UF IFAS UNIVERSITY of FLORIDA

Assessment of Non-native Plants in Florida's Natural Areas

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Assessment date 2 August 2015

	***Hylocereus undatus* South**	**Answer**	**Score**
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to Florida's USDA climate zones (0-low; 1-intermediate; 2-high) North Zone: suited to Zones 8, 9 Central Zone: suited to Zones 9, 10 South Zone: suited to Zone 10	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)	y	1
2.04	Native or naturalized in habitats with periodic inundation North Zone: mean annual precipitation 50-70 inches Central Zone: mean annual precipitation 40-60 inches South Zone: mean annual precipitation 40-60 inches	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed	unk	
3.03	Weed of agriculture	n	0
3.04	Environmental weed	?	
3.05	Congeneric weed	y	2
4.01	Produces spines, thorns or burrs	y	1
4.02	Allelopathic	unk	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	n	-1
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens	n	0
4.07	Causes allergies or is otherwise toxic to humans	n	0
4.08	Creates a fire hazard in natural ecosystems	unk	0
4.09	Is a shade tolerant plant at some stage of its life cycle	n	0
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	unk	0
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	n	0
5.01	Aquatic	n	0
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1

6.03	Hybridizes naturally	unk	-1
6.04	Self-compatible or apomictic	y	1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	y	1
6.07	Minimum generative time (years)	5	-1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	unk	-1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal	n	-1
7.05	Propagules water dispersed	n	-1
7.06	Propagules bird dispersed	y	1
7.07	Propagules dispersed by other animals (externally)	n	-1
7.08	Propagules dispersed by other animals (internally)	y	1
8.01	Prolific seed production	y	1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	n	-1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05		?	
	Total Score	**6**	
	Implemented Pacific Second Screening	**YES**	
	Risk Assessment Results	**LOW/SS**	

section	**# questions answered**	**satisfy minimum?**
A	9	yes
B	9	yes
C	21	yes
total	39	yes

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	***Hylocereus undatus* Central**	**Answer**	**Score**
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to Florida's USDA climate zones (0-low; 1-intermediate; 2-high) North Zone: suited to Zones 8, 9 Central Zone: suited to Zones 9, 10 South Zone: suited to Zone 10	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	1	
2.03	Broad climate suitability (environmental versatility)	y	1
2.04	Native or naturalized in habitats with periodic inundation North Zone: mean annual precipitation 50-70 inches Central Zone: mean annual precipitation 40-60 inches South Zone: mean annual precipitation 40-60 inches	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed	unk	
3.03	Weed of agriculture	n	0
3.04	Environmental weed	?	
3.05	Congeneric weed	y	2
4.01	Produces spines, thorns or burrs	y	1
4.02	Allelopathic	unk	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	n	-1
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens	n	0
4.07	Causes allergies or is otherwise toxic to humans	n	0
4.08	Creates a fire hazard in natural ecosystems	unk	0
4.09	Is a shade tolerant plant at some stage of its life cycle	n	0
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	unk	0
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	n	0
5.01	Aquatic	n	0
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1

6.03	Hybridizes naturally	unk	-1
6.04	Self-compatible or apomictic	y	1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	y	1
6.07	Minimum generative time (years)	5	-1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	unk	-1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal	n	-1
7.05	Propagules water dispersed	n	-1
7.06	Propagules bird dispersed	y	1
7.07	Propagules dispersed by other animals (externally)	n	-1
7.08	Propagules dispersed by other animals (internally)	y	1
8.01	Prolific seed production	y	1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	n	-1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05		?	
	Total Score	**6**	
	Implemented Pacific Second Screening	**YES**	
	Risk Assessment Results	**LOW/SS**	

section	**# questions answered**	**satisfy minimum?**
A	9	yes
B	9	yes
C	21	yes
total	39	yes

