

Taxon: *Selenicereus anthonyanus* (Alexander) D. R. Hunt

Family: Cactaceae

Common Name(s): fishbone cactus
rick rack cactus
St. Anthony's rik-rak
zig-zag cactus

Synonym(s): *Cryptocereus anthonyanus* Alexander

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 5 Apr 2022

WRA Score: 2.0

Designation: EVALUATE

Rating:

Evaluate

Keywords: Epiphytic Cactus, Possibly Naturalizing, Spiny, Rarely Flowers, Spreads Vegetatively

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

Qsn #	Question	Answer Option	Answer
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)		
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		
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	>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	n
705	Propagules water dispersed	y=1, n=-1	n
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/m ²)	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		
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
	Anderson, E. F. (2001). The Cactus Family. Timber Press, Portland, OR	[No evidence of domestication] "Plants climbing, forming branches in clusters. Stems bright green, to 1 m (3.3 ft) or more long, 7-15 cm (2.8-5.9 in) wide, somewhat tapered and rounded apically, deeply lobed, the lobes 2.5-4.5 cm (1-1.8 in) long, 1-1.6 cm (0.4-0.6 in) wide. Areoles small. Spines 3, short. Flowers fragrant, cream colored, 12 cm (4.7 in) long, 10-15 cm (3.9-5.9 in) in diameter; pericarpels with many small tubercles bearing gray wool, bristles, and spines. Fruits not known. Distribution: Chiapas, Mexico."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2022). 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
	Bugaret, F. (2010). Cactus et Plantes Succulentes du Monde. Éditions Quæ, Versailles Cedex	"Origine – Mexique, province de Chiapas." [Translation: Origin – Mexico, province of Chiapas]

202	Quality of climate match data	High
	Source(s)	Notes
	Bugaret, F. (2010). Cactus et Plantes Succulentes du Monde. Éditions Quæ, Versailles Cedex	"Origine – Mexique, province de Chiapas." [Translation: Origin – Mexico, province of Chiapas]

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes

Qsn #	Question	Answer
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"Origin and Habitat: <i>Selenicereus anthonyanus</i> has a fairly wide range in the Mexican states of Chiapas, Oaxaca, Tabasco and Veracruz. Altitude range: 180-700 metres above sea level. Habitat and ecology: The species grows in lowland rainforests. In addition to a slimmer leaf-like appearance, the photosynthesising stem of this plant produces small adventitious roots along its surface that allow it to grip on to trees and climb as high as possible to obtain maximum light, but is adaptable to terrestrial habits. It is relatively common where found, though not very abundant and the threats are not severe enough to warrant a threatened listing. The main threat is deforestation for cattle ranching."
	World of Succulents. (2022). <i>Selenicereus anthonyanus</i> (Fish Bone Cactus). https://worldofsucculents.com/selenicereus-anthonyanus-fish-bone-cactus-zig-zag-cactus-st-anthonys-rik-rak/ . [Accessed 5 Apr 2022]	"USDA hardiness zones 10a to 11b: from 30 °F (-1.1 °C) to 45 °F (+ 7.2 °C)."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Bugaret, F. (2010). <i>Cactus et Plantes Succulentes du Monde</i> . Éditions Quæ, Versailles Cedex	"Origine – Mexique, province de Chiapas." [Translation: Origin – Mexico, province of Chiapas]
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	" <i>Selenicereus anthonyanus</i> (Alexander) D.R.Hunt Cactaceae Total N° of Refs: 3 Habit: Succulent Preferred Climate/s: Subtropical, Tropical Major Pathway/s: Ornamental Dispersed by: Humans, Escapee References: Galapagos Islands-CN-1157, Brazil-N-1597, Global-CD-1611."

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 4 Apr 2022]	"It is most frequently cultivated as a house plant (in pots and hanging baskets). It rarely planted outdoors in tropical countries, where climbs trees in a semi-naturalized state."

