Taxon: Pachypodium rutenbergianum Vatke **Family:** Apocynaceae

Common Name(s): boadaka, bontaka, pachypodium, vohely, vontaka

Synonym(s):

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 9 Jan 2017

WRA Score: 2.0 **Designation:** L **Rating:** Low Risk

Keywords: Succulent Tree, Spiny, Toxic, Wind-Dispersed, Sweet-scented

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	y
406	Host for recognized pests and pathogens	y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
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	y=1, n=0	n
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
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	y
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)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed		
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	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	**Is the species highly domesticated?**	**n**
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	No evidence of domestication

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. 2017. 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, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 5 Jan 2017]	"Native: Africa Western Indian Ocean: Madagascar"

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 12 Jan 2017]	

Qsn #	Question	Answer
203	**Broad climate suitability (environmental versatility)**	**n**
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. 2017. Pachypodium rutenbergianum. http://www.llifle.com. [Accessed 9 Jan 2017]	"Hardiness: It is sensitive to cold and should be kept totally dry in winter at or around 10°C, but it demonstrates some cold resilience if dormant and the soil is bone dry in winter. Protect from frost. It tends to lose its leave and go dormant in winter (USDA Hardiness zones: 10 – 11). "
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"In Madagascar Pachypodium species are found from sea level (P. cactipes, P. geayi and P. rutenbergianum) to an altitude of 1900 m (P. brevicaule)."
	Missouri Botanical Garden. 2017. Pachypodium rutenbergianum. http://www.missouribotanicalgarden.org/. [Accessed 6 Jan 2017]	"Zone: 10 to 11"

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 5 Jan 2017]	"Native: Africa Western Indian Ocean: Madagascar"

205	**Does the species have a history of repeated introductions outside its natural range?**	**?**
	Source(s)	**Notes**
	Sustainable Bioresources, LLC. 2017. Pachypodium rutenbergianum meriondale. http://sustainablebioresources.com/. [Accessed 9 Jan 2017]	"Not in wide cultivation."
	Dave's Garden. 2017. Pachypodium - Pachypodium rutenbergianum. http://davesgarden.com/guides/pf/go/58702/. [Accessed 6 Jan 2017]	"This plant has been said to grow in the following regions: Grenoble, Tarzana, California Brooksville, Florida Miami, Florida Fayetteville, North Carolina"
	Missouri Botanical Garden. 2017. Pachypodium rutenbergianum. http://www.missouribotanicalgarden.org/. [Accessed 6 Jan 2017]	[Cultivated in the mainland US] "Winter hardy to USDA Zones 10-11 where it should be grown in desert-type conditions in full sun or in greenhouses with night temperatures that do not dip below 55 degrees F. Intolerant of frost. Grows well in dry soils. It may also be grown as a houseplant in warm, humid, sunny locations. Houseplants may drop leaves in winter."

301	**Naturalized beyond native range**	**n**
	Source(s)	**Notes**

Qsn #	Question	Answer
	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. 2017. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/. [Accessed 6 Jan 2017]	No evidence

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 species listed as weed. One species, P. saundersii, with an unconfirmed report of naturalization

401	Produces spines, thorns or burrs	y
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"Branchlets 1-3.5 cm in diameter, covered with paired straight or rarely curved spines, 3-15 mm long, 1-10 mm wide at the base, basal part conical and laterally compressed, 0.1-0.4 of the spine length, sometimes in between them one or two minute spines."

402	Allelopathic	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	[Unknown. Grows with other vegetation] "This species is widely spread. It grows on limestone or gneiss rocks and also on pure quartz sand, mostly in dry forests. Alt. 0-400 m. Accompanied by Pachypodium windsorii, P. decaryi, P. rosulatum, P. sofiense, P. ambongense or P. bicolor, depending on the ecology of the species listed here."

