

<b>Taxon:</b> Hoodia parviflora	<b>Family:</b> Apocynaceae
<b>Common Name(s):</b> hoodia	<b>Synonym(s):</b> NA

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 25 Apr 2015
<b>WRA Score:</b> 0.0	<b>Designation:</b> L	<b>Rating:</b> 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		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans		
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		
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		
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/m <sup>2</sup> )		
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
	Court, D. 2000. Succulent Flora of Southern Africa. Revised Edition. A.A. Balkema, Rotterdam, Netherlands	"In south-western Angola west of the Chela Mountains; in northern Namibia along the Cunene River from the Ruacana Falls north-westwards to Otjimbingombonga and southwards to Okonguati."
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 24 Apr 2015]	"Native: AFRICA South Tropical Africa: Angola [s.w.] 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: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 24 Apr 2015]	

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Dave's Garden. 2015. Hoodia - Hoodia parviflora. <a href="http://davesgarden.com/guides/pf/go/162369/">http://davesgarden.com/guides/pf/go/162369/</a> . [Accessed 24 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 & losing 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."

204	<b>Native or naturalized in regions with tropical or subtropical climates</b>	y
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 24 Apr 2015]	"Native: AFRICA South Tropical Africa: Angola [s.w.] Southern Africa: Namibia"

205	<b>Does the species have a history of repeated introductions outside its natural range?</b>	?
	<b>Source(s)</b>	<b>Notes</b>
	Dave's Garden. 2015. Hoodia - Hoodia parviflora. <a href="http://davesgarden.com/guides/pf/go/162369/">http://davesgarden.com/guides/pf/go/162369/</a> . [Accessed 24 Apr 2015]	"This plant has been said to grow in the following regions: Phoenix, Arizona Tempe, Arizona"
	WRA Specialist. 2015. Personal Communication	Unknown. Not widely available through on-line sales. Limited cultivation information

301	<b>Naturalized beyond native range</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	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. <a href="http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm">http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm</a> . [Accessed 24 Apr 2015]	No evidence

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

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

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

305	Congeneric weed	n
	<b>Source(s)</b>	<b>Notes</b>
	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
	<b>Source(s)</b>	<b>Notes</b>
	Court, D. 2000. Succulent Flora of Southern Africa. Revised Edition. A.A. Balkema, Rotterdam, Netherlands	"The shrub has few to many erect stems from 300 mm to over 2 m in height (the largest stapeliad), 35-110 mm thick, with 14-18 vertical tuberculate angles, the tubercular spines 6-10 mm long, the stem epidermis matt blue-green."

402	Allelopathic	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2015. Personal Communication	Unknown

403	Parasitic	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 24 Apr 2015]	Apocynaceae [No evidence]

404	Unpalatable to grazing animals	
	<b>Source(s)</b>	<b>Notes</b>
	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."

Qsn #	Question	Answer
405	<b>Toxic to animals</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Neuwinger, H.D. 1996. African Ethnobotany: Poisons and Drugs : Chemistry, Pharmacology, Toxicology. CRC Press, Boca Raton, FL	[Suggest some toxic properties may be present in sap] "Natives of Kaokoland in northwest Namibia ... use the sap of the plant ... in bait to hunt jackal and similar small animals."
	Oyen, L.P.A., 2013. Hoodia gordonii (Masson) Sweet ex Decne. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). Prota 11(2): Medicinal plants/Plantes médicinales 2. PROTA, Wageningen, Netherlands	[Used for vermin control] "Hoodia parviflora N.E.Br. is the largest Hoodia with stems up to 2 m tall and 11 cm thick and large flowers. It occurs in south-western Angola and north-western Namibia. It is traditionally used for vermin control. "

406	Host for recognized pests and pathogens	
	<b>Source(s)</b>	<b>Notes</b>
	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 cuttings 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 scarring 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."

407	Causes allergies or is otherwise toxic to humans	
	<b>Source(s)</b>	<b>Notes</b>
	Hall, H. 1953. Hoodias. The Cactus and Succulent Journal of Great Britain 15(3): 68-69	"Unlike the milky fluid of Euphorbias, so acrid and poisonous, the sap of Hood/as is even relished by the natives, and I have been shown several times how they actually eat the young stems. Their sap is very bitter, to my mind, but it is not permanently unpleasant."

Qsn #	Question	Answer
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Neuwinger, H.D. 1996. African Ethnobotany: Poisons and Drugs : Chemistry, Pharmacology, Toxicology. CRC Press, Boca Raton, FL	[Unlikely due to succulent habit & stony habitat] "A spiny succulent, consisting of few to many erect stems..." ... "Plant grows mostly in stony areas in river valleys in mopane 'forest; ..."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Dave's Garden. 2015. Hoodia - Hoodia parviflora. <a href="http://davesgarden.com/guides/pf/go/162369/">http://davesgarden.com/guides/pf/go/162369/</a> . [Accessed 24 Apr 2015]	"Sun Exposure: Full Sun Sun to Partial Shade Light Shade"
	Hall, H. 1953. Hoodias. The Cactus and Succulent Journal of Great Britain 15(3): 68-69	[Generic description] "Unlike most of their Stapelia relatives which lurk beneath scrub or rocks, they usually stand out in the open to all the sun and wind and, in places, may be the only living plant for miles."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	Notes
	Neuwinger, H.D. 1996. African Ethnobotany: Poisons and Drugs : Chemistry, Pharmacology, Toxicology. CRC Press, Boca Raton, FL	"Plants grow mostly in stony areas..."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Neuwinger, H.D. 1996. African Ethnobotany: Poisons and Drugs : Chemistry, Pharmacology, Toxicology. CRC Press, Boca Raton, FL	"A spiny succulent, consisting of few to many erect stems forming a medium to large shrub 0.3-2.2 m tall."