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	***Hylocereus undatus* North**	**Answer**	**Score**
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to Florida's USDA climate zones (0-low; 1-intermediate; 2-high) North Zone: suited to Zones 8, 9 Central Zone: suited to Zones 9, 10 South Zone: suited to Zone 10	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)	y	1
2.04	Native or naturalized in habitats with periodic inundation North Zone: mean annual precipitation 50-70 inches Central Zone: mean annual precipitation 40-60 inches South Zone: mean annual precipitation 40-60 inches	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed	y	2
3.03	Weed of agriculture	n	0
3.04	Environmental weed	n	0
3.05	Congeneric weed	y	2
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	n	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	y	1
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens	unk	0
4.07	Causes allergies or is otherwise toxic to humans	unk	0
4.08	Creates a fire hazard in natural ecosystems	unk	0
4.09	Is a shade tolerant plant at some stage of its life cycle	unk	0
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.		
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets		
5.01	Aquatic	n	0
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1

6.03	Hybridizes naturally	unk	-1
6.04	Self-compatible or apomictic		
6.05	Requires specialist pollinators	unk	0
6.06	Reproduction by vegetative propagation	?	
6.07	Minimum generative time (years)		
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal		
7.05	Propagules water dispersed		
7.06	Propagules bird dispersed		
7.07	Propagules dispersed by other animals (externally)	n	-1
7.08	Propagules dispersed by other animals (internally)		
8.01	Prolific seed production		
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	?	
8.03	Well controlled by herbicides	unk	1
8.04	Tolerates, or benefits from, mutilation or cultivation	unk	-1
8.05		?	
	Total Score	**4**	
	Implemented Pacific Second Screening	**YES**	
	Risk Assessment Results	**LOW/SS**	

section	**# questions answered**	**satisfy minimum?**
A	9	yes
B	9	yes
C	21	yes
total	39	yes

