Taxon: Hoodia juttae **Family:** Apocynaceae

Common Name(s): hoodia **Synonym(s):**

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 21 Apr 2015

WRA Score: **-1.0** **Designation:** L **Rating:** Low Risk

Keywords: Succulent, Spiny, Medicinal, Fly-Pollinated, Wind-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	?
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	n
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
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
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		
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)		
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)	y=-1, n=1	y

Supporting Data:

Qsn #	Question	Answer
101	**Is the species highly domesticated?**	**n**
	Source(s)	**Notes**
	Court, D. 2000. Succulent Flora of Southern Africa. Revised Edition. A.A. Balkema, Rotterdam, Netherlands	No evidence

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	NA

201	**Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"**	**High**
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 21 Apr 2015]	"Native: AFRICA Southern Africa: Namibia"

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 21 Apr 2015]	"Native: AFRICA Southern Africa: Namibia"

203	**Broad climate suitability (environmental versatility)**	**n**
	Source(s)	**Notes**
	Loots, S. 2005. Red Data Book of Namibian plants. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria and Windhoek	"Habitat: Mountain bases and summits; among stones and inside bushes; in crevices on east-facing slopes in deep ravine; in coarse gravel on quartzite outcrops; lower slopes of ridges (Bruyns, 1993; WIND, 2002); 1000–1600 m."
	Dave's Garden. 2015. Hoodia - Hoodia juttae. http://davesgarden.com/guides/pf/go/132403/. [Accessed 21 Apr 2015]	"Hardiness: USDA Zone 10a: to -1.1 °C (30 °F) USDA Zone 10b: to 1.7 °C (35 °F) USDA Zone 11: above 4.5 °C (40 °F)"

Qsn #	Question	Answer
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 14 April	"Most of these species grow in areas of Africa where winters are dry, periods of rainfall are short & the plants adapt by becoming dormant & loosing roots. Here in Hawaii winters are the most rainy season, rain occurs frequently throughout the year & periods of prolonged wet soil conditions are encountered. Last summer here was also very wet & wet soil conditions persisted for months. When these plants are dormant they become highly susceptible to bacterial & fungal rot, mites and mite transmitted diseases."
	Craven, P. 2004. Hoodia juttae. The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	[Limited range] "Only known from around the base of and within the Little and Great Karas mountains, Namibia. In the Great Karas mountains it occurs both around the foot of the mountains and also on some of the high, flat topped summits."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 21 Apr 2015]	"Native: AFRICA Southern Africa: Namibia"

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	**Notes**
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 21 April	"Scarce in commerce."
	Bishop Museum. 2015. Online Natural Sciences Collections. http://nsdb.bishopmuseum.org/. [Accessed]	No specimens present in the Online Natural Sciences Collections database
	WRA Specialist. 2015. Personal Communication	Unknown. Not widely available through on-line sales. Limited cultivation information

301	Naturalized beyond native range	n
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. 2015. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm. [Accessed 21 Apr 2015]	No evidence

Qsn #	Question	Answer
302	**Garden/amenity/disturbance weed**	**n**
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

303	**Agricultural/forestry/horticultural weed**	**n**
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

304	**Environmental weed**	**n**
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

305	**Congeneric weed**	**n**
	Source(s)	**Notes**
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

401	**Produces spines, thorns or burrs**	**y**
	Source(s)	**Notes**
	Loots, S. 2005. Red Data Book of Namibian plants. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria and Windhoek	"Description: Spiny succulent, forming shrublet to 300 mm high, 0.5 mm in diameter, branching mainly from base. Stems many, erect, pale grey green, 30–50 mm thick with prominent obtuse, spine-tipped tubercles vertically arranged into 15 to 17 rows."

