

Taxon: <i>Cereus uruguayanus</i>	Family: Cactaceae
Common Name(s): hedge cactus Peruvian apple spiny tree cactus	Synonym(s): <i>Cereus hildmannianus</i> K. Schum. <i>Cereus peruvianus</i> auct. pl.

Assessor: Assessor	Status: Assessor Approved	End Date: 25 Aug 2014
WRA Score: 10.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Naturalized, Weedy Cactus, Spiny, Fast-growing, 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	y = 1*multiplier (see Appendix 2), n= question 205	y
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)	y
304	Environmental weed		
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
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		
406	Host for recognized pests and pathogens	y=1, n=0	n
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)		
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation		
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
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)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
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
	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	[No evidence. The Monstrous form is also naturalized in the Hawaiian Islands in Koko Crater, Oahu] "Native to southern Brazil, Uruguay, and northeastern Argentina, hedge cactus is cultivated worldwide under the incorrect name <i>Cereus peruvianus</i> ." "Monstrous forms of <i>C. uruguayanus</i> are sold in cultivation as <i>Cereus 'Monstrosus'</i> ... these have stems with ribs that are irregularly misshapen into lumpy tubercles. The slow-growing monstrous cultivar is more often seen as a container plant than the typical form, which gets too large for most gardens in Hawai'i."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to southern Brazil, Uruguay, and northeastern Argentina, now widely cultivated as an ornamental throughout warm parts of the world"

202	Quality of climate match data	High
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Riffle, R.L. 1998. The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	" <i>Cereus peruvianus</i> " ... "It is intolerant of all but the lightest frost and is adaptable only to zones 10 and 11, although sometimes surviving in zone 9b."
	Dave's Garden. 2014. PlantFiles: Monstruous Hedge Cactus - <i>Cereus hildmannianus</i> subsp. <i>uruguayanus</i> 'Monstrosus'. http://davesgarden.com/guides/pf/go/66737/ . [Accessed 24 Aug 2014]	"Hardiness: USDA Zone 9a: to -6.6 °C (20 °F) USDA Zone 9b: to -3.8 °C (25 °F) 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)"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to southern Brazil, Uruguay, and northeastern Argentina, now widely cultivated as an ornamental throughout warm parts of the world"

205	Does the species have a history of repeated introductions outside its natural range?	y
	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	"...cultivated worldwide under the incorrect name <i>Cereus peruvianus</i> ."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"...now widely cultivated as an ornamental throughout warm parts of the world..."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Lau, A. & Frohlich, D. 2013. New plant records for the Hawaiian Islands 2011–2012. Bishop Museum Occasional Papers 114: 5–16	" <i>Cereus uruguayanus</i> , or hedge cactus, native to South America and cultivated worldwide, was found sparingly naturalized in Koko Crater Botanical Garden. it has been found as naturalized previously on Maui and Kaua'i, and is widespread on the island of o'ahu. Both the typical and 'Monstrosus' forms (typified by its misshapen stems) were seen spreading in the crater. Material examined. OAHU: Koko Crater Botanical Garden, near trailhead of Crater Rim Trail, near Plumeria. Upright succulent 2 m tall, branches upright or flopping over, tightly clustered and twisted, 'Monstrosus' form. Very sparingly naturalized throughout crater, a few large individuals growing on crater slopes. Leucaena-dominated mixed-alien scrub, 8 Mar 2012, OED 2012030802; Koko Crater Botanical Garden, east side of crater, 21.28669°N, 157.678538°W. Tree cactus with several ascending branches, about 3 m tall, naturalized in crater, with a scattered distribution. dry lowland Prosopis/Leucaena forest, 12 Mar 2012, A. Lau & D. Frohlich 2012031201."