301	Naturalized beyond native range	
	Source(s)	Notes
	Gann GD, Stacking CG and Collaborators. (2001-2022). Floristic Inventory of South Florida Database Online. The Institute for Regional Conservation. Delray Beach, Florida. https://regionalconservation.org/ircs/database/database.asp . [Accessed 4 Apr 2022]	"Hattie Bauer Hammock Present Not Native, Cultivated Only"

Qsn #	Question	Answer
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"References: Galapagos Islands-CN-1157, Brazil-N-1597, Global-CD-1611" [Possibly naturalized in Brazil. References cited do not confirm naturalization]
	Taylor, N. P. (2000). Taxonomy and phytogeography of the Cactaceae of eastern Brazil. The Open University, United Kingdom	"Selenicereus anthonyanus (Alexander) D. Hunt in Bradleya 7: 93 (1989), native of southern Mexico, is the cactus most frequently cultivated as a house plant (in pots and hanging baskets) in Eastern Brazil. It is more rarely planted outdoors, where it has been observed climbing trees in a semi-naturalized state in South-eastern Brazil, outside the area treated here."
	Guézou, A., Trueman, M., Buddenhagen, C. E., Chamorro, S., Guerrero, A. M., Pozo, P., & Atkinson, R. (2010). An extensive alien plant inventory from the inhabited areas of Galapagos. PLoS One, 5(4), e10276	"Table S1. Complete list of the alien vascular plant taxa encountered in the inhabited areas of Galapagos" [Selenicereus anthonyanus - Introduction status in Galapagos = Cu] Cultivated (introduced for cultivation, not naturalized)]
	Oppenheimer, H.L. (2003). Specimen Details for Selenicereus anthonyanus (Alexander) D.R.Hunt. Catalog #: 709392. Herbarium Pacificum. Bishop Museum, Honolulu, HI	[Collected in 2003, and not reported as naturalized. Possibly naturalizing, or persisting from cultivation] "Locality: United States, Hawaii, W Maui, Lahaina District, Honokohau Valley" ... Habitat: Sprawling and climbing plants on lower valley slope with flattened sections, easily rooting from small pieces and along the whole length. Notes: Flowers not yet seen. "
	Rau, E. (2022). President, Sustainable Bioresources, LLC. Personal Communication. 18 March	[Selenicereus anthonyanus identified as persisting, and possibly naturalizing, on Hawaii island] "While walking around the block in Discovery Harbour where I previously found two new invasives, I have found a third candidate. My guess is it is Selenicereus chrysocardium (Fern Leaf Cactus), which is sometimes grown as an ornamental in our area and may have escaped. It is now growing on Christmas berry trees and debris in a shady area intermingled with Barleria repens (Coral Creeper), which is a very abundant invasive in our area."
	Imada, C.T. & Kennedy, B.H. (2020). New Hawaiian plant records from Herbarium Pacificum for 2019. Bishop Museum Occasional Papers 129: 67–92	[Selenicereus setaceus naturalized] "Collections of this climbing cactus, made 20 years or more ago in Kōloa district on Kauaʻi, are still extant (d. Lorence, pers. comm., march 2020) and are now formally included in the Hawaiian naturalized plant ensemble. Selenicereus setaceus occurs in the same part of Kauaʻi in which other cacti have been reported as naturalizing, among them Acanthocereus tetragonus, Harrisia bonplandii, and Selenicereus macdonaldiae (all reported in Lorence et al. 1995), as well as Cereus uruguayanus and Harrisia martinii (reported in Wagner et al. 1990, which notes that many cacti species in that area were reportedly introduced by the moir family). [Note: The Selenicereus macdonaldiae record was originally misidentified as S. grandiflorus (L.) Britton & rose, a change reported in Herbst & Wagner 1999: 16]"
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	Only Selenicereus macdonaldiae listed as naturalized on Kauai at the time of publication

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

Qsn #	Question	Answer
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
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No evidence
	WRA Specialist. (2022). Personal Communication	No evidence found as of 5 April 2022