403	Parasitic	n
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"Candelabrum-shaped tree, 3-12 m high; trunk bottle- or cigar-shaped, 15-100 cm in diameter" [Apocynaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown, but spines, and sap, might deter browsing

405	Toxic to animals	y
	Source(s)	**Notes**
	Sustainable Bioresources, LLC. 2017. Pachypodium rutenbergianum meriondale. http://sustainablebioresources.com/. [Accessed 9 Jan 2017]	"Warning: all parts of plants in the genus Pachypodium should be considered poisonous."
	Bester, S. P. 2007. Pachypodium Lindl. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/pachypodium.htm. [Accessed 9 Jan 2017]	[Presumably Yes] "Pachypodium falls in a group of the Apocynaceae notorious for poisonous properties and for yielding potent poisons that have been used most effectively in arrow poison since ancient times. The active principles in these poisons are usually glucosides with a digitalis-like action that stimulates the heart, and their effect is well known to hunters who often control and administer them with great skill. "

406	Host for recognized pests and pathogens	n
	Source(s)	**Notes**
	Missouri Botanical Garden. 2017. Pachypodium rutenbergianum. http://www.missouribotanicalgarden.org/. [Accessed 9 Jan 2017]	"Problems: No serious insect or disease problems."

407	Causes allergies or is otherwise toxic to humans	y
	Source(s)	**Notes**
	Sustainable Bioresources, LLC. 2017. Pachypodium rutenbergianum meriondale. http://sustainablebioresources.com/. [Accessed 9 Jan 2017]	"Warning: all parts of plants in the genus Pachypodium should be considered poisonous. Wounds caused by thorns may be painful and slow to heal."

Qsn #	Question	Answer
	Bester, S. P. 2007. Pachypodium Lindl. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/pachypodium.htm. [Accessed 9 Jan 2017]	[Presumably Yes] "Pachypodium falls in a group of the Apocynaceae notorious for poisonous properties and for yielding potent poisons that have been used most effectively in arrow poison since ancient times. The active principles in these poisons are usually glucosides with a digitalis like action that stimulates the heart, and their effect is well known to hunters who often control and administer them with great skill. "

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. 2017. Pachypodium rutenbergianum. http://www.llifle.com. [Accessed 9 Jan 2017]	[No evidence. Succulent habit would probably inhibit fire] "Two significant adapations allow Pachypodium to survive in dry, hostile environments: “pachycaul” trunks, and spines. The thick, more or less pithy, trunks of pachypodium facilitate water storage similar to a cactus."
	Hart, G. (2007). Succulents that survive in the Madagascar tsingy. Cactus and Succulent Journal, 79(3), 109-115	[No evidence] "The micro-environments on the tsingy have remained relatively intact, because the tsingy itself forms a natural barrier to exploitation and is largely resistant to fire." ... "Pachypodium rutenbergianum is widely distributed from the west coast to the far north and grows on sandy, flat soils as well as on tsingy. Young plants have thick conical spines that tend to disappear from older wood. Eventually these plants can grow into huge trees (up to 12 meters tall) with a smooth cylindrical trunk that would be unrecognizable as a pachypodium without access to the growing tip."

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. 2017. Pachypodium rutenbergianum. http://www.llifle.com. [Accessed 9 Jan 2017]	"Exposure: It like full sun to light shade."
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"In Hawaii, pachypodiums are grown only in hot, dry areas in full sun and are carefully and sparingly watered."
	Dave's Garden. 2017. Pachypodium - Pachypodium rutenbergianum. http://davesgarden.com/guides/pf/go/58702/. [Accessed 9 Jan 2017]	"Sun Exposure: Full Sun"
	Missouri Botanical Garden. 2017. Pachypodium rutenbergianum. http://www.missouribotanicalgarden.org/. [Accessed 9 Jan 2017]	"Sun: Full sun"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"P. rutenbergianum is found in very diverse ecological situations. It can grow in areas with soils pH 4-7 (measured by Roosli)." ... rutenbergianum can grow on varying substrates, particularly on sand with laterite or on sand such as P. geayi and P. rosulatum." ... "Pachypodium rutenbergianum grows on Mesozoic and Tertiary calcareous rocks, sand, sand with laterite and on outcrops of granite. This species may occur on acid to almost basic soils with pH values ranging from 4.5 to 7."
	LLIFLE - Encyclopedia of living forms. 2017. Pachypodium rutenbergianum. http://www.llifle.com. [Accessed 9 Jan 2017]	"Soil: Needs a gritty, porous cactus potting mix that's not strongly acidic."

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"Candelabrum-shaped tree, 3-12 m high; trunk bottle- or cigar-shaped, 15-100 cm in diameter"

412	Forms dense thickets	n
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	[No evidence] "ECOLOGY. This species is widely spread. It grows on limestone or gneiss rocks and also on pure quartz sand, mostly in dry forests. Alt. 0-400 m. Accompanied by Pachypodium windsorii, P. decaryi, P. rosulatum, P. sofiense, P. ambongense or P. bicolor, depending on the ecology of the species listed here."