Qsn #	Question	Answer
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i naturalized on southern Kaua'i where it was introduced by the Moir family (Benson, 1982). First collected in 1959"
	Forster, P. I., & Schmeider, M. 2000. <i>Cereus uruguayanus</i> (Cactaceae) and its naturalised occurrence in Queensland, Australia. <i>Austrobaileya</i> , 5(4): 671-677	"The first records of <i>Cereus uruguayanus</i> Ritt, ex Kiesl. as a naturalised weed in Australia are reported. Several populations occur in western Queensland on heavy clay soils in natural and disturbed woodland of brigalow (<i>Acacia harpophylla</i> F. Muell. ex Benth.) and belah (<i>Casuarina cristata</i> Miq.). Endozoochorial dispersal is thought to be responsible for the spread of this species in natural vegetation and eradication is recommended. It is estimated that at least 3240 individuals occur at one locality near Glenmorgan. Size class structure of this population is described which shows a preponderance of seedling juveniles and large mature plants. The stand is also notable for the high proportion of fasciated (10.9%) and monstrous (20.2%) individuals that occur. This represents the first numerical data on fasciation and monstrosity in a population, albeit naturalised, of Cactaceae."
	Hosking, J. R., Conn, B. J., Lepschi, B. J., & Barker, C. H. 2007. Plant species first recognised as naturalised for New South Wales in 2002 and 2003, with additional comments on species recognised as naturalised in 2000–2001. <i>Cunninghamia</i> , 10(1): 139-166	"This cactus was common in the initial collection area with hundreds of plants of all ages occurring for many square kilometres in and around the opal mining town of Grawin. Near Gunnedah only six plants from seedlings to adult plants to 4 m high were seen but others are likely to be present. This species is spread by seed. It is also naturalised in Queensland in the Darling Downs, Leichhardt and Maranoa pastoral districts (Forster in Henderson 2002, Batianoff 2112298GNB, 2112318GNB – BRI) and in the Northern Territory (DNA, MEL, NT specimens). This cactus is naturalised in Hawaii and South Africa (Wagner et al. 1999, Bromilow 1995 as <i>Cereus peruvianus</i> Mill. misappl.)."
	Oppenheimer, H. 2008. New Hawaiian plant records for 2007. <i>Bishop Museum Occasional Papers</i> 100: 22-38	"widely cultivated ornamental, hedge cactus is naturalized on southern Kaua'i (Wagner et al. 1999a: 417). On leeward East Maui this arborescent cactus is found scattered on rocky substrate in dry pastures dominated by <i>Prosopis</i> , <i>Leucaena</i> , and <i>Cenchrus</i> with remnant native elements such as <i>Erythrina</i> , <i>Chamaesyce</i> , <i>Myoporum</i> , <i>Hibiscus</i> , and <i>Sida</i> . Material examined. MAUI: East Maui, Wailuku Dist, Paeahu, in pasture, 232 m, 10 Jul 2007, Oppenheimer & D. Crow H70702."

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	A weed of pastures & possibly an environmental weed in Australia (see 3.03 & 3.04)

303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes
	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	"To discourage its spread, Hawaii's Department of Agriculture has listed <i>C. uruguayanus</i> as a noxious weed seed."

Qsn #	Question	Answer
	Central Highlands Regional Resources Use Planning Cooperative. 2014. March Newsletter. http://www.chrrup.org/v1/wp-content/uploads/2012/05/March-2014-newsletter.pdf . [Accessed]	[Reduces grazing area] "Cereus uruguayanus is a significant weed in the Central Highlands as it can form dense stands which replace native vegetation and invade pasture. Cereus uruguayanus can also reduce grazing potential by disturbing stock movement and stock management practices. C. Uruguayanus mainly occurs on heavy clay soils in natural and disturbed brigalow woodlands, however it can also inhabit a variety of dry sclerophyll woodlands."
	USDA Natural Resources Conservation Service. 2014. Hawaii State-listed Noxious Weeds. http://plants.usda.gov/java/noxious?rptType=State&statefips=15 . [Accessed 24 Aug 2014]	Includes Cereus uruguayanus auct. non Kiesling

304	Environmental weed	
	Source(s)	Notes
	Central Highlands Regional Resources Use Planning Cooperative. 2014. March Newsletter. http://www.chrrup.org/v1/wp-content/uploads/2012/05/March-2014-newsletter.pdf . [Accessed]	[Possibly Yes. Can replace native vegetation] "Cereus uruguayanus is a significant weed in the Central Highlands as it can form dense stands which replace native vegetation and invade pasture."