305	Congeneric weed	
	Source(s)	Notes
	Novoa, A., Le Roux, J. J., Robertson, M. P., Wilson, J. R., & Richardson, D. M. (2015). Introduced and invasive cactus species: a global review. AoB Plants, 7, plu078.	"Table 1. Distribution of invasive Cactaceae species outside their native range. Data were compiled from a range of sources" [Selenicereus macdonaldiae included in list. No impacts described]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Selenicereus coniflorus, Selenicereus grandiflorus, Selenicereus macdonaldiae, Selenicereus megalanthus, and Selenicereus pteranthus listed as naturalized and/or weeds, but impacts have not been described in the cited literature.

401	Produces spines, thorns or burrs	y
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). Cryptocereus anthonyanus . http://www.llifle.com/ . [Accessed 4 Apr 2022]	"Areoles: Small, recessed in the sinus near the central nerve. Spines: 3, short" ... "Flowers: Nocturnal fragrant, cream colored, 10-12 cm long, 10-20 cm in diameter. Pericarpels 15–20 mm long, with many small tubercles bearing olive green bracteoles 1–2 mm long, their axils with grey wool, greyish-brown bristles and stout, pale brown spines, 1–3 mm long." ... "Flowers: Nocturnal fragrant, cream colored, 10-12 cm long, 10-20 cm in diameter. Pericarpels 15–20 mm long, with many small tubercles bearing olive green bracteoles 1–2 mm long, their axils with grey wool, greyish-brown bristles and stout, pale brown spines, 1–3 mm long."
	Florence, J. (2004). Flore de la Polynésie française, Volume 2. IRD Editions, Paris	"Epiphyte a tiges articulees, articles de 1 m ou plus de longueur et 7-15 cm de largeur, comprimés latéralement, a marge profondément lobée sur 2,5-4,5 cm. Areoles dans le creux des lobes, portant 3 courtes epines." [Translation: Epiphyte with jointed stems, articles 1 m or more in length and 7-15 cm in width, compressed laterally, margin deeply lobed for 2.5-4.5 cm. Areoles in the hollow lobes, bearing 3 short spines.]

Qsn #	Question	Answer
	Anderson, E. F. (2001). The Cactus Family. Timber Press, Portland, OR	"Plants climbing, forming branches in clusters. Stems bright green, to 1 m (3.3 ft) or more long, 7-15 cm (2.8-5.9 in) wide, somewhat tapered and rounded apically, deeply lobed, the lobes 2.5-4.5 cm (1-1.8 in) long, 1-1.6 cm (0.4-0.6 in) wide. Areoles small. Spines 3, short. Flowers fragrant, cream colored, 12 cm (4.7 in) long, 10-15 cm (3.9-5.9 in) in diameter; pericarpels with many small tubercles bearing gray wool, bristles, and spines. Fruits not known."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Anderson, E. F. (2001). The Cactus Family. Timber Press, Portland, OR	"Plants climbing, forming branches in clusters." [Cactaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"The main threat is deforestation for cattle ranching." [Unknown. Cattle ranching may lead to habitat loss rather than direct browsing]

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 in genus
	Wagstaff, D.J. (2008). International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence in genus

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Planting Man. (2022). Fish Bone Cactus (<i>Selenicereus anthonyanus</i>) – Cactus Plants. https://plantingman.com/fish-bone-cactus-selenicereus-anthonyanus/ . [Accessed 5 Apr 2022]	"Pests and Diseases: Fish Bone cactus are susceptible to the scale or mealybugs. If bugs are detected on the cactus, apply an insecticidal soap to the plant according to the directions on the label." [Widespread pests of agricultural and landscaping plants]

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 in genus
	Wagstaff, D.J. (2008). International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence in genus

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"Habitat and ecology: The species grows in lowland rainforests." ... "Description: <i>Selenicereus anthonyanus</i> (formerly <i>Cryptocereus anthonyanus</i>) is a perennial climbing succulent, forming branches in clusters." [No evidence, and unlikely. A succulent plant of lowland rainforest]

