

Taxon: <i>Heliconia rostrata</i> Ruiz & Pav.	Family: Heliconiaceae
Common Name(s): false bird of paradise hanging lobster claw	Synonym(s): <i>Bihai poeppigiana</i> (Eichler ex <i>Bihai rostrata</i> (Ruiz & Pav.) Griggs <i>Heliconia poeppigiana</i> Eichler ex

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 27 Aug 2020
WRA Score: 4.0	Designation: L	Rating: Low Risk

Keywords: Tropical Herb, Possibly Naturalized, Rhizomatous, Bird-Pollinated, Bird-Dispersed

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

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	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	y
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	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m2)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
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
	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	[No evidence of domestication] "General distribution: Venezuela, Colombia, Ecuador, Peru and Bolivia; widely cultivated elsewhere because of its handsome inflorescences."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2020). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2020). 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
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 26 Aug 2020]	"Native Southern America CENTRAL AMERICA: Belize, Guatemala, Honduras, Panama BRAZIL: Brazil WESTERN SOUTH AMERICA: Bolivia, Colombia, Ecuador, Peru"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed]	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Dave's Garden. (2020). Crab Claws, False Bird of Paradise, Hanging Claw - <i>Heliconia rostrata</i> . https://davesgarden.com/guides/pf/go/55673/ . [Accessed 27 Aug 2020]	"Hardiness: USDA Zone 10a: to -1.1 °C (30 °F) USDA Zone 10b: to 1.7 °C (35 °F) USDA Zone 11: above 4.5 °C (40 °F)"
	Tropicos.org. (2020). Missouri Botanical Garden. http://www.tropicos.org/ . [Accessed 27 Aug 2020]	Collected from 5 m - 1700 m elevation, but primarily at latitudes near the equator [91% of specimens collected below 500 m elevation]

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 26 Aug 2020]	"Native Southern America CENTRAL AMERICA: Belize, Guatemala, Honduras, Panama BRAZIL: Brazil WESTERN SOUTH AMERICA: Bolivia, Colombia, Ecuador, Peru"
	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	[Possibly naturalized or persisting in Puerto Rico] "General distribution: Venezuela, Colombia, Ecuador, Peru and Bolivia; widely cultivated elsewhere because of its handsome inflorescences. Distribution in Puerto Rico: Recorded from Río Grande, in the Caribbean National Forest, Sierra de Luquillo, from a roadside collection, perhaps planted or persistent after cultivation."
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

205	Does the species have a history of repeated introductions outside its natural range?	y
	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	"General distribution: Venezuela, Colombia, Ecuador, Peru and Bolivia; widely cultivated elsewhere because of its handsome inflorescences."
	Whistler, W.A. 2000. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"It is one of the more commonly cultivated of the large heliconias and has pendulous rather than erect inflorescences."

301	Naturalized beyond native range	
	Source(s)	Notes
	Gargiullo, M.B., Magnuson, B.L & Kimball, L.D. 2008. A Field Guide to Plants of Costa Rica. Oxford University Press US, New York, NY	"Habitat: Garden plant, widely cultivated, apparently not escaping from cultivation."

Qsn #	Question	Answer
	Chong, K.Y., Tan, H.T.W. & Corlett, R.T. 2009. A Checklist of the Total Vascular Plant Flora of Singapore: Native, Naturalized and Cultivated Species. Raffles Museum of Biodiversity Research, National University of Singapore, Singapore	" <i>Heliconia rostrata</i> Ruiz & Pav.; Heliconiaceae; cultivated only"
	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	[Possibly naturalized or persisting in Puerto Rico] "General distribution: Venezuela, Colombia, Ecuador, Peru and Bolivia; widely cultivated elsewhere because of its handsome inflorescences. Distribution in Puerto Rico: Recorded from Río Grande, in the Caribbean National Forest, Sierra de Luquillo, from a roadside collection, perhaps planted or persistent after cultivation."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Possibly naturalized. Unable to confirm] "References: Belize-N-850, United States of America-N-101, United States of America- C-1329, Global-CD-1611, El Salvador-N- 1849, India-W-1977."
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Gilman, E.F. & Meerow, A. (1999). <i>Heliconia rostrata</i> Lobster Claw. FPS248. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. http://edis.ifas.ufl.edu . [Accessed 27 Aug 2020]	"Invasive potential: not known to be invasive" [Earlier publication by Morton (1976) suggested the plant might be invasive]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[No confirmed evidence] "References: Belize-N-850, United States of America-N-101, United States of America- C-1329, Global-CD-1611, El Salvador-N- 1849, India-W-1977."