402	**Allelopathic**	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	Unknown

Qsn #	Question	Answer
403	**Parasitic**	**n**
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 21 Apr 2015]	Apocynaceae [No evidence]

404	Unpalatable to grazing animals	
	Source(s)	**Notes**
	Tibe, O., Modise, D. M., & Mogotsi, K. K. (2008). Potential for domestication and commercialization of Hoodia and Opuntia species in Botswana. African Journal of Biotechnology, 7(9): 1199-1203	[Possibly unpalatable] "There is no evidence that the Hoodia species has ever been used as livestock forage and fodder. Its spiny appearance may act as a deterrent to being eaten by animals."
	WRA Specialist. 2015. Personal Communication	Unknown

405	Toxic to animals	n
	Source(s)	**Notes**
	Dent, M. P., Wolterbeek, A. P. M., Russell, P. J., & Bradford R. (2012). Safety profile of Hoodia gordonii extract: rabbit prenatal developmental toxicity study. Food and Chemical Toxicology, 50, S26-S33	[Related taxon non-toxic] "Hoodia gordonii extract was orally administered by gavage to groups of 22 female New Zealand white rabbits from day 3-28 after mating at doses of 0 (control), 3, 6 or 12 mg/kg bodyweight/day. These doses were reached by a dose escalation phase between days 3 and 7 after mating. As well as a vehicle control group, a control group pair-fed to the high dose was also included. On day 29 after mating the females were euthanized and examined. Treatment at 6 or 12 mg/kg/day was associated with a dose related reduction in feed intake and bodyweight gain. Feed consumption and bodyweight gain was unaffected at 3 mg/kg/day. In spite of marked maternal effects at 12 mg/kg/day, reproductive indices were unaffected at all doses and there were no effects on fetal or placental weights and no morphological changes in the fetuses. The no-observed-effect level (NOEL) for developmental effects was therefore 12 mg/kg/ day, and the maternal NOEL was 3 mg/kg/day. At doses that caused marked maternal effects, H. gordonii extract did not affect embryonic or fetal development in a species that is considered predictive of developmental toxicity in man."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 21 April	"Survives longer than H. gordonii when planted in local soils but does not grow and eventually succumbs to bacterial rot and black spot transmitted by mites." ... "Same pests and diseases as H. gordonii"

Qsn #	Question	Answer
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 14 April	[Affected by widespread pests & diseases in the Hawaiian Islands] "When these plants are dormant they become highly susceptible to bacterial and fungal rot, mites and mite transmitted diseases." ... "Approximately 1000 seedlings and cuttngs of various Hoodia species (H. juttae, H. gordonii, H. macrantha, H. parviflora and H. pilifera) and Hoodiopsis triebneri have been grown in containers outdoors or planted directly in the ground for field trials at our site in Naalehu over the past three years. Virtually all of these have contracted black spot disease, a syndrome that apparently results from infestations with the false spider mite Brevipalpus phoenicis during wet weather conditions. The mite is present throughout Hawaii and has many host species. The permanent black lesions and scaring characteristic of the disease may result from the bite of the mite or a self limiting anthraconose fungus infection transmitted by the mites. This is still under investigation. Black spot disease weakens the plants and severely stunts growth of the affected shoots. If mite infestations are untreated the disease usually kills the plants. All species in this group except Caralluma and some Orbea spp. and Huernia spp. are susceptible to black spot disease.Bacterial soft rot is a devastating disease of this entire group, and also most prevalent during wet weather conditions. It is apparently caused by Erwinia bacteria (taxonomy unsettled) beginning as a root infection and spreading rapidly throughout the vascular system of the plant. Particularly in the swarming phase of growth the bacteria release enzymes that degrade the cell walls and result in the complete liquefaction of the internal tissues and collapse of the plant in 1- 2 days after the infection is first noticed. In Hoodia species the infections usually spread very rapidly and kill the entire plant. In Hoodiopsis infections tend to be walled off in the affected shoots, which may drop off and reroot as new plants."
	Directorate: Plant Production Division. 2013. Hoodia (Ascclepladaceae). Department of Agriculture, Forestry and Fisheries, Pretoria, South Africa	[Pests of South Africa taxa described] "The major insects identified in the plant include mealybugs, snails, slugs, scale, red spider mites and nematotes (eelworm)." ... "The major diseases identified include rot."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	Horizon Herbs. 2015. Hoodia* (Hoodia gordonii), potted plant, organic. https://www.horizonherbs.com/product.asp?specific=2181. [Accessed 21 Apr 2015]	[Description of related taxon] "Toxicity to pests or young children: none, the plant is spiny and self-protective, and its chemistry is nontoxic."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	Unlikely due to succulent habit

