; stamens shorter than the petals but exerted from the tube."

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

403	Parasitic	n
	Source(s)	Notes
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). Flora Neotropica, 14(2), 663-1492	"Stemless or rarely caulescent herbs." [No evidence. Genus description]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Simmen, B., & Sabatier, D. (1996). Diets of some French Guianan primates: food composition and food choices. International Journal of Primatology, 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). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence of toxicity in genus

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	Unknown. Limited information on cultivation of this species.

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

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 of toxicity in genus

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Riffle, R.L. (1998). The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	[Does not occur in hot climates] "It grows to 5 feet or more in height and is comparable in beauty to <i>G. bismarckii</i> but, alas, does not like hot climates."
	Imada, C., Clifford, P. & Lau, J. (2011). 2010 Rare Plant Survey, O'ahu Forest National Wildlife Refuge, Waipi'o, O'ahu. Bishop Museum Technical Report 55. Honolulu, HI	[No evidence. In wet habitat] "In 2008, <i>Guzmania lindenii</i> , an epiphytic bromeliad native to northern Peru, was noted on the wet Ko'olau summit ridge above Kalihi Valley at 800 meters elevation, festooning 3-4 meter tall, moss-and-liverwort-covered <i>Metrosideros polymorpha</i> trees in a 20 meter radius (Frohlich & Lau 2010). The wet forest epiphyte niche has not yet been much filled by alien plant species; field crews need to be mindful to monitor this potential habitat."
	Cloud Jungle Epiphytes. (2008). <i>Guzmania lindenii</i> . <a href="http://www.cloudjungle.com/epibook/Canistrum.html">http://www.cloudjungle.com/epibook/Canistrum.html</a> . [Accessed 15 Dec 2023]	[No evidence. Unlikely given wet habitat] "An open rosette is produced by this plant. It grows to about 1-metre (40-inches) high. Moreover, the bright green foliage has wavy cross lines of dark green. Underneath the leaf is red. When mature it displays an inflorescence with green bracts, and white flowers. We can grow this species in a shady, cool to warm atmosphere. Always try to keep the atmosphere moist. In its natural habitat it grows in the ground, and on trees in dense subtropical rainforests. We can find this species in northern, and central Peru, growing at an altitude of 2,300-metres (7,550-feet)." [Archived website accessed using The Wayback Machine]

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Gouda, E. J. (2019). <i>Guzmania bismarckii</i> Rauh vs. <i>Guzmania lindenii</i> (André) Mez. <i>Journal of the Bromeliad Society</i> , 69(3), 117-123	"Most of the vegetation is removed by farmers to let their cattle graze and you can see plants of <i>Guzmania lindenii</i> growing terrestrially, suffer in the full sun (fig. 3), with the leaves becoming yellowish. The plants between the shrubs and small trees are looking well, much darker green." [See "Fig. 3. <i>Guzmania lindenii</i> suffer in the full sun colouring yellowish and showing its natural habitat in the background. Photo by Eric Gouda."]
	Imada, C., Clifford, P. & Lau, J. (2011). 2010 Rare Plant Survey, O'ahu Forest National Wildlife Refuge, Waipi'o, O'ahu. Bishop Museum Technical Report 55. Honolulu, HI	[Cloudy habitat] "In 2008, <i>Guzmania lindenii</i> , an epiphytic bromeliad native to northern Peru, was noted on the wet Ko'olau summit ridge above Kalihi Valley at 800 meters elevation, festooning 3-4 meter tall, moss-and-liverwort-covered <i>Metrosideros polymorpha</i> trees in a 20 meter radius (Frohlich & Lau 2010). The wet forest epiphyte niche has not yet been much filled by alien plant species; field crews need to be mindful to monitor this potential habitat."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	Notes
	Botanical-online. (2023). <i>Guzmania</i> Cultivation. <a href="https://www.botanical-online.com/en/cultivation/guzmania-how-to-grow">https://www.botanical-online.com/en/cultivation/guzmania-how-to-grow</a> . [Accessed 15 Dec 2023]	"It prefers a peaty, acid soil. It doesn't like lime. A mixture of garden soil, peat and sand would be the ideal one."
	Backyard Gardener. (2023). <i>Guzmania</i> ( <i>Guzmania</i> ). <a href="https://www.backyardgardener.com/plantname/guzmania-guzmania/">https://www.backyardgardener.com/plantname/guzmania-guzmania/</a> . [Accessed 15 Dec 2023]	"pH Range: 5.5 to 7 Soil Range: Potting Soil to Potting Soil Water Range: Normal to Moist"