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	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

305	Congeneric weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	CABI. (2020). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"H. bihai is a perennial rhizomatous herb adapted to growth in a wide variety of habitats and which often escapes from gardens and yards (where it has been introduced as an ornamental) into adjacent natural areas (Shenk, 1983; Andersson, 1998; Kress and Whittemore, 2000). Additionally, H. bihai often grows as a pioneer species in waste ground, forest gaps, disturbed secondary forests, and along roadsides, suggesting that this species has the potential to spread much further than it has to date both outside and inside its native distribution range (Acevedo Rodríguez and Strong, 2005; Every, 2013). H. bihai spreads sexually by seeds and vegetatively by rhizomes and it is able to develop monospecific stands which may prevent the establishment of other plant species (Andersson, 1998; Wagner et al., 1999; Acevedo-Rodríguez and Strong, 2005)."
	Argel, M., Pedro, J., Villegas, C., & Doll, J. D. (1977). Control químico de tacana (<i>Heliconia bihai</i>) en potreros. Revista COMALFI 1: 32-44	<i>Heliconia bihai</i> is considered a weed and subjected to control

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Missouri Botanical Garden. (1945). Flora of Panama. Part III. Fascicle I. Annals of the Missouri Botanical Garden, 32 (1): 1-105	[No evidence] "Stout plants 3-5 m. tall; leaves broadly oblong, 45-150 cm. long, 15-40 cm. broad, broadly obtuse at the base; inflorescences pendulous, the peduncle stout, 30-90 cm. long, rather inconspicuously puberulent, the rachis flexuous; bracts very broadly ovate, obtuse to broadly acute at the tip, broadest and somewhat cordate slightly below the middle, obtusely narrowed to the base, 4-9 cm. long, 4-8 cm. broad, minutely puberulent, deep crimson, strongly reflexed at anthesis; perianth 3-4 cm. long, greenish-yellow; fruits broadly trigonal, 1 cm. long, purplish-blue."

402	Allelopathic	n
	Source(s)	Notes
	WRA Specialist. (2020). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Missouri Botanical Garden. (1945). Flora of Panama. Part III. Fascicle I. Annals of the Missouri Botanical Garden, 32 (1): 1-105	"Stout plants 3-5 m. tall; leaves broadly oblong, 45-150 cm. long, 15-40 cm. broad, broadly obtuse at the base;" [Heliconiaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Southern Living. (2020). Lobster Claw, False Bird-of-Paradise. http://www.southernliving.com/plants/lobster-claw-false-bird-of-paradise . [Accessed 27 Aug 2020]	"Deer don't seem to care for them." [Possibly unpalatable]

405	Toxic to animals	n
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Qsn #	Question	Answer
	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

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Gilman, E.F. & Meerow, A. (1999). <i>Heliconia rostrata</i> Lobster Claw. FPS248. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. http://edis.ifas.ufl.edu . [Accessed 27 Aug 2020]	"Pests and Diseases None are usually serious. This plant may be bothered by <i>Cercospora</i> and <i>Helminthosporium</i> leaf spots. Scales and nematodes may also cause problems."
	Sewake, K. T., & Uchida, J. Y. (1995). Diseases of <i>Heliconia</i> in Hawaii. Research Extension Series 159. Hawaii Institute of Tropical Agriculture and Human Resources, Honolulu, HI	[Bacteria pathogen found in a wide range of hosts] " <i>Pseudomonas solanacearum</i> survives in plant parts and many weed hosts." ... "In Hawaii, <i>Pseudomonas solanacearum</i> has been identified on <i>H. psittacorum</i> and <i>H. rostrata</i> (Ferreira et al. 1991)."
	CABI. (2020). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[<i>Heliconia rostrata</i>] "Wild host of: <i>Fusarium oxysporum</i> f.sp. <i>cubense</i> (Panama disease of banana); <i>Raoiella indica</i> (red palm mite) Associated with (not a host): <i>Meloidogyne javanica</i> (sugarcane eelworm)"

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Standley, P.C. & Steyermark., J.A. (1952). Flora of Guatemala. Fieldiana, Botany. Volume 24, Part III: 1-432	"Wet forest or thickets, 600-1,400 meters" [No evidence. Herbaceous plant of wet habitats]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Whistler, W.A. 2000. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"Fertile, moist, but well-drained soils in sunny or partially shaded places are preferred."

