

Taxon: Hoodia ruschii	Family: Apocynaceae
Common Name(s): hoodia	Synonym(s): NA

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 6 May 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	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)		

Qsn #	Question	Answer Option	Answer
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)		
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/m ²)		
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
	Craven, P. 2004. <i>Hoodia ruschii</i> . The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	[No evidence] "This species has a restricted range. It is known from one, possibly two, subpopulations with extent of occurrence estimated at < 625 km ² . The population is assumed to be stable at present, however, this may rapidly change if people begin collecting <i>Hoodia</i> plants for their appetite suppressant qualities (currently only <i>H. gordonii</i> is targeted). "

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
	Craven, P. 2004. <i>Hoodia ruschii</i> . The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	"Range Description: Known only from the Tiras Mountains on eastern flank, Namibia (Bruyns 1993). Countries: Native: Namibia"

202	Quality of climate match data	High
	Source(s)	Notes
	Craven, P. 2004. <i>Hoodia ruschii</i> . The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Dave's Garden. 2015. Hoodia - Hoodia ruschii. http://davesgarden.com/guides/pf/go/85805/ . [Accessed 6 May 2015]	"Hardiness: USDA Zone 11: above 4.5 °C (40 °F)"
	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	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Craven, P. 2004. Hoodia ruschii. The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	"Range Description: Known only from the Tiras Mountains on eastern flank, Namibia (Bruyns 1993). Countries: Native: Namibia"

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	Dave's Garden. 2015. Hoodia - Hoodia ruschii. http://davesgarden.com/guides/pf/go/85805/ . [Accessed 6 May 2015]	"This plant has been said to grow in the following regions: Cabin Creek, West Virginia"
	WRA Specialist. 2015. Personal Communication	Not widely available through on-line sales. Limited cultivation information
	World Seed Supply. 2005. 20 Hoodia Ruschii Seeds. http://worldseedsupply.ecrater.com/p/9680705/20-hoodia-ruschii-seeds-succulent-gordonii . [Accessed 6 May 2015]	Seeds available for purchase

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 6 May 2015]	No evidence

302	Garden/amenity/disturbance weed	n
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Qsn #	Question	Answer
	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
	Court, D. 2000. Succulent Flora of Southern Africa. Revised Edition. A.A. Balkema, Rotterdam, Netherlands	"The many-stemmed plants may reach 500 mm in width and height, the stems 40-50 mm thick, the tubercles in 22-28 angles, bearing spines 6-8 mm long."
402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown
403	Parasitic	n
	Source(s)	Notes
	Court, D. 2000. Succulent Flora of Southern Africa. Revised Edition. A.A. Balkema, Rotterdam, Netherlands	"The many-stemmed plants may reach 500 mm in width and height, the stems 40-50 mm thick, the tubercles in 22-28 angles, bearing spines 6-8 mm long." [No evidence. Apocynaceae]
404	Unpalatable to grazing animals	

Qsn #	Question	Answer
	Source(s)	Notes
	Loots, S. 2005. Red Data Book of Namibian plants. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria and Windhoek	[Unknown, but spines may deter browsing] "Description: Spiny succulent, up to 450 mm high, up to 0.5 m. Stems, many, erect, brownish to grey-green, 40–60 mm thick, branching mainly from base with prominent, spine-tipped tubercles that are vertically arranged into 22–28 rows."

405	Toxic to animals	n
	Source(s)	Notes
	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. 14 April	[Affected by widespread pests & diseases in the Hawaiian Islands] "When these plants are dormant they become highly susceptible to bacterial & fungal rot, mites & mite transmitted diseases." ..."Approximately 1000 seedlings & cuttings of various Hoodia species (<i>H. juttae</i> , <i>H. gordonii</i> , <i>H. macrantha</i> , <i>H. parviflora</i> & <i>H. pilifera</i>) & <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 & has many host species. The permanent black lesions & 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 & severely stunts growth of the affected shoots. If mite infestations are untreated the disease usually kills the plants. All species in this group except <i>Caralluma</i> & some <i>Orbea</i> spp. & <i>Huernia</i> spp. are susceptible to black spot disease. Bacterial soft rot is a devastating disease of this entire group, & also most prevalent during wet weather conditions. It is apparently caused by <i>Erwinia</i> bacteria (taxonomy unsettled) beginning as a root infection & 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 & result in the complete liquefaction of the internal tissues & collapse of the plant in 1- 2 days after the infection is first noticed. In <i>Hoodia</i> species the infections usually spread very rapidly & kill the entire plant. In <i>Hoodiopsis</i> infections tend to be walled off in the affected shoots, which may drop off & reroot as new plants."