Qsn #	Question	Answer
411	Climbing or smothering growth habit	y
	<b>Source(s)</b>	<b>Notes</b>
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	[Smothering epiphytic habit] "Over 150 plants of all size classes were observed, mostly growing epiphytically, occasionally forming dense coverings on tree branches."
412	Forms dense thickets	n
	<b>Source(s)</b>	<b>Notes</b>
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	[Primarily epiphytic] "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."
501	Aquatic	n
	<b>Source(s)</b>	<b>Notes</b>
	Flora of North America Editorial Committee. (1993). Flora of North America: Volume 22: Magnoliophyta: Alismatidae, Arecidae, Commelinidae(in Part), and Zingiberidae. Oxford University Press, Oxford, UK	"Herbs, usually epiphytic, stemless to rarely caulescent" [Genus description]
502	Grass	n
	<b>Source(s)</b>	<b>Notes</b>
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). Flora Neotropica, 14(2), 663-1492	Tillandsioideae (Bromeliaceae)
503	Nitrogen fixing woody plant	n
	<b>Source(s)</b>	<b>Notes</b>
	Flora of North America Editorial Committee. (1993). Flora of North America: Volume 22: Magnoliophyta: Alismatidae, Arecidae, Commelinidae(in Part), and Zingiberidae. Oxford University Press, Oxford, UK	Tillandsioideae (Bromeliaceae)
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	<b>Source(s)</b>	<b>Notes</b>
	Flora of North America Editorial Committee. (1993). Flora of North America: Volume 22: Magnoliophyta: Alismatidae, Arecidae, Commelinidae(in Part), and Zingiberidae. Oxford University Press, Oxford, UK	[Genus description] "Herbs, usually epiphytic, stemless to rarely caulescent. Leaves many-ranked, usually ligulate, margins entire. Inflorescences 5--many-flowered, many-ranked, mostly 2-pinnate to less commonly single spike, flowers laxly to densely arranged; floral bracts broad, conspicuous, mostly obscuring rachis. Flowers bisexual; sepals distinct to connate over 1/2 length, usually symmetric; petals with claws adherent to subconnate petal, forming short tube, blade distinct; stamens usually included, adherent to adnate with petal claws; ovary superior. Capsules cylindric, dehiscent. Seeds with basal, usually tan-brown plumose appendage"
601	Evidence of substantial reproductive failure in native habitat	

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. (2023). Personal Communication	Unknown. Limited information on this species from within its native range.
602	<b>Produces viable seed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	"Mature plants in this population were heavily set with fruits, and we estimate one plant can produce greater than 30,000 seeds per inflorescence."
603	<b>Hybridizes naturally</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Smith, L. B., & Downs, R. J. (1977). Tillandsioideae (Bromeliaceae). Flora Neotropica, 14(2), 663-1492	Unknown. No evidence found
604	<b>Self-compatible or apomictic</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	"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)."
	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	"Vriesea and Werauhia species are capable of inbreeding and numerous <i>Guzmania</i> species are self-pollinated."
605	<b>Requires specialist pollinators</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	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	"numerous <i>Guzmania</i> species are self-pollinated."
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	"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)."

Qsn #	Question	Answer
606	Reproduction by vegetative fragmentation	y
	<b>Source(s)</b>	<b>Notes</b>
	Joy Us Garden. (2023). <i>Guzmania Bromeliad: Care Tips For This Jazzy Blooming Plant.</i> <a href="https://www.joyusgarden.com/guzmania-bromeliad-plant-care-tips/">https://www.joyusgarden.com/guzmania-bromeliad-plant-care-tips/</a> . [Accessed 20 Dec 2023]	"It doesn't die immediately when the flower stalk starts turning brown; it's a slow process. But don't worry, pups appear at the base, and the mother plant lives on. You can either leave them on or transplant them if you wish."
	Botanical-online. (2023). <i>Guzmania Cultivation.</i> <a href="https://www.botanical-online.com/en/cultivation/guzmania-how-to-grow/">https://www.botanical-online.com/en/cultivation/guzmania-how-to-grow/</a> . [Accessed 20 Dec 2023]	"This plant can be reproduced from new shoots springing from the base of an adult plant . To do this, we will carefully separate the new offspring below the roots that kept it to the main plant and we will plant it in a new pot. It is necessary to maintain it in a warm place and to provide the necessary humidity . After some days, it will have been acclimatized and we will possess a new guzmania sample. This method becomes necessary to perpetuate the species when a plant has definitively flourished and it will begin to dry off in short."