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	World of Succulents. (2022). <i>Selenicereus anthonyanus</i> (Fish Bone Cactus). https://worldofsucculents.com/selenicereus-anthonyanus-fish-bone-cactus-zig-zag-cactus-st-anthonys-rik-rak/ . [Accessed 5 Apr 2022]	"Epiphytes do not exist in the open sun, instead of receiving bright filtered light in most situations. They thrive as houseplants because of their relatively low lighting requirements. Ideally, you should provide full morning sun and shade for the rest of the day."
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"Exposition: It perform best if grown in semi-shade but tolerate full sun. Extra light in the early spring will stimulate budding."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Planting Man. (2022). Fish Bone Cactus (<i>Selenicereus anthonyanus</i>) – Cactus Plants. https://plantingman.com/fish-bone-cactus-selenicereus-anthonyanus/ . [Accessed 5 Apr 2022]	"Soil: It grows well in a rich-organic, well-drained soil mix."
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"Soil: It needs a compost containing plenty of humus and sufficient moisture in summer (though quite adaptable) it can be also cultivated on split bark like <i>Monstera</i> or in orchid substrate."

Qsn #	Question	Answer
411	Climbing or smothering growth habit	y
	Source(s)	Notes
	Anderson, E. F. (2001). The Cactus Family. Timber Press, Portland, OR	"Plants climbing, forming branches in clusters."
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"The species grows in lowland rainforests. In addition to a slimmer leaf-like appearance, the photosynthesising stem of this plant produces small adventitious roots along its surface that allow it to grip on to trees and climb as high as possible to obtain maximum light, but is adaptable to terrestrial habits."

412	Forms dense thickets	n
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	[No evidence] "Habitat and ecology: The species grows in lowland rainforests. In addition to a slimmer leaf-like appearance, the photosynthesising stem of this plant produces small adventitious roots along its surface that allow it to grip on to trees and climb as high as possible to obtain maximum light, but is adaptable to terrestrial habits. It is relatively common where found, though not very abundant and the threats are not severe enough to warrant a threatened listing. The main threat is deforestation for cattle ranching."

501	Aquatic	n
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"The species grows in lowland rainforests. In addition to a slimmer leaf-like appearance, the photosynthesising stem of this plant produces small adventitious roots along its surface that allow it to grip on to trees and climb as high as possible to obtain maximum light, but is adaptable to terrestrial habits."

502	Grass	n
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 5 Apr 2022]	"Family: Cactaceae Subfamily: Cactoideae Tribe: Hylocereeae"

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	"Family: Cactaceae Subfamily: Cactoideae Tribe: Hylocereeae"

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed]	
	Anderson, E. F. (2001). <i>The Cactus Family</i> . Timber Press, Portland, OR	"Plants climbing, forming branches in clusters. Stems bright green, to 1 m (3.3 ft) or more long, 7-15 cm (2.8-5.9 in) wide, somewhat tapered and rounded apically, deeply lobed, the lobes 2.5-4.5 cm (1-1.8 in) long, 1-1.6 cm (0.4-0.6 in) wide."
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"It is relatively common where found, though not very abundant and the threats are not severe enough to warrant a threatened listing. The main threat is deforestation for cattle ranching."
602	Produces viable seed	y
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 4 Apr 2022]	"Seeds: 2 x 1,5 mm, black." ... "Propagation: By cuttings rooted in moss as an epiphyte." [Seeds may be rare in cultivation due to pollinator limitation]
603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown. No evidence found
604	Self-compatible or apomictic	
	Source(s)	Notes
	Lichtenzweig, J., Abbo, S., Nerd, A., Tel-Zur, N., & Mizrahi, Y. (2000). Cytology and mating systems in the climbing cacti <i>Hylocereus</i> and <i>Selenicereus</i> . <i>American Journal of Botany</i> , 87(7), 1058-1065	[Unknown for <i>S. anthonyanus</i>] "A pollination study confirmed self-incompatibility in <i>H. polyrhizus</i> and a weakened incompatibility reaction in <i>H. undatus</i> and <i>S. megalanthus</i> ."
605	Requires specialist pollinators	y
	Source(s)	Notes