Qsn #	Question	Answer
	Gilman, E.F. & Meerow, A. (1999). <i>Heliconia rostrata</i> Lobster Claw. FPS248. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. http://edis.ifas.ufl.edu . [Accessed 27 Aug 2020]	""Light requirement: plant grows in part shade/part sun"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Gilman, E.F. & Meerow, A. (1999). <i>Heliconia rostrata</i> Lobster Claw. FPS248. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. http://edis.ifas.ufl.edu . [Accessed 27 Aug 2020]	"Soil tolerances: acidic; alkaline; sand; loam; clay"
	Shoot Gardening. (2020). <i>Heliconia rostrata</i> (Hanging lobster claw). https://www.shootgardening.co.uk/plant/heliconia-rostrata . [Accessed 27 Aug 2020]	"Soil type - Loamy, Sandy Soil drainage - Moist but well-drained, Well-drained Soil pH - Acid, Neutral"

411	Climbing or smothering growth habit	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	"Erect herb usually 3-5 m tall; leafy shoots in groups of 8 to 29; pseudostem green, glabrous, 1.25-2 m tall, 3.4-4.5 cm thick; leaves 6 to 19 per shoot; petioles 20-30 × 1.1-1.4 cm; blades oblong, the longest 100-125 × 15-28 cm, the apex acute to acuminate, the base usually truncate, the surfaces green and glabrous."

412	Forms dense thickets	
	Source(s)	Notes
	Morton, J.F. 1976. Pestiferous spread of many ornamental and fruit species in South Florida. Proceedings of the Florida State Horticultural Society 89: 348-353	" <i>Heliconia rostrata</i> Ruiz & Pavon. PLATANILLO. Central America to Peru and Brazil. Suckers profusely; forms extensive patches."
	Missouri Botanical Garden. (1945). Flora of Panama. Part III. Fascicle I. Annals of the Missouri Botanical Garden, 32 (1): 1-105	"Nicaragua to Peru, in lowland forest and thickets."
	Standley, P.C. & Steyermark., J.A. (1952). Flora of Guatemala. Fieldiana, Botany. Volume 24, Part III:1-432	"Wet forest or thickets" [A component of thicket vegetation, although other references suggest it may form extensive, and perhaps monotypic cover]

501	Aquatic	n
	Source(s)	Notes
	Missouri Botanical Garden. (1945). Flora of Panama. Part III. Fascicle I. Annals of the Missouri Botanical Garden, 32 (1): 1-105	"Stout plants 3-5 m. tall ... Nicaragua to Peru, in lowland forest and thickets." [Terrestrial]

502	Grass	n
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Qsn #	Question	Answer
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 26 Aug 2020]	Family: Heliconiaceae Alternate family(ies): Strelitziaceae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 26 Aug 2020]	Family: Heliconiaceae Alternate family(ies): Strelitziaceae

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	"Large perennial rhizomatous herbs with erect pseudostems and distichous, petiolate leaves with broad simple blades."

601	Evidence of substantial reproductive failure in native habitat	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	[No evidence] "General distribution: Venezuela, Colombia, Ecuador, Peru and Bolivia; widely cultivated elsewhere because of its handsome inflorescences."

602	Produces viable seed	y
	Source(s)	Notes
	Whistler, W.A. 2000. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"FRUIT a one- to three-seeded drupe, infrequently formed in cultivation."
	Shoot Gardening. (2020). <i>Heliconia rostrata</i> (Hanging lobster claw). https://www.shootgardening.co.uk/plant/heliconia-rostrata . [Accessed 27 Aug 2020]	"Propagation - Sow seed at 19-24C in spring. Divide rhizomes, including offsets, in spring. Propagation methods - Seed, Division"