412	Forms dense thickets	
	Source(s)	Notes
	Neuwinger, H.D. 1996. African Ethnobotany: Poisons and Drugs : Chemistry, Pharmacology, Toxicology. CRC Press, Boca Raton, FL	"Widespread in the highlands in Kaokoland in Namibia."
	Hall, H. 1953. Hoodias. The Cactus and Succulent Journal of Great Britain 15(3): 68-69	[Generic description] "Generally speaking, Hoodias inhabit the hot stony plains and rocky slopes where the rainfall is comparatively low. They are never plentiful, for there are vast miles of the said hot plains without a trace of a Hoodia plant."

Qsn #	Question	Answer
501	<b>Aquatic</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Neuwinger, H.D. 1996. African Ethnobotany: Poisons and Drugs : Chemistry, Pharmacology, Toxicology. CRC Press, Boca Raton, FL	[Terrestrial] "Plants grow mostly in stony areas in river valleys in mopane 'forest' but are also found scattered on steep slopes and mountain tops."

502	<b>Grass</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 24 Apr 2015]	"Family: Apocynaceae subfamily: Asclepiadoideae tribe: Ceropegieae subtribe: Stapeliinae. Also placed in: Asclepiadaceae "

503	<b>Nitrogen fixing woody plant</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 24 Apr 2015]	"Family: Apocynaceae subfamily: Asclepiadoideae tribe: Ceropegieae subtribe: Stapeliinae. Also placed in: Asclepiadaceae"

504	<b>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Neuwinger, H.D. 1996. African Ethnobotany: Poisons and Drugs : Chemistry, Pharmacology, Toxicology. CRC Press, Boca Raton, FL	"A spiny succulent, consisting of few to many erect stems forming a medium to large shrub 0.3-2.2 m tall."

601	<b>Evidence of substantial reproductive failure in native habitat</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Neuwinger, H.D. 1996. African Ethnobotany: Poisons and Drugs : Chemistry, Pharmacology, Toxicology. CRC Press, Boca Raton, FL	"Widespread in the highlands in Kaokoland in Namibia."
	Klaassen, E. S., & Kwembeya, E. G. (2013). A Checklist of Namibian Indigenous and Naturalised Plants. Occasional Contributions, 5. National Botanical Research Institute, Windhoek, Namibia	Hoodia parviflora - LC Least concern

602	<b>Produces viable seed</b>	y
	<b>Source(s)</b>	<b>Notes</b>



Qsn #	Question	Answer
	Dave's Garden. 2015. Hoodia - Hoodia parviflora. <a href="http://davesgarden.com/guides/pf/go/162369/">http://davesgarden.com/guides/pf/go/162369/</a> . [Accessed 24 Apr 2015]	"Propagation Methods: From woody stem cuttings Allow cut surface to callous over before planting From seed; winter sow in vented containers, coldframe or unheated greenhouse From seed; direct sow after last frost From seed; germinate in a damp paper towel"

603	Hybridizes naturally	
	Source(s)	Notes
	Oyen, L.P.A., 2013. Hoodia gordonii (Masson) Sweet ex Decne. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). Prota 11(2): Medicinal plants/Plantes médicinales 2. PROTA, Wageningen, Netherlands	[Natural hybrids reported in other members of genus] "Natural hybrids have been recorded between Hoodia gordonii and Hoodia flava (N.E.Br.) Plowes. The plants were fertile and backcrosses with the parents successful. Natural intergeneric crosses include: Hoodia gordonii × Orbeopsis lutea (N.E.Br.) L.C.Leach subsp. vaga (N.E.Br.) L.C.Leach and Hoodia gordonii × Stapelia arenosa Luckhoff."
	Sustainable Bioresources, LLC. 2015. Certified Nursery Product List. <a href="http://hdoa.hawaii.gov/pi/files/2013/01/0482-Sustainable-Bioresources-LLC-15-03-05.pdf">http://hdoa.hawaii.gov/pi/files/2013/01/0482-Sustainable-Bioresources-LLC-15-03-05.pdf</a> . [Accessed ]	[Possibly Yes. Artificial hybrids in cultivation] "Hoodia parviflora X Hoodia spp. intraspecific hybrids ("HPARX-" series cultivars)"