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

Qsn #	Question	Answer
	Loots, S. 2005. Red Data Book of Namibian plants. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria and Windhoek	[No evidence. Presumably used medicinally as are other related taxa] "illegal harvesting may become a potential future threat."
	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
	Loots, S. 2005. Red Data Book of Namibian plants. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria and Windhoek	[No evidence. Unlikely given succulent habit & sparsely vegetated habitat] "Spiny succulent, up to 450 mm high, up to 0.5 m." ... "On steep granite slopes among rocks and small bushes; east-facing slopes in steep dry rocky areas; on flats below mountains; 1600–1700 m (WIND, 2002)."

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Dave's Garden. 2015. Hoodia - Hoodia ruschii. http://davesgarden.com/guides/pf/go/85805/ . [Accessed 6 May 2015]	"Sun Exposure: Full Sun Sun to Partial 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
	Loots, S. 2005. Red Data Book of Namibian plants. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria and Windhoek	"On steep granite slopes among rocks and small bushes; east-facing slopes in steep dry rocky areas; on flats below mountains; 1600–1700 m (WIND, 2002)."
	Dave's Garden. 2015. Hoodia - Hoodia ruschii. http://davesgarden.com/guides/pf/go/85805/ . [Accessed 6 May 2015]	"Soil pH requirements: 6.1 to 6.5 (mildly acidic) 6.6 to 7.5 (neutral)"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Court, D. 2000. Succulent Flora of Southern Africa. Revised Edition. A.A. Balkema, Rotterdam, Netherlands	"The many-stemmed plants may reach 500 mm in width and height, the stems 40-50 mm thick, the tubercles in 22-28 angles, bearing spines 6-8 mm long."

Qsn #	Question	Answer
412	Forms dense thickets	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	[No evidence from native range] "Not uncommon but rather scattered"
501	Aquatic	n
	Source(s)	Notes
	Craven, P. 2004. <i>Hoodia ruschii</i> . 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 6 May 2015]	"Family: Apocynaceae subfamily: Asclepiadoideae tribe: Ceropegieae subtribe: Stapeliinae. Also placed in: Asclepiadaceae"
503	Nitrogen fixing woody plant	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 6 May 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
	Court, D. 2000. Succulent Flora of Southern Africa. Revised Edition. A.A. Balkema, Rotterdam, Netherlands	[No evidence] "The many-stemmed plants may reach 500 mm in width and height, the stems 40-50 mm thick, the tubercles in 22-28 angles, bearing spines 6-8 mm long."

Qsn #	Question	Answer
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Craven, P. 2004. <i>Hoodia ruschii</i> . The IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org	" <i>Hoodia ruschii</i> is assessed as Least Concern. The RAMAS® Red List version 2.0 software package was used to make this assessment. This species has a restricted range. It is known from one, possibly two, subpopulations with extent of occurrence estimated at < 625 km². The population is assumed to be stable at present, however, this may rapidly change if people begin collecting <i>Hoodia</i> plants for their appetite suppressant qualities (currently only <i>H. gordonii</i> is targeted). "
602	Produces viable seed	y
	Source(s)	Notes
	Dave's Garden. 2015. <i>Hoodia</i> - <i>Hoodia ruschii</i> . http://davesgarden.com/guides/pf/go/85805/ . [Accessed 6 May 2015]	"Propagation Methods: From herbaceous stem cuttings From seed; sow indoors before last frost"
	Succulent Plant Site. 2015. <i>Hoodia ruschii</i> . http://www.succulents.co.za/Asclepiadaceae/hoodia/hoodia_ruschii.htm . [Accessed 6 May 2015]	"Propagation: Seeds and cuttings."
603	Hybridizes naturally	
	Source(s)	Notes
	Sustainable Bioresources, LLC. 2015. Certified Nursery Product List. http://hdoa.hawaii.gov/pi/files/2013/01/0482-Sustainable-Bioresources-LLC-15-03-05.pdf . [Accessed 6 May 2015]	[Possibly Yes. Artificial hybrids in cultivation] " <i>Hoodia ruschii</i> X <i>Hoodia</i> spp. hybrids"
604	Self-compatible or apomictic	
	Source(s)	Notes
	Rau, E. 2015. President, Sustainable Bioresources, LLC. Personal Communication. 14 April	"Observations suggest that these <i>Hoodias</i> are self-sterile and that pollination by the same or related species is required."

