

<b>Taxon:</b> <i>Willughbeia angustifolia</i> (Miq.) Markgr.	<b>Family:</b> Apocynaceae
<b>Common Name(s):</b> kubal madu pitabu serapit	<b>Synonym(s):</b> <i>Ancylocladus rufescens</i> (Dyer ex <i>Chilocarpus brachyanthus</i> Pierre <i>Urnularia rufescens</i> (Dyer ex Hook.f.) <i>Vahea angustifolia</i> Miq. <i>Willughbeia angustifolia</i> var. <i>gracilior</i> <i>Willughbeia apiculata</i> Miq. <i>Willughbeia elmeri</i> Merr. <i>Willughbeia rufescens</i> Dyer ex <i>Willughbeiosis rufescens</i> (Dyer ex

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 8 Mar 2016
<b>WRA Score:</b> -1.0	<b>Designation:</b> L	<b>Rating:</b> Low Risk

**Keywords:** Tropical, Liana, Unarmed, Edible Fruit, Zoochorous

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	n
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	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
404	Unpalatable to grazing animals	y=1, n=-1	n
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)		
411	Climbing or smothering growth habit	y=1, n=0	y
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)	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	n
705	Propagules water dispersed		
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
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)		

**Supporting Data:**

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	No evidence
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	No evidence of domestication
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2016. 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
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Distribution - Southern Thailand, Malay Peninsula, Borneo, Sumatra, Bum, Nicobar Islands."
202	Quality of climate match data	High
	Source(s)	Notes
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"Strictly a tropical species. It occurs wild in mixed dipterocarp forests and riverine forests in Borneo."
	Sunshine Seeds. 2016. <i>Willughbeia angustifolia</i> . <a href="http://www.sunshine-seeds.de/">http://www.sunshine-seeds.de/</a> . [Accessed 8 Mar 2016]	"Zone: 11"

Qsn #	Question	Answer
204	<b>Native or naturalized in regions with tropical or subtropical climates</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"The species is indigenous to Nicobar Island to Malesia. It is commonly found wild in Borneo (Brunei, Sarawak, Sabah and Indonesian Kalimantan)."
205	<b>Does the species have a history of repeated introductions outside its natural range?</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	"Strictly a tropical species. It occurs wild in mixed dipterocarp forests and riverine forests in Borneo"
	WRA Specialist. 2016. Personal Communication	No evidence of widespread cultivation outside native range
301	<b>Naturalized beyond native range</b>	<b>n</b>
	<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. 2016. 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 8 Mar 2016]	No evidence
302	<b>Garden/amenity/disturbance weed</b>	<b>n</b>
	<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>	<b>n</b>
	<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	<b>Environmental weed</b>	<b>n</b>
	<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

Qsn #	Question	Answer
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	n
	Source(s)	Notes
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	[No evidence] "Woody climber to 60 m. Branchlets glabrous, very rarely minutely puberulent; lenticillate. Leaves', petiole 0.4-1.7 cm long; blade elliptic, ovate or oblong, apex obtuse to acuminate, base rounded to cuneate; 1.5-4.2 x as long as wide, 2.6-14.3 x 0.9- 4.4 cm; subcoriaceous to thickly coriaceous; glabrous; 9-24 pairs of lateral nerves at 60-85°, reaching margin or anastomosing shortly before it, tertiary venation of 1, rarely to 3, intercalated veins and then with further reticulate venation or almost obscure."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

403	Parasitic	n
	Source(s)	Notes
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Woody climber to 60 m." [Apocynaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Matsuda, I., Tuuga, A., & Higashi, S. (2009). The feeding ecology and activity budget of proboscis monkeys. <i>American Journal of Primatology</i> , 71(6), 478-492	"TABLE III. Food Items and Parts of Each Item Consumed by Focal Monkeys of BE-Group From May 2005 to May 2006" [ <i>Willughbeia angustifolia</i> leaves are consumed]