305	Congeneric weed	y
	Source(s)	Notes
	Klein, H. 1999. Biological control of three cactaceous weeds, <i>Pereskia aculeata</i> Miller, <i>Harrisia martinii</i> (Labouret) Britton and <i>Cereus jamacaru</i> De Candolle in South Africa. African Entomology Memoir, 1: 3-14	[<i>Cereus jamacaru</i>] "By 1987, infestations of <i>C. jamacaru</i> (Queen of the night; Fig. 4) were mainly restricted to the hot, dry regions of Gauteng and the Northern and North-West Provinces (De Beer 1987). The plant has since been recorded from all provinces in South Africa (Fig. 5), but large infestations are mostly limited to Gauteng and the Northern Province. One of the worst infestations in South Africa covers more than 3000 ha of farmland in the Moloto-Witnek district (25.28S 28.37E) and is believed to have arisen from a single specimen planted in a farm garden some 60 years ago. Densities of almost 40 000 plants per hectare have been recorded within this infestation (Taylor & Walker 1984)."

401	Produces spines, thorns or burrs	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Plants arborescent, up to 6 m tall, branched; stems cylindrical, 10-20 cm in diameter, ribs 6-9, rarely fewer. Areoles gray or brown, spines 6-8 per areole, brown or black, 1-4 cm long."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unknown

403	Parasitic	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Plants arborescent, up to 6 m tall, branched; stems cylindrical, 10-20 cm in diameter, ribs 6-9, rarely fewer." [Cactaceae]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Fruit palatable to birds and other frugivorous animals, but palatability of vegetative material unknown. Spines on plant may deter browsing

405	Toxic to animals	
	Source(s)	Notes
	Alaska Department of Health and Social Services. 2007. Pioneer Homes Toxic Plant List. http://dhss.alaska.gov/daph/documents/docs/toxplantlist.pdf . [Accessed 25 Aug 2014]	[Purportedly toxic, but unable to find confirmation in peer-reviewed literature. Document includes a member of the Euphorbiaceae, which superficially resembles cacti] "Cacti: Ingesting any part of the plant may cause severe irritation of the mouth, throat and skin; temporary blindness; vomiting; diarrhea and stomach pain. <ul style="list-style-type: none"> • Bunny Ears (<i>Opuntia microdasyl's alkispina</i>) • Candelabra Cactus (<i>Euphorbia lactea</i>) • Column (<i>Cereus peruvianus</i>) • Rats Tail (<i>Aporocactus flagelliformis</i>) • Sunset (<i>Iokwia famatimensis</i>)"
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No reports of toxicity in the genus

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	Mizrahi, Y., & Nerd, A. 1999. Climbing and columnar cacti: new arid land fruit crops. Pp. 358-366 in J. Janick (ed.). Perspectives on New Crops and New Uses. ASHS Press, Alexandria, VA	"Pests and diseases. To date, no significant problems of pests or diseases have arisen."
	CactiGuide.com. 2012. <i>Cereus Peruvianus</i> -The Least and Best Known Cactus. http://cactiguide.com/article/?article=article3.php . [Accessed 25 Aug 2014]	"The plants we see carelessly tossed into the classification of <i>Cereus peruvianus</i> are all very easy to grow. They tolerate a wide variety of conditions, they can be propagated easily by seed and even more easily by cuttings. They are resistant (indeed impervious) to rot, disease, and infestations; they grow fast and they produce nice large white flowers without any coaxing."