501	Aquatic	n
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	[Terrestrial] "Candelabrum-shaped tree, 3-12 m high; trunk bottle- or cigar-shaped, 15-100 cm in diameter" ... "Low open deciduous western forest, coastal bush, scrubland and savanna"

502	Grass	n
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 5 Jan 2017]	Family: Apocynaceae Subfamily: Apocynoideae Tribe: Malouetieae

Qsn #	Question	Answer
503	**Nitrogen fixing woody plant**	**n**
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 5 Jan 2017]	Family: Apocynaceae Subfamily: Apocynoideae Tribe: Malouetieae

504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"HABIT. Tree 3-12 m high, with conspicuous thickening of trunk."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"The popularity of these plants has endangered them in the wild, primarily due to over collecting."
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"This species is widely spread."
	Wiersema, J.H. & León, B. 1999. World Economic Plants: A Standard Reference. CRC Press, Boca Raton, FL	CITES-II [Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled.]

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. 2017. Pachypodium rutenbergianum. http://www.llifle.com. [Accessed 9 Jan 2017]	"Propagation: Seeds or (rarely) cuttings. Fresh seeds results in a remarkable yield of new plants, perhaps 90% and seedlings grow fairly easily. Soak seeds in warm water for 24 hours before sowing in a 5 mm deep, sterile, moist sandy medium (4 parts fine and 4 parts coarse river sand 1 part sieved, well-rotten compost; 1 part perlite; 1 part vermiculite. Keep the mix moist and at a temperature of 27–35°C to ensure rapid germination. Seed start sprouting in just 3-4 days (but continue to germinate erratically for about 6 month) they are also propagated by removal of branches from old plant (if they need to be pruned)."
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"REPRODUCTION. By seeds."

603	**Hybridizes naturally**	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Eggli, U. 2002. Illustrated handbook of succulent plants: Dicotyledons. Springer-Verlag, Berlin - Heidelberg - New York	[Unknown] "Occasional wild hybrids have been reported, and garden hybrids have been created, but none so fare between Madagascan and African species."

604	Self-compatible or apomictic	
	Source(s)	**Notes**
	Lipow, S. R., & Wyatt, R. (1999). Floral morphology and late-acting self-incompatibility in Apocynum cannabinum (Apocynaceae). Plant Systematics and Evolution, 219(1-2): 99-109	[Unknown for P. rutenbergianum] "... five species of Pachypodium (Anderson 1983) are self compatible."

605	Requires specialist pollinators	y
	Source(s)	**Notes**
	Eggli, U. 2002. Illustrated handbook of succulent plants: Dicotyledons. Springer-Verlag, Berlin - Heidelberg - New York	"Pollination is as for Adenium..." "... Adenium .. Pollination requires a long, slender proboscis to enter the lower chamber between one of the five slits in the androecial cone. Incoming pollen lands on the stigmatic area; as the proboscis is withdrawn it is gummed by contact with the knob of the style and picks up fresh pollen from the anthers above. In cultivation a cat's whisker or horse's tail hair can be used to cross-pollinate two plants."

606	Reproduction by vegetative fragmentation	n
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. 2017. Pachypodium rutenbergianum. http://www.llifle.com. [Accessed 9 Jan 2017]	"Propagation: Seeds or (rarely) cuttings."
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"REPRODUCTION. By seeds"

607	Minimum generative time (years)	
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. 2017. Pachypodium rutenbergianum. http://www.llifle.com. [Accessed 9 Jan 2017]	[Age of first flowering unspecified] "Growth rate: Relatively fast growing for a Pachypodium. It is probably the largest also, easily attaining tree proportions and an impressive caudex can be steadily developed. In the winters it is deciduous, except in very tropical areas." ... "Young plants have more conical spines and begin early to swell nicely, branch and even flower."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	**Notes**

Qsn #	Question	Answer
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"The seeds of Pachypodium spp. are provided with awns suggesting that dispersal is by wind. However, according to Keraudren (1963) wind dispersal may not be very effective because the awns of the seeds separate easily or even as soon as the fruit follicles open, and the seeds will fall on the ground near the mother plant." [No evidence]