Qsn #	Question	Answer
409	**Is a shade tolerant plant at some stage of its life cycle**	
	Source(s)	**Notes**
	Dave's Garden. 2015. Hoodia - Hoodia juttae. http://davesgarden.com/guides/pf/go/132403/. [Accessed 21 Apr 2015]	"Sun Exposure: Light Shade"

410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**n**
	Source(s)	**Notes**
	Hübner, F. & Tränkle, U. 2014. Asclepidarium. http://www.asclepidarium.de/English/index_e.htm. [Accessed 21 Apr 2015]	"Hoodia juttae prefers purely mineral, fluffy and acidic substratum, well permeable to water. Accumulated heat and full sunshine make the plant dry up or scorches the shoot apexes fairly soon. Impeded drainage and high humidity, especially in combination with temperatures below 10° to 15°, should definitely be avoided, even though this species does not easily attract fungus rot."

411	**Climbing or smothering growth habit**	**n**
	Source(s)	**Notes**
	Hübner, F. & Tränkle, U. 2014. Asclepidarium. http://www.asclepidarium.de/English/index_e.htm. [Accessed 21 Apr 2015]	"Plant: opulently branching shrub, up to 30 by 50 cm, predominantly branching out from the base, stems pale grey-green, erect, 3 to 5 cm wide. Rows: tubercles set up in rows of 15-17, each ending in a pale grey-green 8 to 11 cm long spine."

412	**Forms dense thickets**	
	Source(s)	**Notes**
	Albers, F. & Meve, U. (eds.). 2002. Illustrated Handbook of Succulent Plants: Asclepiadaceae. Springer Science & Business Media, Berlin - Heidelberg - New York	"Forming dense cushions, 30 - 50 cm" [Unknown to what extent dense cushions may exclude other vegetation]

501	**Aquatic**	**n**
	Source(s)	**Notes**
	Craven, P. 2004. Hoodia juttae. The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	"Systems: Terrestrial"

502	**Grass**	**n**
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 21 Apr 2015]	"Family: Apocynaceae subfamily: Asclepiadoideae tribe: Ceropegieae subtribe: Stapeliinae. Also placed in: Asclepiadaceae"

503	**Nitrogen fixing woody plant**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 21 Apr 2015]	"Family: Apocynaceae subfamily: Asclepiadoideae tribe: Ceropegieae subtribe: Stapeliinae. Also placed in: Asclepiadaceae"

504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	Loots, S. 2005. Red Data Book of Namibian plants. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria and Windhoek	"Description: Spiny succulent, forming shrublet to 300 mm high, 0.5 mm in diameter, branching mainly from base. Stems many, erect, pale grey green, 30–50 mm thick with prominent obtuse, spine-tipped tubercles vertically arranged into 15 to 17 rows."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Craven, P. 2004. Hoodia juttae. The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	"Hoodia juttae is assessed as Least Concern." ... "This species is known from 9–18 subpopulations, with extent of occurrence < 10,000 km² and area of occupancy suspected to be < 5,625 km². The population is assumed to be stable at present, however, this may rapidly change if people begin collecting Hoodia plants for their appetite suppressant qualities (currently only H. gordonii is targeted). "

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Hübner, F. & Tränkle, U. 2014. Asclepidarium. http://www.asclepidarium.de/English/index_e.htm. [Accessed 21 Apr 2015]	"Reproduction is best accomplished by seed or grafting of cuttings."