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

Qsn #	Question	Answer
	Top Tropicals. 2014. <i>Cereus peruvianus</i> , <i>Cereus uruguayanus</i> , <i>Cereus hildmannianus</i> . http://toptropicals.com/catalog/uid/cereus_peruvianus.htm . [Accessed 24 Aug 2014]	[No evidence. Edible fruit & ornamental uses] " <i>Cereus peruvianus</i> is a large erect, thorny columnar cactus. It is an unexplored, underutilized cactus, grown only as an ornamental plant, even though it produces attractive, edible fruits. The nocturnal flowers remain open for one night. The fruits are thornless and vary in skin color from violet-red to yellow. The flesh, which is the edible part of the fruit, is white and contains small, edible, and crunchy seeds."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence or reports of toxicity in the genus

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Sonoma County Master Gardeners. 2014. Firesafe Gardening and Landscaping. http://ucanr.edu/sites/scmg/Sonoma_Gardener_Articles/Firesafe_Gardening_and_Landscaping/ . [Accessed 25 Aug 2014]	[A succulent cactus recommended for use in a firesafe landscape. This and websites document the lower flammability of succulent plants, and cacti such as <i>C. peruvianus</i>] "Fortunately, it's possible to have landscaping around the home that is both more fire-safe, and good looking--and even drought tolerant, too. We'll concentrate on two topics in this article- general fire safety principals as regards landscaping--safe zones and the like; and plant selection and plant placement for fire-safe gardening."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Dave's Garden. 2014. PlantFiles: Monstruous Hedge Cactus - <i>Cereus hildmannianus</i> subsp. <i>uruguayanus</i> 'Monstrosus'. http://davesgarden.com/guides/pf/go/66737/ . [Accessed 24 Aug 2014]	"Sun Exposure: Full Sun Sun to Partial Shade"
	Top Tropicals. 2014. <i>Cereus peruvianus</i> , <i>Cereus uruguayanus</i> , <i>Cereus hildmannianus</i> . http://toptropicals.com/catalog/uid/cereus_peruvianus.htm . [Accessed 24 Aug 2014]	"The plant can handle low light levels but thrives in bright light."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Backyard Gardener. 2014. <i>Cereus uruguayanus</i> (Peruvian Apple Cactus). http://www.backyardgardener.com/plantname/pda_b618-2.html . [Accessed 24 Aug 2014]	"pH Range: 5.5 to 6.5 Soil Range: Mostly Sand to Sandy Loam"
	Queensland Government. 2012. Waterwise Plant Selector - Tree <i>Cereus</i> (<i>Cereus uruguayanus</i>). http://www.nrm.qld.gov.au/waterwise/plantselector/details.php?plant_id=1146 . [Accessed 25 Aug 2014]	"Soil type - Loam, sand"

411	Climbing or smothering growth habit	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Plants arborescent, up to 6 m tall, branched; stems cylindrical, 10-20 cm in diameter, ribs 6-9, rarely fewer."

412	Forms dense thickets	y
	Source(s)	Notes
	Central Highlands Regional Resources Use Planning Cooperative. 2014. March Newsletter. http://www.chrrup.org/v1/wp-content/uploads/2012/05/March-2014-newsletter.pdf . [Accessed]	"Cereus uruguayanus is a significant weed in the Central Highlands as it can form dense stands which replace native vegetation and invade pasture."

501	Aquatic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Terrestrial Cactaceae] "Plants arborescent, up to 6 m tall..."