Qsn #	Question	Answer
405	<b>Toxic to animals</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Matsuda, I. 2008. Feeding and Ranging Behaviors of Proboscis Monkey <i>Nasalis larvatus</i> in Sabah, Malaysia. PhD Dissertation. Hokkaido University, Hokkaido, Japan	"Table 6 Food items and parts of each item consumed by focal members of BE-Group from May 2005 to May 2006" [No evidence. Leaves consumed]
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	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
	Sunshine Seeds. 2016. <i>Willughbeia angustifolia</i> . <a href="http://www.sunshine-seeds.de/">http://www.sunshine-seeds.de/</a> . [Accessed 8 Mar 2016]	"Pests: Spider mites > especially under glass"

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Useful Tropical Plants Database. 2016. <i>Willughbeia angustifolia</i> . <a href="http://tropical.theferns.info/viewtropical.php?id=Willughbeia+angustifolia">http://tropical.theferns.info/viewtropical.php?id=Willughbeia+angustifolia</a> . [Accessed 8 Mar 2016]	"Known Hazards: None known"
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	[No evidence] "The mucilaginous pulp of the ripe fruit is eaten. The orange pulp of kupal madu variety is sweet and has excellent flavour liken to that of orange sherbet."
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	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
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits. Springer, New York	[No evidence that members of this genus occur in fire prone ecosystems or contribute to increased fire risk] "Strictly a tropical species. It occurs wild in mixed dipterocarp forests and riverine forests in Borneo."

Qsn #	Question	Answer
409	Is a shade tolerant plant at some stage of its life cycle	
	<b>Source(s)</b>	<b>Notes</b>
	Sunshine Seeds. 2016. <i>Willughbeia angustifolia</i> . <a href="http://www.sunshine-seeds.de/">http://www.sunshine-seeds.de/</a> . [Accessed 8 Mar 2016]	"Locations: sun-semi-shade"
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	<b>Source(s)</b>	<b>Notes</b>
	NParks Flora&FaunaWeb. 2013. <i>Willughbeia edulis</i> . <a href="https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1534">https://florafaunaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1534</a> . [Accessed 8 Mar 2016]	"Plant & Rootzone Preference/Tolerance : Moist Soils, Well-Drained Soils, Fertile Loamy Soils" [Unknown for <i>W. angustifolia</i> , but may have soil preferences similar to related taxon]
411	Climbing or smothering growth habit	y
	<b>Source(s)</b>	<b>Notes</b>
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Woody climber to 60 m."
412	Forms dense thickets	n
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. 2012. <i>Edible Medicinal and Non-Medicinal Plants</i> . Volume 1, Fruits. Springer, New York	[Climbing & potentially smothering habit] "A perennial, evergreen woody climber with branches bearing tendrils formed from modified inflorescences. Leaves are opposite, distichous on short petioles, lamina ovate-lanceolate, apex acute to acuminate, base obtuse ovate, coriaceous and penninerve with a distinct midrib"
501	Aquatic	n
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. 2012. <i>Edible Medicinal and Non-Medicinal Plants</i> . Volume 1, Fruits. Springer, New York	[Terrestrial] "Strictly a tropical species. It occurs wild in mixed dipterocarp forests and riverine forests in Borneo."
502	Grass	n
	<b>Source(s)</b>	<b>Notes</b>
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. <a href="http://www.ars-grin.gov/npgs/index.html">http://www.ars-grin.gov/npgs/index.html</a> . [Accessed 8 Mar 2016]	"Family: Apocynaceae Subfamily: Rauvolfioideae Tribe: Willughbeieae"
503	Nitrogen fixing woody plant	n
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. 2012. <i>Edible Medicinal and Non-Medicinal Plants</i> . Volume 1, Fruits. Springer, New York	"A perennial, evergreen woody climber with branches bearing tendrils formed from modified inflorescences." [Apocynaceae. No evidence]

Qsn #	Question	Answer
504	<b>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Woody climber to 60 m."