603	**Hybridizes naturally**	
	Source(s)	**Notes**
	Hübner, F. & Tränkle, U. 2014. Asclepidarium. http://www.asclepidarium.de/English/index_e.htm. [Accessed 21 Apr 2015]	"Spontaneous frutification has not been recorded yet, neither have natural hybrids. In collections there are however some very beautiful hybrids."
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 21 April	[Hybridization suspected in cultivation. Suggest hybrids may occur in natural settings, but not observed thus far] "Container grown plants have bloomed and set viable seeds, apparently hybridizing with H. gordonii or other Hoodia species."

Qsn #	Question	Answer
604	**Self-compatible or apomictic**	
	Source(s)	**Notes**
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 14 April	"Observations suggest that these Hoodias are self□sterile and that pollination by the same or related species is required."

605	Requires specialist pollinators	n
	Source(s)	**Notes**
	Court, D. 2000. Succulent Flora of Southern Africa. Revised Edition. A.A. Balkema, Rotterdam, Netherlands	"...the flowers smaller with a longer pedicel. whereas in H. gordonii the flowers are closer to the stem. The outer corona lobes in H. juttae spread over the corolla disc outside the tube. whereas in H. gordonii the erect lobes do not lie on the disc surface."
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 21 April	"Fly pollinators are present here - common flies in Sarcophagidae, Calliphoridae, Muscidae etc."
	Swart E. 2008. Hoodia gordonii in Southern Africa. WG 3 – Succulents and Cycads, Case Study 6 – Hoodia gordonii. Mexico, NDF Workshop Case Studies	[Pollination syndrome described for H. gordonii. Presumably, H. juttae also visited & pollinated by flies] "Flowers are generally dish-shaped (50-110mm in diameter), with a fleshy colour (colour does vary from red to purple to brown to mottled dark yellow). Flowers are also referred to as carrion-flowers or stapeliads and smell like decaying meat to attract pollinators, namely flies and blowflies. Pollination occurs when the flies lay their eggs inside the flower."

606	Reproduction by vegetative fragmentation	n
	Source(s)	**Notes**
	Hübner, F. & Tränkle, U. 2014. Asclepidarium. http://www.asclepidarium.de/English/index_e.htm. [Accessed 21 Apr 2015]	"Reproduction is best accomplished by seed or grafting of cuttings."

607	Minimum generative time (years)	3
	Source(s)	**Notes**
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 21 April	" Comes out of dormancy later than H. gordonii."
	Hübner, F. & Tränkle, U. 2014. Asclepidarium. http://www.asclepidarium.de/English/index_e.htm. [Accessed 21 Apr 2015]	"It starts blooming at an early age of 3 or 4 years already."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	Unlikely, but possibly if hairs on seeds aid in adherence to clothing, or mud on shoes or equipment

702	Propagules dispersed intentionally by people	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 21 April	"Scarce in commerce."
	Amazon.com. 2015. Exotic Plants Hoodia juttae - Asclepiads - 3 seeds. http://www.amazon.com/Hoodia-juttae-Asclepiads-3-seeds/dp/B00LAFZJGO. [Accessed 21 Apr 2015]	Seeds sold commercially

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	**Notes**
	Hübner, F. & Tränkle, U. 2014. Asclepidarium. http://www.asclepidarium.de/English/index_e.htm. [Accessed 21 Apr 2015]	[Possible, but unlikely] "Seed of strictly this singular species is still hard to obtain, although it gained some more entry into collection within the last few years. Still it is rare. With some practice, hand pollination is easily successful. Spontaneous frutification has not been recorded yet, neither have natural hybrids."
	WRA Specialist. 2015. Personal Communication	Possibly, but no evidence. Seeds could potentially be blown into other crops, or containers with other plants & be dispersed unintentionally

704	Propagules adapted to wind dispersal	y
	Source(s)	**Notes**
	Hübner, F. & Tränkle, U. 2014. Asclepidarium. http://www.asclepidarium.de/English/index_e.htm. [Accessed 21 Apr 2015]	[Presumably yes. Seeds in genus with tuft of hairs at one side] " Fruit: follicle, in most cases two, 140 mm long, 270 seed per pair."