502	Grass	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	Cactaceae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	Cactaceae

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Plants arborescent, up to 6 m tall, branched; stems cylindrical, 10-20 cm in diameter, ribs 6-9, rarely fewer. Areoles gray or brown, spines 6-8 per areole, brown or black, 1-4 cm long. Flowers nocturnal, 12-15 cm long, 8-10 cm in diameter; sepaloïd perianth parts green or slightly pinkish, narrowly oblong to narrowly lanceolate, 4-5 cm long, 0.9-1.2 cm wide, inner perianth parts white, oblanceolate, 4.5-7.5 cm long, 1-2 cm wide; staminal filaments greenish; style green, 7.5-10 cm long; stigma lobes 12-15, green, ca. 1 cm long. Berries reddish or yellowish orange, 5-7.5 cm long, 4.5-5 cm in diameter, smooth or with a few scales, splitting along 1 side and exposing a sweet white pulp"

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Yetman, D. 2007. The Great Cacti: Ethnobotany & Biogeography. University of Arizona Press, Tucson, AZ	[Area or origin may be unclear, but no evidence of reproductive failure throughout its range] "The plant's rapid growth and fruit production apparently have made it attractive throughout the neotropics. It is so commonly grown that its origins are unclear and in dispute...It might have originated in Peru or in Uruguay or in neither."

602	Produces viable seed	y
	Source(s)	Notes
	Nursery & Garden Industry Australia . 2012. Grow Me Instead - A Guide for Gardeners in Queensland SouthWest. http://www.growmeinstead.com.au/public/GMI-brochure-Qld-South West.pdf . [Accessed 25 Aug 2014]	"Cereus hildmannianus subsp. uruguayanus" ... "This plant easily regenerates from seed, which is plentiful on established plants."
	Riffle, R.L. 1998. The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	"Propagation by seed and cuttings"
	Dave's Garden. 2014. PlantFiles: Monstruous Hedge Cactus - Cereus hildmannianus subsp. uruguayanus 'Monstrosus'. http://davesgarden.com/guides/pf/go/66737/ . [Accessed 24 Aug 2014]	"Propagation Methods: From woody stem cuttings From softwood cuttings Allow cut surface to callous over before planting From seed; direct sow after last frost"

603	Hybridizes naturally	
	Source(s)	Notes
	Nobel, P.S. 2002. Cacti: Biology and Uses. University of California Press, Berkeley and Los Angeles, CA	Unknown. No mention of Cereus hybrids in this publication

604	Self-compatible or apomictic	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Weiss, J., Nerd, A., & Mizrahi, Y. 1994. Flowering and pollination requirements in <i>Cereus peruvianus</i> cultivated in Israel. <i>Israel Journal of Plant Sciences</i> , 42(2): 149-158	" <i>C. peruvianus</i> was found to be self-incompatible, and fruit set did not occur when flowers were hand self-pollinated. Hand cross-pollination resulted in very high fruit set (92%) and heavy fruits with a high seed number."
	Nobel, P.S. 2002. <i>Cacti: Biology and Uses</i> . University of California Press, Berkeley and Los Angeles, CA	"Self-incompatibility also occurs for <i>Astrophytum</i> , <i>Pediocactus</i> , <i>Stenocereus griseus</i> , <i>S. repandus</i> , <i>S. horrispinus</i> , and <i>Thelocactus</i> (Nassar et al. 1997) and in clones of <i>Cereus peruvianus</i> , <i>Hylocereus costaricensis</i> , and <i>H. polyrhizus</i> (Weiss et al. 1994a,b, 1995)."
	Uruguay's wildlife & Natural sanctuaries. 2006. <i>Daily Archives: October 13th, 2006</i> . http://uruguay1.wordpress.com/2006/10/13/ . [Accessed 25 Aug 2014]	[Possibly requires cross-pollination] "A large species, <i>Cereus uruguayanus</i> can grow up to approximately 5 metres tall. Large showy flowers are followed (following successful pollination) by red edible fruit if cross-pollination occurs."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Weiss, J., Nerd, A., & Mizrahi, Y. 1994. Flowering and pollination requirements in <i>Cereus peruvianus</i> cultivated in Israel. <i>Israel Journal of Plant Sciences</i> , 42(2): 149-158	"Flowers were visited only by day-active insects: the honey bee (<i>Apis mellifera</i>) and the carpenter bee (<i>Xylocopa pubescens</i>). The visitors' behavior indicated that they were involved in pollination. Early-opening flowers were visited both in the evening and in the morning, whereas late-openers were visited only in the morning."
	Yetman, D. 2007. <i>The Great Cacti: Ethnobotany & Biogeography</i> . University of Arizona Press, Tucson, AZ	"The flowers are equally appealing to winged creatures of the night; I have watched the 15-cm wide flowers open, usually after ten o'clock. All manner of pollinators are attracted, including hummingbird moths at night and carpenter bees, honeybees, houseflies, wasps, and a host of lesser arthropods in the daytime, but I believe nectar-eating (<i>Leptonycteris</i>) bats are the principal pollinators."