	Reference	Source data
1.01	1. Journal of Arid Environments. http://www.uv.mx/personal/tcarmona/files/2010/08/Valiente-et-al-2007.pdf (Accessed: 30 July 2015)	1. "Nearly 118 cacti species have been used by Mesoamerican people since pre-Columbian times, and about 40 of those species show signs of domestication. Among used and domesticated species, the hemiepiphytic cactus Hylocereus undatus is one of the most appreciated in Mexico" --- No evidence of selection for reduced weediness
1.02	1. USDA Germplasm Resource Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19487 (Accessed: 30 July 2015)	Skip to question 2.01 1. Naturalized in South Africa, Reunion, China, Taiwan, Australia, United States, New Caledonia, Niue, Brazil, and Chile.
1.03	1. Pacific Island Ecosystems at Risk. http://www.hear.org/pier/species/hylocereus_undatus.htm (Accessed: 30 July 2015) 2. Global Compendium of Weeds. http://www.hear.org/gcw/species/hylocereus_undatus/ (Accessed: 30 July 2015)	Skip to question 2.01 1. Cited as invasive in Chile, Hawaii, Nauru, Niue, Australia, China, Taiwan, La Reunion, and Florida. 2. Classified as a cultivation escape, environmental weed, and weed.
2.01	1. PERAL NAPPFAST Global Plant Hardiness. http://www.nappfast.org/Plant_hardiness/2012/PHZ%20update201230%20yr%20%20300dpi.tif (Accessed: 30 July 2015). 2. National Tropical Botanical Garden. http://www.ntbg.org/plants/plant_details.php?plantid=%201188 4 (Accessed: 30 July 2015) 3. USDA Germplasm Resource Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19487 (Accessed: 30 July 2015) 4. Dave's Garden. http://davesgarden.com/guides/pf/go/54131/#b (Accessed: 30 July 2015)	No computer analysis was performed. 1. Florida North Zone: Hardiness zones 8 and 9. Central Zone: Hardiness zones 9 and 10. South Zone: Hardiness zone 10. 2. "Hylocereus undatus is native to tropical deciduous forests in Mexico, the West Indies, Central America, and northern Southern America and is now widely distributed in cultivation throughout the world." 3. Naturalized in South Africa, Reunion, China, Taiwan, Australia, United States, New Caledonia, Niue, Brazil, and Chile. 4. Present in USDA Zone 10 and 11.
2.02		
2.03	1. The University of Melbourne. Köppen-Geiger Climate Map of the World. http://people.eng.unimelb.edu.au/mpeel/koppen.html (Accessed: 30 July 2015) 2. National Tropical Botanical Garden. http://www.ntbg.org/plants/plant_details.php?plantid=%201188 4 (Accessed: 30 July 2015) 3. USDA Germplasm Resource Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19487 (Accessed: 30 July 2015)	1. Present in the following Köppen-Geiger Climate zones: Af, Am, Aw, BWh, BWk, BSh, BSk, Csa, Csb, Cwa, Cwb, Cfa, and Cfb. 2. "Hylocereus undatus is native to tropical deciduous forests in Mexico, the West Indies, Central America, and northern Southern America and is now widely distributed in cultivation throughout the world." 3. Naturalized in South Africa, Reunion, China, Taiwan, Australia, United States, New Caledonia, Niue, Brazil, and Chile.
2.04	1. Climate Charts. World Climate Maps. http://www.climate-charts.com/World-Climate-Maps.html#rain (Accessed: 30 July 2015)	1. Present in areas with rainfall in these ranges
2.05	1. National Tropical Botanical Garden. http://www.ntbg.org/plants/plant_details.php?plantid=%201188 4 (Accessed: 30 July 2015) 2. Pacific Island Ecosystems at Risk. http://www.hear.org/pier/species/hylocereus_undatus.htm (Accessed: 30 July 2015)	1. "Hylocereus undatus is native to tropical deciduous forests in Mexico, the West Indies, Central America, and northern Southern America and is now widely distributed in cultivation throughout the world." 2. Introduced to Chile, French Polynesia, Hawaii, Nauru, New Caledonia, Niue, Philippines, Australia, China, Singapore, Taiwan, La Reunion, and Florida.
3.01	1. National Tropical Botanical Garden. http://www.ntbg.org/plants/plant_details.php?plantid=%201188 4 (Accessed: 30 July 2015) 2. USDA Germplasm Resource Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19487 (Accessed: 30 July 2015)	1. "Hylocereus undatus is native to tropical deciduous forests in Mexico, the West Indies, Central America, and northern Southern America and is now widely distributed in cultivation throughout the world." 2. Naturalized in South Africa, Reunion, China, Taiwan, Australia, United States, New Caledonia, Niue, Brazil, and Chile.
3.02		No evidence
3.03		No evidence