603	Hybridizes naturally	
	Source(s)	Notes

Qsn #	Question	Answer
	Hapsari, L., Trimanto, T., & Wahyudi, D. (2019). Species diversity and phylogenetic analysis of <i>Heliconia</i> spp. collections of Purwodadi Botanic Garden (East Java, Indonesia) inferred by rbcL gene sequences. <i>Biodiversitas</i> , 20(5), 1266-1283	[Unknown. Hybrids documented in genus] "The broad diversity of <i>Heliconia</i> species, varieties, hybrids, and cultivars has caused confusion and uncertainty regarding the correct denomination of the species triggering problems at technical/scientific levels also commercial (Kumar et al. 1998; Sultana and Hasan 2008; Isaza et al. 2012)."
	Isaza, L., Marulanda, M. L., & López, A. M. (2012). Genetic diversity and molecular characterization of several <i>Heliconia</i> species in Colombia. <i>Genetics and Molecular Research</i> 11(4): 4552-4563	[Unknown. Hybrids documented in genus] "The existence of interspecific hybrids, such as <i>H. caribaea</i> x <i>H. bihai</i> , can be determined by the fact that hummingbirds are the sole pollinators of heliconias in the Americas, influencing the hybridization phenomenon between heliconias."

604	Self-compatible or apomictic	
	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	"Both self-compatibility and self-incompatibility have been demonstrated in <i>Heliconia</i> (Kress 1983a,b, 1985b). Of the species examined, the majority was found to be self-compatible."
	Janeček, Š., Chmel, K., Uceda Gómez, G., Janečková, P., Chmelová, E., Sejfová, Z., & Luma Ewome, F. (2020). Ecological fitting is a sufficient driver of tight interactions between sunbirds and ornithophilous plants. <i>Ecology and Evolution</i> , 10(4), 1784-1793	"Most of the <i>Heliconia</i> species seem to be self-compatible (Kress, 1983) as was shown also for <i>H. latispatha</i> (Kress, 1983) and <i>H. bihai</i> (Meléndez-Ackerman, Rojas-Sandoval, & Planas, 2008)."
	Shashank, K. D. 2011. Variability studies in seedlings of <i>Heliconia</i> . MSc Thesis. Kerala Agricultural University, Kerala, India	"Most species of <i>Heliconia</i> that have been tested so far are self-compatible; that is, a flower will produce seed following self-pollination. Seed set by transfer of pollen by pollinator is also seen (Berry and Kress, 1991). According to them small bird like the humming bird and some ants act as pollinating agents."

605	Requires specialist pollinators	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	"New World <i>Heliconia</i> are pollinated by hummingbirds (Linhart 1973; Stiles 1975, 1979; Kress 1985a)."
	Janeček, Š., Chmel, K., Uceda Gómez, G., Janečková, P., Chmelová, E., Sejfová, Z., & Luma Ewome, F. (2020). Ecological fitting is a sufficient driver of tight interactions between sunbirds and ornithophilous plants. <i>Ecology and Evolution</i> , 10(4), 1784-1793	[Pollinated by hummingbirds and perhaps sunbirds] "Studied plant species were visited by three sunbird species: <i>Cinnyris chloropygius</i> , <i>Cyanomitra olivacea</i> , and <i>Cyanomitra oritis</i> ." ... "We were surprised how <i>H. rostrata</i> , which is pollinated by hovering hummingbirds (Iles et al., 2017), is able to precisely place pollen on the heads of perching <i>C. olivacea</i> and <i>C. oritis</i> "

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Morton, J.F. 1976. Pestiferous spread of many ornamental and fruit species in South Florida. <i>Proceedings of the Florida State Horticultural Society</i> 89: 348-353	" <i>Heliconia rostrata</i> Ruiz & Pavon. PLATANILLO. Central America to Peru and Brazil. Suckers profusely; forms extensive patches."

Qsn #	Question	Answer
	Shoot Gardening. (2020). <i>Heliconia rostrata</i> (Hanging lobster claw). https://www.shootgardening.co.uk/plant/heliconia-rostrata . [Accessed 27 Aug 2020]	"Propagation - Sow seed at 19-24C in spring. Divide rhizomes, including offsets, in spring."