606	Reproduction by vegetative fragmentation	
	Source(s)	Notes
	Yetman, D. 2007. <i>The Great Cacti: Ethnobotany & Biogeography</i> . University of Arizona Press, Tucson, AZ	[Suggests stem fragments may be able to establish if they break off] "The apple cactus also grows readily from cuttings, sprouting quickly and growing rapidly into a tall columnar. I planted a cutting 30 cm tall in my front yard in 1990. By the year 2000, it was 6 m tall, with more than a dozen arms."
	Nursery & Garden Industry Australia . 2012. <i>Grow Me Instead - A Guide for Gardeners in Queensland SouthWest</i> . http://www.growmeinstead.com.au/public/GMI-brochure-Qld-South West.pdf . [Accessed 25 Aug 2014]	[Suggests vegetative pieces may be able to root & spread the plant] "Be careful how branches and off-cuts of this plant are disposed of in dumped garden waste."

607	Minimum generative time (years)	3
	Source(s)	Notes

Qsn #	Question	Answer
	Mizrahi, Y., & Nerd, A. 1999. Climbing and columnar cacti: new arid land fruit crops. Pp. 358-366 in J. Janick (ed.). Perspectives on New Crops and New Uses. ASHS Press, Alexandria, VA	"C. peruvianus is a precocious yielder from an early age—three to five years from seeds and two to three years from cuttings"
	Yetman, D. 2007. The Great Cacti: Ethnobotany & Biogeography. University of Arizona Press, Tucson, AZ	"It is ridiculously easy to propagate, grows quickly (a young plant will easily grow more than a foot per year), tolerates moderate frost, and produces numerous showy white flowers to 15 cm across." ... "The plant's rapid growth and fruit productions apparently have made it attractive throughout the neotropics."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Nursery & Garden Industry Australia . 2012. Grow Me Instead - A Guide for Gardeners in Queensland SouthWest. http://www.growmeinstead.com.au/public/GMI-brochure-Qld-South West.pdf . [Accessed 25 Aug 2014]	[Can be accidentally spread as garden waste] "Be careful how branches and off-cuts of this plant are disposed of in dumped garden waste"

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"now widely cultivated as an ornamental throughout warm parts of the world"

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	No evidence of produce contamination & presumably not a likely vector. A fleshy-fruited cactus dispersed by birds & other frugivorous animals, and both intentionally planted by people, as well as dispersed unintentionally via garden waste.

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Berries reddish or yellowish orange, 5-7.5 cm long, 4.5-5 cm in diameter, smooth or with a few scales, splitting along 1 side and exposing a sweet while pulp"

Qsn #	Question	Answer
705	Propagules water dispersed	n
	Source(s)	Notes
	Oppenheimer, H. 2008. New Hawaiian plant records for 2007. Bishop Museum Occasional Papers 100: 22-38	[Water dispersal unlikely. A fleshy-fruited cactus of dry areas] "A widely cultivated ornamental, hedge cactus is naturalized on southern Kaua'i (Wagner et al. 1999a: 417). On leeward East Maui this arborescent cactus is found scattered on rocky substrate in dry pastures..."