3.04	1. Global Compendium of Weeds. http://www.hear.org/gcw/species/hylocereus_undatus/ (Accessed: 30 July 2015)	1. Classified as an environmental weed --- no evidence found
3.05	1. Global Compendium of Weeds. http://www.hear.org/gcw/species/hylocereus_undatus/ (Accessed: 30 July 2015)	1. Hylocereus costaricensis is listed as a cultivation escape and environmental weed.
4.01	1. Pacific Island Ecosystem at Risk. http://www.hear.org/pier/species/hylocereus_undatus.htm (Accessed: 31 July 2015) 2. CABI. http://www.cabi.org/isc/datasheet/27317 (Accessed: 31 July 2015) 3. Dave's Garden. http://davesgarden.com/guides/pf/go/54131/#b (Accessed: 30 July 2015)	1. "Areoles with 1-4 conical spines" 2. "Each stem segment has 3 flat wavy ribs and corneous margins may be spineless or have 1-3 small spines." 3. "Plant has spines or sharp edges; use extreme caution when handling"
4.02	1. Journal of Plant Interactions. http://www.tandfonline.com/doi/full/10.1080/17429140701749906#.VbvE3ovVmOI (Accessed: 31 July 2015)	1. "Recently, the flavonoid-3-glycosides isorhamnetin-3-O-rutinoside and isorhamnetin-3-O-robinobioside, isolated from the cactaceous Hylocereus undatus, have been reported for their allelopathic properties" (However, this from a concentrated and isolated compound)
4.03	1. Tasty Landscape. http://tastylandscape.com/2013/05/19/how-to-get-dragon-fruit-cactus-to-bloom/ (Accessed: 30 July 2015)	1. "this plant is often considered an epiphyte (an epiphyte is just a name for a plant that grows on another plant without being a parasite)"
4.04	1. Swedish University of Agricultural Sciences. http://stud.epsilon.slu.se/804/1/andersson_m_100126.pdf (Accessed: 31 July 2015)	1. "Approximately 53 browse species were found on the pasture, and thirteen of them were once or more often consumed by the sheep, Fig. 5. Two of the consumed browse species; Thanh long (Hylocereus undatus, dragonfruit) and Thuôc là (Nicotiana tabacum, tobaccoplant) were not grown at the pasture but in a area nearby where the animals went."
4.05	1. Swedish University of Agricultural Sciences. http://stud.epsilon.slu.se/804/1/andersson_m_100126.pdf (Accessed: 31 July 2015)	1. "Approximately 53 browse species were found on the pasture, and thirteen of them were once or more often consumed by the sheep, Fig. 5. Two of the consumed browse species; Thanh long (Hylocereus undatus, dragonfruit) and Thuôc là (Nicotiana tabacum, tobaccoplant) were not grown at the pasture but in a area nearby where the animals went."
4.06	1. Cooperative Extension Service, University of Hawaii. Fruits and Nuts. http://scholarspace.manoa.hawaii.edu/bitstream/handle/10125/2403/FN-9.pdf?sequence=1 (Accessed: 31 July 2015)	No evidence that Hylocereus undatus is a significant primary or alternate host. 1. "Diseases known to affect pitaya are few. Reports from Australia and Central America mention a stem rot caused by Xanthomonas campestris and brown spots on fruit caused by Dothiorella."
4.07		No evidence, the fruit is regularly consumed by humans
4.08		No evidence
4.09	1. CABI. http://www.cabi.org/isc/datasheet/27317 (Accessed: 31 July 2015) 2. Dave's Garden. http://davesgarden.com/guides/pf/go/54131/#b (Accessed: 30 July 2015)	1. "dragon fruit may be injured by extreme sunlight and can tolerate some shade; however, it is considered to be a full sunlight crop in Central and South American countries" 2. "Sun Exposure: Full Sun, Sun to Partial Shade, Light Shade"
4.10	1. World Agroforestry. http://www.worldagroforestry.org/downloads/Publications/PDFS/BC07324.pdf (Accessed: 31 July 2015) 2. Cactus Art Nursery. http://www.cactus-art.biz/schede/HYLOCEREUS/Hylocereus_undatus/Hylocereus_undatus/Hylocereus_undatus.htm (Accessed: 31 July 2015)	1. "Soil: Dragon fruit could be growin in a wide range of soils. The most important factor is that the soil should be well drained as it does not tolerate water logging. Dragon fruit prefers slightly acidic soil. The best soils are loams with plenty of organic matter. It can tolerate some salt in the soil, although the extent of tolerance will depend on the cultivars." 2. "The plants aren't usually too picky as to soil type, but because of their epiphytic nature, it is recommended to grow them in well-drained soil mix that is supplemented with high amounts of organic material." --- insufficient information