Qsn #	Question	Answer
605	Requires specialist pollinators	n
	Source(s)	Notes
	Court, D. 2000. Succulent Flora of Southern Africa. Revised Edition. A.A. Balkema, Rotterdam, Netherlands	"Flowers in clusters of 4-10, foul-smelling."
	Loots, S. 2005. Red Data Book of Namibian plants. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria and Windhoek	[Odor presumably to attract flies for pollination, as in other members of the genus] "Flowers in groups of 4–10, mainly on upper half of stem, extremely foul-smelling; corolla 20–40 mm in diameter, broadly bellshaped, glabrous, pale green to reddish at base outside, deep red-brown inside, with conical papillae, each tipped with slender, spreading bristle (Bruyns, 1993)." ... "flowers putrid smelling"

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Succulent Plant Site. 2015. Hoodia ruschii. http://www.succulents.co.za/Asclepiadaceae/hoodia/hoodia_ruschii.htm . [Accessed 6 May 2015]	"Propagation: Seeds and cuttings."
	Hall, H. 1953. Hoodias. The Cactus and Succulent Journal of Great Britain 15(3): 68-69	[Generic description] "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)	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown. Other Hoodia species reach reproductive maturity in 3-5+ years from seed

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
	World Seed Supply. 2005. 20 Hoodia Ruschii Seeds. http://worldseedsupply.ecrater.com/p/9680705/20-hoodia-ruschii-seeds-succulent-gordonii . [Accessed 6 May 2015]	Seeds available for purchase

703	Propagules likely to disperse as a produce contaminant	

Qsn #	Question	Answer
	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
	Hall, H. 1953. Hoodias. The Cactus and Succulent Journal of Great Britain 15(3): 68-69	"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 aoes see specimens tangled up with the bush."
	WRA Specialist. 2015. Personal Communication	Presumably yes, as are other species in the genus

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] "On steep granite slopes among rocks and small bushes; east-facing slopes in steep dry rocky areas; on flats below mountains; 160–1700 m (WIND, 2002)."

706	Propagules bird dispersed	n
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	No evidence & not fleshy-fruited

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

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
	WRA Specialist. 2015. Personal Communication	Unknown

Qsn #	Question	Answer
802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Dave's Garden. 2015. Hoodia - Hoodia ruschii. http://davesgarden.com/guides/pf/go/85805/ . [Accessed 6 May 2015]	"Seed does not store well; sow as soon as possible"
803	Well controlled by herbicides	
	Source(s)	Notes
	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	
	Source(s)	Notes
	Loots, S. 2005. Red Data Book of Namibian plants. Southern African Botanical Diversity Network Report No. 38. SABONET, Pretoria and Windhoek	[Unknown. Plants presumably do not tolerate or recover well from damage to or removal of plant parts] "Restricted range but no real threats could be confirmed; illegal harvesting may become a potential future threat."
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
- Reproduces by wind-dispersed seeds
- May be able to produce interspecific & intergeneric hybrids
- Limited ecological information may reduce accuracy of risk prediction

Low Risk Traits

- No reports of invasiveness or naturalization, but introduction outside native range appear to 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