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
	Grubben, G.J.H. (ed.). 2004. Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Most Hoodia flowers have a foetid, excrement-like odour; they produce nectar and pollination is mostly effected by flies."
	Court, D. 2000. Succulent Flora of Southern Africa. Revised Edition. A.A. Balkema, Rotterdam, Netherlands	"Relatively small flowers cluster at the stem apex, on short pedicels 2-4 mm long. The corolla is funnel-shaped, 5-lobed, 30-55 mm across, the corolla face covered with setose papillae on the yellow to brownish-orange surface with darker venation. The tube is up to 4 mm deep, corona purplish-black."
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 14 April	"The large flowered species of Hoodia with malodorous blooms - "carrion flowers" (H. gordonii, H. macrantha, H. parviflora, H. juttiae and some H. pilifera ssp.) and Hoodiopsis are pollinated by flies. We have confirmed that a wide variety of fly species present throughout Hawaii are capable of pollinating the plants resulting in production of viable seeds."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes

Qsn #	Question	Answer
	Hall, H. 1953. Hoodias. The Cactus and Succulent Journal of Great Britain 15(3): 68-69	[No evidence] "It seems an impossible task to propagate them by cuttings, and I have never seen root formation upon branches broken off by animals, etc., and which may have been lying on the soil for a year or more. One would imagine that a plant with 30—40 branches from the base would have a few supplementary roots from some of them, but the root system appears to be confined to the original central stem."

607	Minimum generative time (years)	3
	Source(s)	Notes
	Oyen, L.P.A., 2013. Hoodia gordonii (Masson) Sweet ex Decne. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). Prota 11(2): Medicinal plants/Plantes médicinales 2. PROTA, Wageningen, Netherlands	[H. gordonii reaches maturity in 3+ years. H. parviflora probably has a similar, or longer time to maturity due to large size] "Hoodia parviflora N.E.Br. is the largest Hoodia with stems up to 2 m tall and 11 cm thick and large flowers."

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
	Amazon.com. 2015. Exotic Plants Hoodia parviflora - Asclepiads - 3 seeds. <a href="http://www.amazon.com/Hoodia-parviflora-Asclepiads-3-seeds/dp/B00LAFZKYA">http://www.amazon.com/Hoodia-parviflora-Asclepiads-3-seeds/dp/B00LAFZKYA</a> . [Accessed 24 Apr 2015]	Seeds sold commercially

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	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
	Neuwinger, H.D. 1996. African Ethnobotany: Poisons and Drugs : Chemistry, Pharmacology, Toxicology. CRC Press, Boca Raton, FL	"Fruit. The follicles have a slightly angles shape with a slight ridge running longitudinally along the edge. They develop quickly after flowering."
	Hall, H. 1953. Hoodias. The Cactus and Succulent Journal of Great Britain 15(3): 68-69	[Generic description] "But it must be remembered that the seed is wind borne, too, and they get arrested in their progress by bushes at times so that one does see specimens tangled up with the bush."

705	Propagules water dispersed	
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Neuwinger, H.D. 1996. African Ethnobotany: Poisons and Drugs : Chemistry, Pharmacology, Toxicology. CRC Press, Boca Raton, FL	[Unlikely. Although some secondary dispersal by water may be possible, this is a wind-dispersed species of arid habitats. Proximity to rivers may aid in secondary dispersal] "Plants grow mostly in stony areas in river valleys ..."

706	Propagules bird dispersed	n
	<b>Source(s)</b>	<b>Notes</b>
	Neuwinger, H.D. 1996. African Ethnobotany: Poisons and Drugs : Chemistry, Pharmacology, Toxicology. CRC Press, Boca Raton, FL	[Not fleshy-fruited] "Fruit. The follicles have a slightly angles shape with a slight ridge running longitudinally along the edge. They develop quickly after flowering."

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

708	Propagules survive passage through the gut	n
	<b>Source(s)</b>	<b>Notes</b>
	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 & are unlikely to be consumed]

801	Prolific seed production (>1000/m2)	n
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2015. Personal Communication	Unknown

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	<b>Source(s)</b>	<b>Notes</b>
	Royal Botanic Gardens Kew. 2008. Seed Information Database (SID). Version 7.1. <a href="http://data.kew.org/sid/">http://data.kew.org/sid/</a> . [Accessed 25 Apr 2015]	Unknown. Seeds of other Hoodia species have orthodox storage

803	Well controlled by herbicides	n
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2015. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	n
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown. Other Hoodia species are damaged by overharvesting & exploitation of wild populations

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y
	Source(s)	Notes
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 14 April	[Affected by widespread pests & diseases] "Approximately 1000 seedlings and cuttings of various Hoodia species ( <i>H. juttae</i> , <i>H. gordonii</i> , <i>H. macrantha</i> , <i>H. parviflora</i> and <i>H. pilifera</i> ) and <i>Hoodiopsis triebneri</i> 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 <i>Brevipalpus phoenicis</i> during wet weather conditions. The mite is present throughout Hawaii and has many host species. The permanent black lesions and scarring 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
- Possibly produces interspecific hybrids
- 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
- Valuable medicinal plant
- 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