607	Minimum generative time (years)	2
	Source(s)	Notes
	Moore, S. (2020). <i>Heliconia</i> Growth. Home Guides SF Gate, https://homeguides.sfgate.com/heliconia-growth-80168.html . [Accessed 27 Aug 2020]	"Flowers develop of plants once they reach maturity, about 2 years of age, and continue to flower thereafter in the spring and summer."
	Exotic Tropical Plants. 2017. <i>Heliconia</i> Information Page. http://members.iinet.net.au/~meckms/Heliconia%20Information%20Page.html . [Accessed 27 Aug 2020]	"Growing speed-heliconias are fairly quick growers if given plenty of good rich soil and fertilizer. Most of the larger species will take 12-24 months to flower when grown from a rhizome." [Time required to flowering after rhizome planting, reproduction by seed must be longer - minimum estimate is given for a rhizomatous perennial herb]
	Gilman, E.F. & Meerow, A. (1999). <i>Heliconia rostrata</i> Lobster Claw. FPS248. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. http://edis.ifas.ufl.edu . [Accessed 27 Aug 2020]	"Growth rate: fast"

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	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	"Fruit a capsule or drupe-like, separating into 3 cocci or dehiscent, usually blue or black. Seeds stony, grayish, without an aril." [Generic description. No evidence. Fruits & seeds lack means of external attachment]

702	Propagules dispersed intentionally by people	y
	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	"General distribution: Venezuela, Colombia, Ecuador, Peru and Bolivia; widely cultivated elsewhere because of its handsome inflorescences."
	Whistler, W.A. 2000. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"It is one of the more commonly cultivated of the large heliconias and has pendulous rather than erect inflorescences."

Qsn #	Question	Answer
703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Whistler, W.A. 2000. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"FRUIT a one- to three-seeded drupe, infrequently formed in cultivation." [Limited seed production would limit potential for any contamination of other potted plants]
	WRA Specialist. (2020). Personal Communication	Not a food crop. Commercial propagation in Heliconias is mostly by rhizomes and not seeds; stems used in floral arrangements do not contain seeds and do not root.

704	Propagules adapted to wind dispersal	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	"Ripe fruits blue, 9- 12 mm long, 5-8 mm in diam."
	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	"The fleshy drupes of Heliconia are dispersed by birds in the neotropics and a wide variety of birds have been reported (Stiles 1979) to feed on them."

705	Propagules water dispersed	
	Source(s)	Notes
	Hapsari, L., Trimanto, T., & Wahyudi, D. (2019). Species diversity and phylogenetic analysis of <i>Heliconia</i> spp. collections of Purwodadi Botanic Garden (East Java, Indonesia) inferred by rbcL gene sequences. Biodiversitas, 20(5), 1266-1283	"Habitat. The species frequently found at low elevation, along seasonally flooded river banks." [Although adapted for bird dispersal, rhizome fragments or seeds could potentially be moved by water in riparian habitat]

706	Propagules bird dispersed	y
	Source(s)	Notes
	Link, A. & Stevenson, P.R. (2004). Fruit dispersal syndromes in animal disseminated plants at Tinigua National Park, Colombia. Revista Chilena de Historia Natural 77: 319-334	"APPENDIX 1 Animal dispersed plant species in Tinigua National Park, that were included in the analyses of dispersal syndromes." [Includes <i>Heliconia rostrata</i>]
	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	"The fleshy drupes of Heliconia are dispersed by birds in the neotropics and a wide variety of birds have been reported (Stiles 1979) to feed on them."

Qsn #	Question	Answer
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. Contributions from the United States National Herbarium 52: 1-415	"Fruit a capsule or drupe-like, separating into 3 cocci or dehiscent, usually blue or black. Seeds stony, grayish, without an aril." [Generic description. Fruits & seeds lack means of external attachment and lack arils which could facilitate ant dispersal]

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Kricher, J. 2011. Tropical Ecology. Princeton University Press. Princeton, NJ	"Heliconias produce green fruits that ripen and become blue-black in approximately three months. Each fruit contains three large, hard seeds. Birds attracted to heliconia fruits are important in the plant's seed dispersal." ... "The birds digest the pulp but regurgitate the seed whole." [Effectively functions as internal dispersal]
	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	"The fleshy drupes of Heliconia are dispersed by birds in the neotropics and a wide variety of birds have been reported (Stiles 1979) to feed on them."