601	<b>Evidence of substantial reproductive failure in native habitat</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Distribution - Southern Thailand, Malay Peninsula, Borneo, Sumatra, Bum, Nicobar Islands." [No evidence]
	Lim, T.K. 2012. <i>Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits.</i> Springer, New York	"Strictly a tropical species. It occurs wild in mixed dipterocarp forests and riverine forests in Borneo." [No evidence]

602	<b>Produces viable seed</b>	y
	<b>Source(s)</b>	<b>Notes</b>
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Fruit spherical; 1.9-9.9 cm diameter; pale green, yellow, orange or reddish. Seed 1.2-2.4 x 0.6-1.4 x 0.6-1.1 cm."
	Useful Tropical Plants Database. 2016. <i>Willughbeia angustifolia</i> . <a href="http://tropical.theferns.info/viewtropical.php?id=Willughbeia+angustifolia">http://tropical.theferns.info/viewtropical.php?id=Willughbeia+angustifolia</a> . [Accessed 8 Mar 2016]	"Propagation. Seed"

603	<b>Hybridizes naturally</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	Unknown. No hybrids documented

604	<b>Self-compatible or apomictic</b>	
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. 2012. <i>Edible Medicinal and Non-Medicinal Plants. Volume 1, Fruits.</i> Springer, New York	[Unknown. Perfect flowers] "Flowers are pentamerous, yellowish-white and actinomorphic; calyx deeply divided with ovate-oblong lobes; corolla lobes in bud overlapping to the left forming a cone or cylinder of erect lobes; corolla tube cylindrical, inflated and short, stamens inserted in tube with ovate anthers; ovary single, glabrous, unilocular, with 2 parietal placentas."

605	<b>Requires specialist pollinators</b>	n
	<b>Source(s)</b>	<b>Notes</b>



Qsn #	Question	Answer
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Inflorescence axillary, rarely up to 3 in one leaf axil; axis shorter or as long as subtending petiole, to 1.7 cm long; axes glabrous; 5-19 flowers per inflorescence; pedicel 0.8-3.7 mm long. Sepals ovate, apex obtuse to acuminate; 0.9-1.8 mm long, lobes 0.5-1 x 0.4-0.7 mm, 1-2.5 x as long as wide; glabrous, ciliate. Corolla white or greenish; tube inflated, 1.2-3 mm long, outside and inside glabrous; lobes oblong or elliptic, 1.7-4.5 mm long, glabrous. Stamens inserted at 0.6-1.7 mm from base, 0.40-0.63 of tube length; filaments 0.3-0.6 mm long; anthers 1.3-1.8 x as long as wide, 0.4-0.9 x 0.3-0.5 mm, ovate to elliptic. Ovary 0.5-0.8 mm long; style 0.3-0.5 mm long, not impressed on ovary; stigma 0.1-0.2 mm long; stigmatic apex 0.1-0.2 mm long."
	NParks Flora&FaunaWeb. 2013. <i>Willughbeia edulis</i> . <a href="https://florafauanaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1534">https://florafauanaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1534</a> . [Accessed 8 Mar 2016]	"Its flowers are insect-pollinated." [Related taxon]

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Useful Tropical Plants Database. 2016. <i>Willughbeia angustifolia</i> . <a href="http://tropical.theferns.info/viewtropical.php?id=Willughbeia+angustifolia">http://tropical.theferns.info/viewtropical.php?id=Willughbeia+angustifolia</a> . [Accessed 8 Mar 2016]	"Propagation. Seed"
	Trade Winds Fruit/ 2016. Pitabu - <i>Willughbeia angustifolia</i> . <a href="http://www.tradewindsfruit.com/content/pitabu.htm">http://www.tradewindsfruit.com/content/pitabu.htm</a> . [Accessed 8 Mar 2016]	"Propagation: By seeds"

607	Minimum generative time (years)	
	Source(s)	Notes
	NParks Flora&FaunaWeb. 2013. <i>Willughbeia edulis</i> . <a href="https://florafauanaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1534">https://florafauanaweb.nparks.gov.sg/special-pages/plant-detail.aspx?id=1534</a> . [Accessed 8 Mar 2016]	[Unknown. Information for related taxon provided] "Plant Growth Rate : Moderate"

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Fruit spherical; 1.9-9.9 cm diameter; pale green, yellow, orange or reddish. Seed 1.2-2.4 x 0.6-1.4 x 0.6-1.1 cm." [Fruits & seeds relatively large & lack means of external attachment]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Fruit Lover's Seed Co. 2016. Tropical Fruit Seed List. <a href="http://www.fruitlovers.com/seedlistUSA.html">http://www.fruitlovers.com/seedlistUSA.html</a> . [Accessed 8 Mar 2016]	[Commercially available at times]