702	Propagules dispersed intentionally by people	y
	Source(s)	**Notes**
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Although most are found only in specialty collections, nearly all of the known species of Pachypodiums are grown here."
	Rau, E. 2016. President, Sustainable Bioresources, LLC. Personal Communication. 29 December	"P. rutenbergianum (grows very fast in certified media in outdoor containers/ready for sale)"

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"The seeds of Pachypodium spp. are provided with awns suggesting that dispersal is by wind. However, according to Keraudren (1963) wind dispersal may not be very effective because the awns of the seeds separate easily or even as soon as the fruit follicles open, and the seeds will fall on the ground near the mother plant." [Unlikely. No evidence]

704	Propagules adapted to wind dispersal	y
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	[Yes, but may be ineffective over long distances] "The seeds of Pachypodium spp. are provided with awns suggesting that dispersal is by wind. However, according to Keraudren (1963) wind dispersal may not be very effective because the awns of the seeds separate easily or even as soon as the fruit follicles open, and the seeds will fall on the ground near the mother plant."

705	Propagules water dispersed	n
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	[Unlikely. Tufted seeds may by buoyant, but occurs in dry habitat] "The seeds of Pachypodium spp. are provided with awns suggesting that dispersal is by wind. However, according to Keraudren (1963) wind dispersal may not be very effective because the awns of the seeds separate easily or even as soon as the fruit follicles open, and the seeds will fall on the ground near the mother plant. In addition, it is possible that insects, birds and also small rodents may disperse the seeds."

706	Propagules bird dispersed	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"The seeds of Pachypodium spp. are provided with awns suggesting that dispersal is by wind. However, according to Keraudren (1963) wind dispersal may not be very effective because the awns of the seeds separate easily or even as soon as the fruit follicles open, and the seeds will fall on the ground near the mother plant. In addition, it is possible that insects, birds and also small rodents may disperse the seeds." [Possibly No. Primarily adapted for wind dispersal]

707	Propagules dispersed by other animals (externally)	
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"The seeds of Pachypodium spp. are provided with awns suggesting that dispersal is by wind. However, according to Keraudren (1963) wind dispersal may not be very effective because the awns of the seeds separate easily or even as soon as the fruit follicles open, and the seeds will fall on the ground near the mother plant. In addition, it is possible that insects, birds and also small rodents may disperse the seeds." [Possibly. Hairs may adhere to fur or feathers, or rodents may cache and disperse seeds]

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."
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"The seeds of Pachypodium spp. are provided with awns suggesting that dispersal is by wind. However, according to Keraudren (1963) wind dispersal may not be very effective because the awns of the seeds separate easily or even as soon as the fruit follicles open, and the seeds will fall on the ground near the mother plant. In addition, it is possible that insects, birds and also small rodents may disperse the seeds." [Probably No. Seed dispersal, if any, by animals likely to occur externally]

801	Prolific seed production (>1000/m2)	
	Source(s)	**Notes**
	Rapanarivo, S.H.J.V. (1999). Pachypodium (Apocynaceae): Taxonomy, Ecology & Cultivation. CRC Press, Boca Raton, FL	"REPRODUCTION. By seeds." [Unknown, but probably no. No description of prolific seeding]

Qsn #	Question	Answer
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	
	Source(s)	**Notes**
	Royal Botanic Gardens Kew. (2017) Seed Information Database (SID). Version 7.1. Available from: http://data.kew.org/sid/. [Accessed 9 Jan 2017]	[Unknown] "Storage Behaviour: No data available for species. Of 1 known taxa of genus Pachypodium, 100.00% Orthodox(p/?)"

803	Well controlled by herbicides	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. 2017. Pachypodium rutenbergianum. http://www.llifle.com. [Accessed 9 Jan 2017]	[Presumably Yes] "This Pachypodium will not require any pruning to look like a very interesting and unusual fat tree, but after several years it can outgrow its indoor location, requiring a 'pruning'. It has amazing regenerative properties."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits
• Grows in tropical climates
• Spiny
• Toxic
• Tolerates many soil types
• Seeds likely dispersed by wind and people
• Able to regenerate after cutting

Low Risk Traits
• No reports of invasiveness or naturalization, but no evidence of widespread introduction outside native range
• Landscaping and ornamental value
• Specialized pollinator requirements (likely limits seed set outside native range)
• Not reported to spread vegetatively

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> No. Not known to form dense stands. A light demanding tree, & presumably shade intolerant
Outcome = Accept (Low Risk)