801	Prolific seed production (>1000/m2)	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	"Fruit a capsule or drupe-like, separating into 3 cocci or dehiscent, usually blue or black. Seeds stony, grayish, without an aril." [Generic description. ca. Inflorescences per plant / year - 35 inflorescences; 3 seeds per fruit]
	Whistler, W.A. 2000. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"FRUIT a one- to three-seeded drupe, infrequently formed in cultivation."
	Hapsari, L., Trimanto, T., & Wahyudi, D. (2019). Species diversity and phylogenetic analysis of Heliconia spp. collections of Purwodadi Botanic Garden (East Java, Indonesia) inferred by rbcL gene sequences. Biodiversitas, 20(5), 1266-1283	"Fruit drupe; immature fruit 8.11-9.45 mm x 3.56-3.74 mm, off white to yellow; mature fruit not observed."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Kricher, J. 2011. Tropical Ecology. Princeton University Press. Princeton, NJ	"Heliconia seeds have a six- to seven-month dormancy period prior to germination, which ensures that the seeds will germinate at the onset of rainy season." [Unknown if seeds persist in soil beyond 12 months]

803	Well controlled by herbicides	
	Source(s)	Notes

Qsn #	Question	Answer
	Sewake, K. T., & Uchida, J. Y. (1995). Diseases of Heliconia in Hawaii. Research Extension Series 159. Hawaii Institute of Tropical Agriculture and Human Resources, Honolulu, HI	"control measures should include immediate roguing of infected plants or killing them with herbicide and keeping that area undisturbed." [Refers to sanitary measures for controlling Heliconia diseases but no specifics of an effective herbicide treatment are given]

804	Tolerates, or benefits from, mutilation, cultivation, or fire	Y
	Source(s)	Notes
	Moore, S. (2020). Heliconia Growth. Home Guides SF Gate, https://homeguides.sfgate.com/heliconia-growth-80168.html . [Accessed 27 Aug 2020]	"If Heliconia freeze, they will usually die back to the ground, but in warm climates their underground roots will regenerate new shoots and regrow."
	Botanical Growers Network. (2020). Pendant Lobster Claw Plant (<i>heliconia rostrata</i>). https://monsterblooms.com/product/pendant-lobster-claw-plant-heliconia-rostrata/ . [Accessed 27 Aug 2020]	"If your stand is getting too large or you simply want to get a fresh start, simply cut all stalks off at ground level, the plant will then regenerate with new offsets."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Sewake, K. T., & Uchida, J. Y. (1995). Diseases of Heliconia in Hawaii. Research Extension Series 159. Hawaii Institute of Tropical Agriculture and Human Resources, Honolulu, HI	[Bacteria and nematodes present. Unknown if these act as limiting factors in Hawaii] "The bacterial wilt pathogen <i>Pseudomonas solanacearum</i> causes foliar symptoms that include leaf rolling and wilting (Figure 28), leaf margin firing (browning of edges) (Figure 29), and eventual dieback of the shoot (Figure 30)." ... "Pseudomonas solanacearum survives in plant parts and many weed hosts." ... "In Hawaii, <i>Pseudomonas solanacearum</i> has been identified on <i>H. psittacorum</i> and <i>H. rostrata</i> (Ferreira et al. 1991)." ... "Nematodes have been recovered from roots of <i>H. angusta</i> cv. Yellow Christmas; <i>H. farinosa</i> cv. Rio; <i>H. chartacea</i> cv. Sexy Pink; <i>H. stricta</i> cv. Bucky; <i>H. caribaea</i> cv. Purpurea; <i>H. psittacorum</i> cv. Andromeda; <i>H. rostrata</i> ; and more (Sewake and Ogata, unpublished)."
	WRA Specialist. (2020). Personal Communication	Unknown if any natural enemies act as limiting factors to spread of this species in the Hawaiian Islands

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Possibly naturalized in Puerto Rico, and other locations
- Other species have become invasive
- Tolerates many soil types
- Reproduces by seeds and rhizomes
- Seeds dispersed by birds and intentionally by people
- Able to resprout from rhizomes after cutting or pruning

Low Risk Traits

- Unarmed (no spines, thorns, or burrs)
- Non-toxic
- Fruit and seeds rarely produced in cultivation; may limit ability to be dispersed long distances
- Requires specialized pollinators (hummingbirds) which may limit seed set in areas lacking hummingbirds