706	Propagules bird dispersed	y
	Source(s)	Notes
	Central Highlands Regional Resources Use Planning Cooperative. 2014. March Newsletter. http://www.chrrup.org/v1/wp-content/uploads/2012/05/March-2014-newsletter.pdf . [Accessed]	"Endozoochorial dispersal by birds is responsible for the spread of seed to recruiting areas, with the fruit highly palatable to both birds and mammals."
	Silva W.R. 1988: Ornithochory of <i>Cereus peruvianus</i> Cactaceae in the Serra do Japi state of Sao Paulo Brazil. <i>Revista Brasileira De Biologia</i> : 48(2): 381-390	"The seed dispersal of <i>Cereus peruvianus</i> (Cactaceae) was studied in the Serra do Japi, State of Sao Paulo, Southeastern Brazil. This cactus has fruits with morphological and color patterns in accordance with the ornithochory syndrome (dispersal by birds). Several bird species feed on the pulp of mature fruits, including the seeds. The Sayaca Tanager (<i>Thraupis sayaca</i>) is probably the main local disperser due to its frequent visits and ability to defecate seeds in viable conditions of germination. Two granivorous finch species (<i>Zonotrichia capensis</i> and <i>Coryphospingus cucullatus</i>) act as seed predators, since most of the eaten seeds seem to be destroyed in their digestive tracts. Almost all visitors can be considered as opportunistic birds, with generalist feeding habits. The morphology and display of fruits in the plant do not restrict the access to a particular kind of visitor, which eliminates the possibility of selection or more specialized dispersers (primary frugivores). Thus the plant's response to the variety of visitors, including both dispersers and seed predators, could be to convert more reproductive energy into the production of a greater number of small seeds, thereby counterbalancing the effect of waste and predation on the diaspores."
	Forster, P. I., & Schmeider, M. 2000. <i>Cereus uruguayanus</i> (Cactaceae) and its naturalised occurrence in Queensland, Australia. <i>Austrobaileya</i> , 5(4): 671-677	[Presumably birds and other frugivorous animals disperse the seeds] "Endozoochorial dispersal is thought to be responsible for the spread of this species in natural vegetation and eradication is recommended."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Britton, N.L. & Rose, J.N. 1920. The Cactaceae: Descriptions and Illustrations of Plants of the Cactus Family, Volume II. The Carnegie Institution of Washington, Washington, D.C.	[Unlikely. Small seeds could possibly adhere to mud on animals, but otherwise lack means of external attachment & are adapted for internal dispersal] "fruit subglobose, orange-yellow, somewhat glaucous, about 4 cm. in diameter; seeds black, 2 mm. broad, rough."