703	Propagules likely to disperse as a produce contaminant	n
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Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Fruit spherical; 1.9-9.9 cm diameter; pale green, yellow, orange or reddish. Seed 1.2-2.4 x 0.6-1.4 x 0.6-1.1 cm." [Unlikely. Fruits & seeds relatively large]

704	Propagules adapted to wind dispersal	n
	<b>Source(s)</b>	<b>Notes</b>
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Fruit spherical; 1.9-9.9 cm diameter; pale green, yellow, orange or reddish. Seed 1.2-2.4 x 0.6-1.4 x 0.6-1.1 cm." [Not adapted for wind dispersal]

705	Propagules water dispersed	
	<b>Source(s)</b>	<b>Notes</b>
	Lim, T.K. 2012. <i>Edible Medicinal and Non-Medicinal Plants</i> . Volume 1, Fruits. Springer, New York	"It occurs wild in mixed dipterocarp forests and riverine forests in Borneo." [Buoyancy of fruit unknown. Possible if growing in riparian areas]

706	Propagules bird dispersed	
	<b>Source(s)</b>	<b>Notes</b>
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	[Possibly. Fleshy-fruited, but fruit & seeds relatively large] "Fruit spherical; 1.9-9.9 cm diameter; pale green, yellow, orange or reddish. Seed 1.2-2.4 x 0.6-1.4 x 0.6-1.1 cm."

707	Propagules dispersed by other animals (externally)	n
	<b>Source(s)</b>	<b>Notes</b>
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Fruit spherical; 1.9-9.9 cm diameter; pale green, yellow, orange or reddish. Seed 1.2-2.4 x 0.6-1.4 x 0.6-1.1 cm." [Fruits & seeds lack means of external attachment. In native range, may be carried externally by primates before consumption of pulp]

708	Propagules survive passage through the gut	y
	<b>Source(s)</b>	<b>Notes</b>
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Fruit spherical; 1.9-9.9 cm diameter; pale green, yellow, orange or reddish. Seed 1.2-2.4 x 0.6-1.4 x 0.6-1.1 cm." [Presumably yes. Could be dispersed by feral pigs in the Hawaiian Islands]

801	Prolific seed production (>1000/m2)	
	<b>Source(s)</b>	<b>Notes</b>
	Middleton, D. J. (1993). A taxonomic revision of <i>Willughbeia</i> Roxb (Apocynaceae). <i>Blumea</i> , 38(1), 1-24	"Fruit spherical; 1.9-9.9 cm diameter; pale green, yellow, orange or reddish. Seed 1.2-2.4 x 0.6-1.4 x 0.6-1.1 cm." [Unknown. Fruits & seeds relatively large]

Qsn #	Question	Answer
802	Evidence that a persistent propagule bank is formed (>1 yr)	
	<b>Source(s)</b>	<b>Notes</b>
	Royal Botanic Gardens Kew. (2016) Seed Information Database (SID). Version 7.1. <a href="http://data.kew.org/sid/">http://data.kew.org/sid/</a> . [Accessed 8 Mar 2016]	[Unknown] "Storage Behaviour: No data available for species or genus. Of 182 known taxa of family APOCYNACEAE, 95.60% Orthodox(p/?), 1.65% Recalcitrant(?), 2.75% Uncertain
803	Well controlled by herbicides	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2016. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species
804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2016. Personal Communication	Unknown
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2016. Personal Communication	Unknown

**Summary of Risk Traits:**

High Risk / Undesirable Traits

- Thrives in tropical climates
- Climbing, & potentially smothering, growth habit
- Reproduces by seed
- Seeds dispersed by mammals & intentionally by people
- Limited ecological information reduces accuracy of risk prediction

Low Risk Traits

- No reports of invasiveness or naturalization, but no evidence of widespread introduction outside native range
- Unarmed (no spines, thorns or burrs)
- Edible fruit
- Medicinal uses
- Fruit relatively large & unlikely to be accidentally dispersed