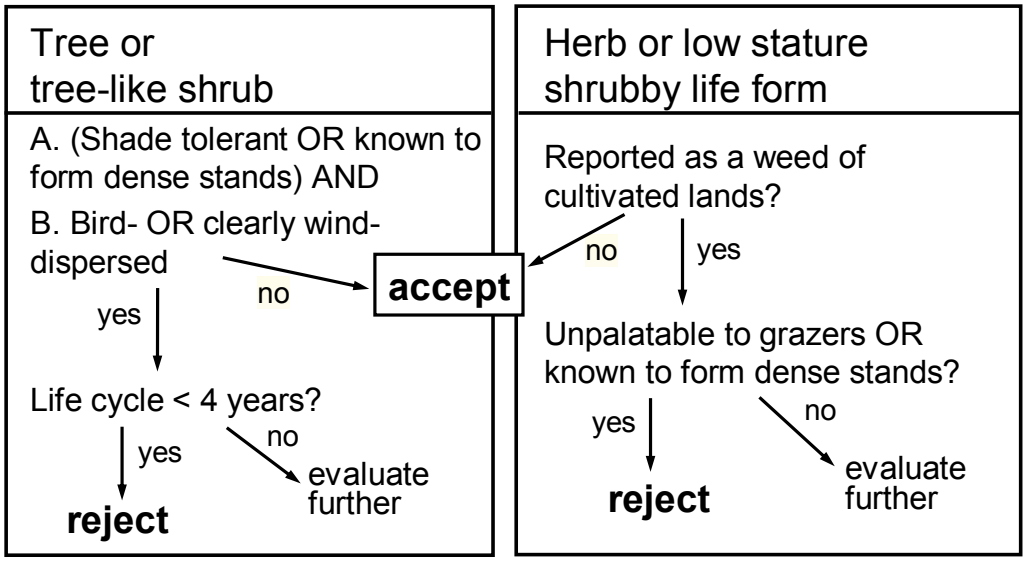
4.11	1. Pacific Island Ecosystem at Risk. http://www.hear.org/pier/species/hylocereus_undatus.htm (Accessed: 30 July 2015) 2. Purdue University. https://www.hort.purdue.edu/newcrop/morton/strawberry_pear_ars.html (Accessed: 31 July 2015)	1. "Climbing or scrambling succulent plant to at least 10 m high on trees." 2. "They arch over rocks or bushes, climb and form dense masses in trees, and cling to walls, by means of numerous, strong aerial roots."
4.12	1. Purdue University. https://www.hort.purdue.edu/newcrop/morton/strawberry_pear_ars.html (Accessed: 31 July 2015)	1. "They arch over rocks or bushes, climb and form dense masses in trees"
5.01	1. USDA Germplasm Resource Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19487 (Accessed: 30 July 2015) 2. Purdue University. https://www.hort.purdue.edu/newcrop/morton/strawberry_pear_ars.html (Accessed: 31 July 2015)	1. "Family: Cactaceae" 2. "This cactus may be terrestrial or epiphytic."
5.02	1. USDA Germplasm Resource Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19487 (Accessed: 30 July 2015)	1. "Family: Cactaceae"
5.03	1. USDA Germplasm Resource Information Network. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19487 (Accessed: 30 July 2015)	1. "Family: Cactaceae"
5.04		No evidence of specialized structures
6.01		No evidence of substantial reproductive failure
6.02	1. YouTube. https://www.youtube.com/watch?v=McIp5nuKH9U (Accessed: 31 July 2015) 2. Formosa Fruit. http://formosa-fruit.com/Hylocereus.undatus.html (Accessed: 31 July 2015) 3. Tasty Landscape. http://tastylandscape.com/2013/07/30/how-to-get-dragon-fruit-cactus-to-fruit/ (Accessed: 31 July 2015)	1. See video. Shows seedlings sprouting directly from seeds, even while still embedded within the fruit. 2. Seeds can be purchased online. "Pitaya, or dragon fruit, grows quite well from seed... Seeds are able to be stored for many years if left in a cool, dry and dark conditions. Our seeds are picked fresh from the plant and washed clean." 3. "You can also start Dragon Fruit Cactus from seed but it takes a lot longer for them to grow and reach fruiting maturity (It can take up to 6 years to fruit)."
6.03	1. Cooperative Extension Service, University of Hawaii. Fruits and Nuts. http://scholarspace.manoa.hawaii.edu/bitstream/handle/10125/2403/FN-9.pdf?sequence=1 (Accessed: 31 July 2015) 2. Pine Island Nurserys. http://www.tropicalfruitnursery.com/dragon/ (Accessed: 31 July 2015)	1. "Many selections are being evaluated from the red-fleshed fruit types belonging to two closely related species, Hylo- cereus polyrhizus and H. costaricensis, and their hybrids with H. undatus." 2. "Varieties of Hylocereus guatemalensis, Hylocereus polyrhizus, and Hylocereus undatus as well as hybrids of these three species are grown commercially worldwide." --- Unknown whether hybrids are naturally occuring (appear to be only commercial hybrids)
6.04	1. Journal of Arid Environments. http://www.uv.mx/personal/tcarmona/files/2010/08/Valiente-et-al-2007.pdf (Accessed: 31 July 2015) 2. HortScience. http://hortsci.ashspublications.org/content/29/12/1487.short (Accessed: 31 July 2015)	1. "Both self-pollination (100% in unmanipulated treatments and 53.8% in hand self-pollination treatments) and hand cross-pollination treatments (40%) set fruit. The capability of selfing in this cultivated plant has not been reported elsewhere and may be a result of intense local cultivation of this plant in Mexico." 2. "In contrast to H. undatus, S. megalanthus clones could set fruit without pollen vector involvement, although the set was slightly lower than with hand pollination."