607	Minimum generative time (years)	3
	<b>Source(s)</b>	<b>Notes</b>
	Joy Us Garden. (2023). <i>Guzmania Bromeliad: Care Tips For This Jazzy Blooming Plant.</i> <a href="https://www.joyusgarden.com/guzmania-bromeliad-plant-care-tips/">https://www.joyusgarden.com/guzmania-bromeliad-plant-care-tips/</a> . [Accessed 20 Dec 2023]	[Estimated to be 3+ years] "How long does a guzmania bromeliad live? It takes a bromeliad 3-6 years to flower. After flowering, the plant eventually dies. So, I'd estimate the lifespan to be anywhere from four years to seven years. If you buy a guzmania in flower, it could last four months to nine months. "

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	<b>Source(s)</b>	<b>Notes</b>
	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	"Fruit a dehiscent capsule. Seeds with straight basal tuft of hairs" [Possible that hairs may stick to clothing, fur or feathers, but unlikely vector given epiphytic habit]

702	Propagules dispersed intentionally by people	y
	<b>Source(s)</b>	<b>Notes</b>
	Frohlich, D. & Lau, A. (2010). <i>New plant records from O'ahu for 2008.</i> Bishop Museum Occasional Papers 107: 3 -18	"It is highly sought after by bromeliad enthusiasts, and notoriously difficult to grow (H. Luther, pers. comm., 2008), possibly due to a poor habitat match in most home gardens compared to the species' native habitat."

703	Propagules likely to disperse as a produce contaminant	n
	<b>Source(s)</b>	<b>Notes</b>
	Frohlich, D. & Lau, A. (2010). <i>New plant records from O'ahu for 2008.</i> Bishop Museum Occasional Papers 107: 3 -18	"The fruit is a capsule, containing small seeds with a brown plumose appendage, which are easily wind dispersed."
	Kubitzki, K. (ed.). (1998). <i>The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae).</i> Springer-Verlag, Berlin, Heidelberg, New York	"Wind-borne seeds prevail in Pitcairnioideae and are obligatory for Tillandsioideae, both with capsular fruits."

704	Propagules adapted to wind dispersal	y
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	"The fruit is a capsule, containing small seeds with a brown plumose appendage, which are easily wind dispersed."
	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	"Wind-borne seeds prevail in Pitcairnioideae and are obligatory for Tillandsioideae, both with capsular fruits."

705	Propagules water dispersed	
	Source(s)	Notes
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	"A native of northern Peru, where it grows as a low epiphyte but also terrestrially in shady wet forest between 1000-1500 m elevation" ... "The fruit is a capsule, containing small seeds with a brown plumose appendage, which are easily wind dispersed." [It may be possible that the wind-dispersed seeds are dispersed by water in wet, terrestrial habitats]

706	Propagules bird dispersed	n
	Source(s)	Notes
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	"The fruit is a capsule, containing small seeds with a brown plumose appendage, which are easily wind dispersed."

707	Propagules dispersed by other animals (externally)	
	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	"Fruit a dehiscent capsule. Seeds with straight basal tuft of hairs" [Possible that hairs could stick to clothing, fur or feathers]

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	"The fruit is a capsule, containing small seeds with a brown plumose appendage, which are easily wind dispersed."

801	Prolific seed production (>1000/m <sup>2</sup> )	y
	Source(s)	Notes
	Frohlich, D. & Lau, A. (2010). New plant records from O'ahu for 2008. Bishop Museum Occasional Papers 107: 3-18	"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)	
	Source(s)	Notes

Qsn #	Question	Answer
	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	[Unknown. Other species in genus remain viable for >1 year] "Mature seeds of <i>Guzmania lingulata</i> , <i>Guzmania monostachia</i> , <i>Tillandsia fasciculata</i> , <i>Tillandsia flexuosa</i> , <i>Vriesea gladiiflora</i> , <i>Vriesea sanguinolenta</i> and <i>Vriesea viridiflora</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
	WRA Specialist. (2023). Personal Communication	Unknown

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2023). Personal Communication	Unknown

**Summary of Risk Traits:**

*Guzmania lindenii* is an epiphytic, and sometimes terrestrial bromeliad native to shady, wet forests of Peru, from elevations of 1000-1500 m (3280-4920 feet). Although rare in cultivation, it is prized by bromeliad enthusiasts, and was discovered to be naturalized in native forest in Kalihi Valley, Oahu. 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

- Native to and able to spread in regions with tropical climates
- Naturalized on Oahu.
- 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.
- Prolific seed production (ca. 30,000/inflorescence)

Low Risk Traits

- Unarmed (no spines, thorns, or burrs)
- Non-toxic