Qsn #	Question	Answer
	Bugaret, F. (2010). Cactus et Plantes Succulentes du Monde. Éditions Quæ, Versailles Cedex	"Les floraisons sont nocturnes, pollinisées par les insectes de nuit et les chauvessouris. La fleur ne dure qu'une nuit, mesure 10 à 15 centimètres de diamètre, largement ouverte, avec de nombreux pétales fins, couleur lie de vin, et un énorme pistil avec son stigmate qui sort du centre, parmi de nombreuses étamines." [Translation: The flowers are nocturnal, pollinated by nocturnal insects and bats. The flower lasts only one night, measures 10 to 15 centimeters in diameter, widely open, with many fine, wine-coloured petals, and an enormous pistil with its stigma protruding from the center, among numerous stamens.]
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 4 Apr 2022]	"S. anthonyanus blooms only once a year, however, and only for one night in late spring or early summer. It is common that specimens rare or never flower, but when they do so, they are usually rootbound in poor soil, then can produce many blossoms, which begin to open right at dusk, releasing a pleasing fragrance intended to attract nocturnal pollinators. Pollination in this species is not completely understood, but it is believed that bats are responsible for pollination."

606	Reproduction by vegetative fragmentation	Y
	Source(s)	Notes
	Oppenheimer, H.L. (2003). Specimen Details for <i>Selenicereus anthonyanus</i> (Alexander) D.R.Hunt. Catalog #: 709392. Herbarium Pacificum. Bishop Museum, Honolulu, HI	"Habitat: Sprawling and climbing plants on lower valley slope with flattened sections, easily rooting from small pieces and along the whole length."

607	Minimum generative time (years)	>3
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"S. anthonyanus blooms only once a year, however, and only for one night in late spring or early summer. It is common that specimens rare or never flower, but when they do so, they are usually rootbound in poor soil, then can produce many blossoms, which begin to open right at dusk, releasing a pleasing fragrance intended to attract nocturnal pollinators."
	Dave's Garden. (2022). Fishbone Orchid Cactus, Ric Rac Orchid Cactus. <i>Selenicereus anthonyanus</i> . https://davesgarden.com/guides/pf/go/62665/ . [Accessed 5 Apr 2022]	[This comment is representative of growers who rarely observe flowering after long periods of cultivation, or never see flowers] "On Mar 23, 2011, Rosa02 from Richards Bay, South Africa wrote: I have had this plant for more or less 18 years in extremely hot sub-tropical conditions. It flowers and multiplies like crazy. Very pest and disease resistant. Rough on the hands though - treat with care. A Fish-bone in full bloom is a beautiful sight to behold. I stay on the East Coast of South Africa, near the Mocambiquan border. Day temps around 36 with killer humidity factors."
	WRA Specialist. (2022). Personal Communication	Time to reproductive maturity unknown, but presumably greater than four years based on rarity or absence of observed flowers on long cultivated plants.

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
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Qsn #	Question	Answer
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"Fruit; Ovoid, 6 x 5 cm long, fragrant, areoles 4 mm with spines 1–2 cm, dark green. Seeds: 2 x 1,5 mm, black." [Seeds, if produced, likely dispersed by birds or mammals]
	Oppenheimer, H.L. (2003). Specimen Details for <i>Selenicereus anthonyanus</i> (Alexander) D.R.Hunt. Catalog #: 709392. Herbarium Pacificum. Bishop Museum, Honolulu, HI	"Habitat: Sprawling and climbing plants on lower valley slope with flattened sections, easily rooting from small pieces and along the whole length." [Based on locations of plants in Hawaii, dispersal may occur as garden waste or through discarding of vegetative fragments]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 4 Apr 2022]	"It is most frequently cultivated as a house plant (in pots and hanging baskets). It rarely planted outdoors in tropical countries, where climbs trees in a semi-naturalized state."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Ornamental Dispersed by: Humans, Escapee"