705	Propagules water dispersed	n
	Source(s)	**Notes**
	Loots, S. 2005. Red Data Book of Namibian plants. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria and Windhoek	[Unlikely. Although some secondary dispersal by water may be possible, this is a wind-dispersed species of arid habitats] "Habitat: Mountain bases and summits; among stones and inside bushes; in crevices on east-facing slopes in deep ravine; in coarse gravel on quartzite outcrops; lower slopes of ridges (Bruyns, 1993; WIND, 2002); 1000–1600 m."

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	Hübner, F. & Tränkle, U. 2014. Asclepidarium. http://www.asclepidarium.de/English/index_e.htm. [Accessed 21 Apr 2015]	[Not fleshy-fruited] " Fruit: follicle, in most cases two, 140 mm long, 270 seed per pair."

707	Propagules dispersed by other animals (externally)	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	[Unknown. Adapted for wind dispersal, but hairs could possibly allow seeds to adhere to fur or mud]

Qsn #	Question	Answer
708	**Propagules survive passage through the gut**	**n**
	Source(s)	**Notes**
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. Plant Protection Quarterly, 25(2): 56-74	"Answer 'no' where the taxon is unlikely to be eaten by animals or if seeds are not viable following passage through the gut." [Seeds possess adaptations for wind dispersal]

801	**Prolific seed production (>1000/m2)**	
	Source(s)	**Notes**
	Hübner, F. & Tränkle, U. 2014. Asclepidarium. http://www.asclepidarium.de/English/index_e.htm. [Accessed 21 Apr 2015]	[Unknown] " Fruit: follicle, in most cases two, 140 mm long, 270 seed per pair." ... "Seed of strictly this singular species is still hard to obtain, although it gained some more entry into collection within the last few years. Still it is rare. With some practice, hand pollination is easily successful. Spontaneous frutification has not been recorded yet, neither have natural hybrids."

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	
	Source(s)	**Notes**
	Royal Botanic Gardens Kew. 2008. Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/. [Accessed 21 Apr 2015]	Unknown. Seeds of other Hoodia species have orthodox storage

803	**Well controlled by herbicides**	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	Unknown. No information on herbicide efficacy or control of this species

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	
	Source(s)	**Notes**
	Loots, S. 2005. Red Data Book of Namibian plants. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria and Windhoek	"Threats: Illegal harvesting may become a potential future threat."

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

Qsn #	Question	Answer
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 14 April	[Affected by widespread pests & diseases] "Approximately 1000 seedlings and cuttngs of various Hoodia species (H. juttae, H. gordonii, H. macrantha, H. parviflora and H. pilifera) and Hoodiopsis triebneri have been grown in containers outdoors or planted directly in the ground for field trials at our site in Naalehu over the past three years. Virtually all of these have contracted black spot disease, a syndrome that apparently results from infestations with the false spider mite Brevipalpus phoenicis during wet weather conditions. The mite is present throughout Hawaii and has many host species. The permanent black lesions and scaring characteristic of the disease may result from the bite of the mite or a self limiting anthraconose fungus infection transmitted by the mites."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Able to grow in regions with tropical climates
• Spiny
• Possibly unpalatable to animals
• Reproduces by wind-dispersed seeds
• Limited ecological information may reduce accuracy of risk prediction

Low Risk Traits
• No reports of invasiveness or naturalization, but introduction outside native range may be limited
• Susceptibility to bacterial and fungal rot, mites and mite transmitted diseases may limit ability to escape & spread in the Hawaiian Islands
• Possibly self-incompatible
• Not reported to spread vegetatively