6.05	1. World Agroforestry. http://www.worldagroforestry.org/downloads/Publications/PDFS/BC07324.pdf (Accessed: 31 July 2015) 2. Florida Atlantic University. http://www.ces.fau.edu/files/education/resources/Bat_ID_sheet.pdf (Accessed: 31 July 2015) 3. Florida's Nature. http://www.floridasnature.com/florida_butterflies_3.htm (Accessed: 31 July 2015) 4. Cooperative Extension Service, University of Hawaii. Fruits and Nuts. http://scholarspace.manoa.hawaii.edu/bitstream/handle/10125/2403/FN-9.pdf?sequence=1 (Accessed: 31 July 2015)	1. "As the flowers open at night, bats and hawk moths in the natural range pollinate the flowers. In many countries where the crop is grown as a new crop, pollination is poor due to the lack of natural pollinators. Hense, hand pollination has been suggested to increase fruit set. Under Sri Lanken conditions, Honey bee, little honey bee, and Rock bee efeecively pollinate the Dragon fruit during the early hours of the morning" 2. Bats are common in Florida. 3. Moths are common in Florida. 4. "The flowers open rapidly, starting at around 6:40– 7:00 p.m., and flowering is completed by about 10:00 p.m. At 2:00 a.m., with pollination completed, the flower be- gins to wilt. The flower petals close completely by daybreak. Pitaya is pol- linated by moths in the evening, and hand pollination can enhance fruit set and size. The blooming of pitaya flowers is affected by temperature and light intensity. The flowers may open as early as 4:00 p.m. on a warm, cloudy day, while cool temperatures during off-seasons could slow flower wilt- ing so it concludes as late as 10:00 a.m." This could make pollination by other species possible.
6.06	1. Pacific Island Ecosystem at Risk. http://www.hear.org/pier/species/hylocereus_undatus.htm (Accessed: 31 July 2015)	1. "spreading, often extensively, vegetatively"
6.07	1. Shoot. http://www.shootgardening.co.uk/plant/hylocereus-undatus (Accessed: 31 July 2015) 2. Tasty Landscape. http://tastylandscape.com/2013/07/30/how-to-get-dragon-fruit-cactus-to-fruit/ (Accessed: 31 July 2015)	1. "5-10 years to maturity" 2. "You can also start Dragon Fruit Cactus from seed but it takes a lot longer for them to grow and reach fruiting maturity (It can take up to 6 years to fruit)."
7.01	Text	No evidence
7.02	1. Pacific Island Ecosystem at Risk. http://www.hear.org/pier/species/hylocereus_undatus.htm (Accessed: 30 July 2015) 2. CABI.http://www.cabi.org/isc/datasheet/27317 (Accessed: 30 July 2015)	1. "Commonly introduced as an ornamental and for its fruits but can naturalize." 2. "Dragon fruit plants are also grown as ornamentals for their large, attractive flowers and as bonsai specimens."
7.03		No evidence
7.04	1. National Tropical Botanical Garden. http://www.ntbg.org/plants/plant_details.php?plantid=%201188 4 (Accessed: 31 July 2015)	1. See photo. Seeds are very small and embedded within the fruit.
7.05	1. National Tropical Botanical Garden. http://www.ntbg.org/plants/plant_details.php?plantid=%201188 4 (Accessed: 31 July 2015)	1. See photo. Seeds are very small and embedded within the fruit.
7.06	1. Bird Ecology Study Group. http://www.besgroup.org/2013/04/05/birds-do-eat-the-dragon-fruit-hylocereus-undatus/ (Accessed: 30 July 2015) 2. CABI. http://www.cabi.org/isc/datasheet/27317 (Accessed: 31 July 2015)	1. See photos. Shows birds eating directly from the fleshy inside fo the fruit where the seeds are located. 2. "The tiny black seeds are eaten with the fruit; however, these are indigestible"
7.07	1. National Tropical Botanical Garden. http://www.ntbg.org/plants/plant_details.php?plantid=%201188 4 (Accessed: 31 July 2015)	1. See photo of fruit. Fruit lacks mechanism of attachment.
7.08	1. CABI. http://www.cabi.org/isc/datasheet/27317 (Accessed: 31 July 2015)	1. "The tiny black seeds are eaten with the fruit; however, these are indigestible"
8.01	1. Journal of Arid Environments. http://www.uv.mx/personal/tcarmona/files/2010/08/Valiente-et-al-2007.pdf (Accessed: 31 July 2015)	1. The control group produced approximately 5000 seeds per fruit.