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"Fruit; Ovoid, 6 x 5 cm long, fragrant, areoles 4 mm with spines 1–2 cm, dark green. Seeds: 2 x 1,5 mm, black." [Fruit and seeds rarely produced. Unlikely to ever become a contaminant]

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"Fruit; Ovoid, 6 x 5 cm long, fragrant, areoles 4 mm with spines 1–2 cm, dark green. Seeds: 2 x 1,5 mm, black."
	Anderson, E. F. (2001). The Cactus Family. Timber Press, Portland, OR	"The most common method of cactus fruit or seed dispersal is by birds, which is indicated by the large number of juicy, sweet, colorful fruits in the family."

705	Propagules water dispersed	n
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"Fruit; Ovoid, 6 x 5 cm long, fragrant, areoles 4 mm with spines 1–2 cm, dark green. Seeds: 2 x 1,5 mm, black."
	Anderson, E. F. (2001). The Cactus Family. Timber Press, Portland, OR	"The most common method of cactus fruit or seed dispersal is by birds, which is indicated by the large number of juicy, sweet, colorful fruits in the family."

706	Propagules bird dispersed	y
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Qsn #	Question	Answer
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"Fruit; Ovoid, 6 x 5 cm long, fragrant, areoles 4 mm with spines 1–2 cm, dark green. Seeds: 2 x 1,5 mm, black."
	Flora Fauna Web. (2022). <i>Selenicereus anthonyanus</i> . https://www.nparks.gov.sg/florafaunaweb/flora/5/8/5876 . [Accessed 5 Apr 2022]	"Seed or Spore Dispersal - Biotic (Fauna)"
	Anderson, E. F. (2001). <i>The Cactus Family</i> . Timber Press, Portland, OR	[Family description. Fruit and seeds, if produced, presumably dispersed by birds and perhaps other frugivores] "The most common method of cactus fruit or seed dispersal is by birds, which is indicated by the large number of juicy, sweet, colorful fruits in the family."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	"Fruit; Ovoid, 6 x 5 cm long, fragrant, areoles 4 mm with spines 1–2 cm, dark green. Seeds: 2 x 1,5 mm, black."
	Anderson, E. F. (2001). <i>The Cactus Family</i> . Timber Press, Portland, OR	"The most common method of cactus fruit or seed dispersal is by birds, which is indicated by the large number of juicy, sweet, colorful fruits in the family."

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	[Presumably yes, although fruit and seeds may be rarely produced] "Blooming season: <i>S. anthonyanus</i> blooms only once a year, however, and only for one night in late spring or early summer. It is common that specimens rare or never flower, but when they do so, they are usually rootbound in poor soil, then can produce many blossoms, which begin to open right at dusk, releasing a pleasing fragrance intended to attract nocturnal pollinators. Pollination in this species is not completely understood, but it is believed that bats are responsible for pollination. Fruit; Ovoid, 6 x 5 cm long, fragrant, areoles 4 mm with spines 1–2 cm, dark green. Seeds: 2 x 1,5 mm, black."

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Anderson, E. F. (2001). <i>The Cactus Family</i> . Timber Press, Portland, OR	"Fruits not known." [Suggests fruiting may be rare in cultivation]

Qsn #	Question	Answer
	LLIFLE - Encyclopedia of living forms. (2022). <i>Cryptocereus anthonyanus</i> . http://www.llifle.com/ . [Accessed 5 Apr 2022]	[Rarely flowering, so unlikely to produce large numbers of seeds, even when fruit are produced] " <i>S. anthonyanus</i> blooms only once a year, however, and only for one night in late spring or early summer. It is common that specimens rare or never flower, but when they do so, they are usually rootbound in poor soil, then can produce many blossoms, which begin to open right at dusk, releasing a pleasing fragrance intended to attract nocturnal pollinators. Pollination in this species is not completely understood, but it is believed that bats are responsible for pollination. Fruit; Ovoid, 6 x 5 cm long, fragrant, areoles 4 mm with spines 1–2 cm, dark green. Seeds: 2 x 1,5 mm, black."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Rojas-Aréchiga, M., & Vázquez-Yanes, C. (2000). Cactus seed germination: a review. <i>Journal of arid environments</i> , 44(1), 85-104	[Unknown] "There is no available information in the reviewed literature about the seed bank of cacti species, but it is possible that many species showing any kind of dormancy could form at least a short-term seed bank if they are able to avoid predation."