708	Propagules survive passage through the gut	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Castro, E. R. D., & Galetti, M. 2004. Frugivory and seed dispersal by the tegu lizard <i>Tupinambis merianae</i> Reptilia: Teiidae. <i>Papéis Avulsos de Zoologia</i> , 44(6): 91-97	"Tegu lizards have a generalist diet and may play an important role as seed dispersers in semideciduous forests in southeast Brazil. We studied the frugivory and seed dispersal of tegu lizards using captive animals and offering wild fruits from a semideciduous forest. Thirty fruit species were eaten by the lizards in captivity, ranging from 0.81 to 10.0 cm (fruit diameter). Even large fruit adapted to dispersal by large mammals were swallowed (ex. <i>Syagrus oleracea</i>). There were no statistical differences in seed germination between seeds that passed through the lizard gut and the control in <i>Eugenia uniflora</i> ($\chi^2 = 0.69$, $P > 0.50$), <i>Genipa americana</i> ($\chi^2 = 6.4$, $P > 0.975$), <i>Cereus peruvianus</i> ($\chi^2 = 0.018$, $P > 0.10$), and <i>Solanum viarum</i> ($\chi^2 = 6.23$, $P > 0.975$). Seed retention time in the tegu gut ranged from 22-24 h (<i>Solanum lycocarpum</i>) to 43-44 h (for <i>Syagrus romanzoffiana</i>). Our results indicate that tegu lizards have a potential to be an important seed dispersers in the Neotropics."
	Silva W.R. 1988: Ornithochory of <i>Cereus peruvianus</i> Cactaceae in the Serra do Japi state of Sao Paulo Brazil. <i>Revista Brasileira De Biologia</i> : 48(2): 381-390	"The seed dispersal of <i>Cereus peruvianus</i> (Cactaceae) was studied in the Serra do Japi, State of Sao Paulo, Southeastern Brazil. This cactus has fruits with morphological and color patterns in accordance with the ornithochory syndrome (dispersal by birds). Several bird species feed on the pulp of mature fruits, including the seeds. The Sayaca Tanager (<i>Thraupis sayaca</i>) is probably the main local disperser due to its frequent visits and ability to defecate seeds in viable conditions of germination."
	Central Highlands Regional Resources Use Planning Cooperative. 2014. March Newsletter. http://www.chrup.org/v1/wp-content/uploads/2012/05/March-2014-newsletter.pdf . [Accessed]	[Presumably Yes] "Endozoochorial dispersal by birds is responsible for the spread of seed to recruiting areas, with the fruit highly palatable to both birds and mammals."
	Forster, P. I., & Schmeider, M. 2000. <i>Cereus uruguayanus</i> (Cactaceae) and its naturalised occurrence in Queensland, Australia. <i>Austrobaileya</i> , 5(4): 671-677	[Presumably Yes] "Endozoochorial dispersal is thought to be responsible for the spread of this species in natural vegetation and eradication is recommended."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Britton, N.L. & Rose, J.N. 1920. The Cactaceae: Descriptions and Illustrations of Plants of the Cactus Family, Volume II. The Carnegie Institution of Washington, Washington, D.C.	[Unknown. Plants can get fairly large & seeds are small] "Usually tall, said to reach 16 meters in height, tree-like, with a large much branched top; branches 10 to 20 cm. in diameter" ... "fruit subglobose, orange-yellow, somewhat glaucous, about 4 cm. in diameter; seeds black, 2 mm. broad, rough."

Qsn #	Question	Answer
802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes
	Doijode, S.J. 2001. Seed Storage of Horticultural Crops. Food Product Press, Inc., Binghamton, NY	[Presumably would lose viability quickly under natural conditions] "Cactus seeds appear to be orthodox in storage behavior. They preserve viability and vigor under dry, cool conditions. Seeds of <i>Cereus peruvianus</i> and <i>Oreocereus trollii</i> lose their viability rapidly under room temperatures and maintain it at 2°C (Zimmer, 1966)."

803	Well controlled by herbicides	
	Source(s)	Notes
	Central Highlands Regional Resources Use Planning Cooperative. 2014. March Newsletter. http://www.chrrup.org/v1/wp-content/uploads/2012/05/March-2014-newsletter.pdf . [Accessed]	[Efficacy unknown] "Chemical control methods, either by stem injection for larger plants or foliar spray for juveniles, should be employed prior to fruiting."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unknown

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unknown. No native, but several introduced Cactaceae in the Hawaiian Islands. No pests have been noted on cultivated or naturalized plants

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in arid tropical climates
- Naturalized in the Hawaiian Islands, Australia, & possibly elsewhere
- Can invade pasture and reduce grazing potential
- May compete with native vegetation
- Other *Cereus* species have become invasive
- Spiny
- Unconfirmed reports of toxicity
- Can form dense stands
- Seeds dispersed by birds, frugivorous animals & intentionally by people
- Able to reach maturity from seed in 3-5 years
- May be able to spread by vegetative fragments

Low Risk Traits

- Ornamental uses and edible fruit
- Self-incompatible
- Seeds lose viability quickly