8.02	1. Bananas Raras. http://www.bananasraras.org/frutasrarasingles/hylocereus.htm (Accessed: 31 July 2015) 2. Formosa Fruit. http://formosa-fruit.com/Hylocereus.undatus.html (Accessed: 31 July 2015)	1. "The seeds are hard-shelled and round, and are viable for 6 to 8 months, when stored in dark bottles." 2. "Seeds are able to be stored for many years if left in a cool, dry and dark conditions." (However, these are unnatural conditions)
8.03	1. Cooperative Extension Service, University of Hawaii. Herbicidal Weed Control Methods for Pastures and Natural Areas of Hawaii. http://www2.ctahr.hawaii.edu/oc/freepubs/pdf/WC-8.pdf (Accessed: 1 August 2015) 2. Hawaii Ecosystems at Risk. https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnx3ZWVkcmlza2Fzc2Vzc21lbnR8Z3g6M2Q0MTE0MTkzNDUxOTRmNw (Accessed: 1 August 2015)	1. Sensitive to Triclopyr. 2. "Hand pull and remove from site if possible; if removal is not feasible, lay the plants out on a plastic tarp and spray them with 10% Garlon 4; 15% Roundup has been successful but it takes much longer for the plants to die."
8.04	1. East Ballina Landcare Incorporated. https://www.ballina.nsw.gov.au/page.asp?f=RES-LGY-21-43-76 (Accessed: 31 July 2015)	1. "It is semi-epiphytic and xerophytic and can survive in the canopy after the main root had been severed."
8.05		No evidence

Pacific second screening: decision rules for species with WRA scores between 1 and 6

(from Daehler *et al*. 2004)



Vines must pass both tests