803	Well controlled by herbicides	
	Source(s)	Notes
	Novoa, A. et al. (2019). Global actions for managing cactus invasions. <i>Plants</i> , 8(10), 421	"The use of chemical products, such as herbicides, is usually more cost-efficient than physical methods for managing cactus invasions [59,68]. A wide range of herbicides can be used to manage invasive cacti (Table 3). For example, in Australia, the herbicides with the active ingredients Amitrole, Monosodium methyl arsenate (MSMA), Triclopyr, and Triclopyr + Picloram are registered for the management of cactus invasions (www.apvma.gov.au). However, other countries have different regulations regarding the use of herbicides. For example, a number of herbicides used in Australia and South Africa to control <i>Cylindropuntia rosea</i> are not allowed to be used in Europe [59], or cannot be used in protected areas or in the proximity of water bodies."
	WRA Specialist. (2022). Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes

Qsn #	Question	Answer
	Novoa, A. et al. (2019). Global actions for managing cactus invasions. <i>Plants</i> , 8(10), 421	[Unknown. No biocontrol listed for <i>Selenicereus</i> globally, and unknown if any natural enemiew occur in the Hawaiian Islands] "Table 4. A list of all biocontrol agents that have been released against invasive alien cacti based on Klein [85], Winston et al. [21], Zimmermann [68] and Zachariades [76,77], as well as biological control practitioners. The feeding guilds are classified sensu Barbeta [86]. Establishment is categorised as "Yes", "No" or "Under investigation" depending on whether there is evidence of a self-perpetuating population of the agent after release or on whether this evidence is still under investigation. The severity of damage is rated sensu Olckers and Hill [80] as extensive (very high levels of damage, as much as could be expected from the agent; few plants survive, or growth is arrested, or almost no seeds are produced), considerable (high levels of damage; some plants may survive but growth rates are noticeably slower, or seed production is reduced by more than 50%), moderate (perceivable damage, but most plants survive; growth may be slowed to some extent, or seed production is reduced by less than 50%), trivial (some damage, but survival, growth and seed production of the plants is almost normal), none (no damage) or unknown (agent has been too recently released, or has not been evaluated yet)."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Grows, and could spread, in regions with tropical climates
- Described as semi-naturalized in Brazil, and persisting, or possibly naturalizing on Maui and Hawaii islands
- Spiny
- Tolerates shade
- Climbing, and potentially smothering, habit
- Reproduces by seeds (rarely) and vegetative fragments
- Seeds, if produced, dispersed by birds, or other frugivores
- Dispersed by people through intentional cultivation and possibly through discarded garden waste or vegetative fragments
- Gaps in biological and ecological information may reduce accuracy of risk prediction

Low Risk Traits

- No reports of negative impacts where introduced
- Non-toxic
- Rarely, if ever flowers, limiting potential for long distance dispersal
- Suspected of being pollinated by nocturnal pollinators (bats or hawkmoths), which may limit seed set, when flowers are produced

Second Screening Results for Vines & Lianas

- (A) Reported as a weed of cultivated lands?> No evidence.
(B) Unpalatable to grazers Or known to form dense stands?> Palatability unknown. Not known to form dense stands.
(C) Shade tolerant or known to form dense stands?> Tolerates some shade. Not known to form dense stands.
(D) Bird- Or clearly wind- dispersed?> Presumably bird dispersed.
Outcome = Evaluate