

Taxon: *Moringa drouhardii*

Family: Moringaceae

Common Name(s): bottle tree

Synonym(s): NA

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 14 May 2015

WRA Score: -3.0

Designation: L

Rating: Low Risk

Keywords: Tropical Tree, Medicinal, Gap Tree, Seed-propagated, Rapid Growth

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		
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		
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
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		
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	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)	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		
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
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)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	"The excellent qualities of the oil in cosmetic and medicinal products and its adaptation to very dry conditions deserve further research into the possibilities of domestication and utilization in small scale industries."
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
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	" <i>Moringa drouhardii</i> is endemic to Toliara province in south-western Madagascar, where it occurs wild and planted. It is also planted in other places along the west coast."
202	Quality of climate match data	High
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed]	
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes

Qsn #	Question	Answer
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	"The natural habitat is very dry forest. Rainfall may be as low as 200 mm per year and very unreliable. Completely dry years are not uncommon. <i>Moringa drouhardii</i> occurs on calcareous soils."
	Tropicos.org. 2015. Tropicos [Online Database]. Missouri Botanical Garden. http://www.tropicos.org/ . [Accessed 13 May 2015]	Collected at across an elevation range of 0 m - 333 m and a latitudinal range of 21°17'00"N to 25°09'00"S

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	" <i>Moringa drouhardii</i> is endemic to Toliara province in south-western Madagascar, where it occurs wild and planted."

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. <i>A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places</i> . Bishop Museum Press, Honolulu, HI	"One Madagascan species (<i>M. drouhardii</i> Jumelle) has a swollen, bottle-shaped trunk that stores water, much like the baobab tree (<i>Bombacaceae</i>); it is cultivated in Hawaii in botanical gardens."
	Tropicos.org. 2015. Tropicos [Online Database]. Missouri Botanical Garden. http://www.tropicos.org/ . [Accessed 13 May 2015]	[Planted at Koko Crate, Oahu, Hawaiian Islands] "Description: Tree 10 m tall; corollas white. Accession #65-0362 Locality Oahu: Koko Crater"

301	Naturalized beyond native range	n
	Source(s)	Notes
	Randall, R.P. 2012. <i>A Global Compendium of Weeds</i> . 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence
	Wagner, W.L., Herbst, D.R. & Lorence, D.H. 2015. <i>Flora of the Hawaiian Islands</i> . Smithsonian Institution, Washington, D.C. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm . [Accessed 13 May 2015]	No evidence

302	Garden/amenity/disturbance weed	
	Source(s)	Notes

Qsn #	Question	Answer
	Olson, M.E. 1999. Moringa Home Page. http://www.mobot.org/gradstudents/olson/moringahome.html . [Accessed 13 May 2015]	[Not regarded as a weed, but fast growing & possibly able to exploit light gaps] "It grows in scattered stands that can number hundreds of individuals, usually on limestone. I found many young trees in gaps in the dry forest in the southeast of the island. In cultivation, <i>M. drouhardii</i> grows extremely fast, surpassing three meters in its first year. This fast growth rate may permit it to exploit these gaps in the forest."

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
	Navie, S. & Csurhes, S. 2010. Weed Risk Assessment. Horseradish tree. <i>Moringa oleifera</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	[Regarded as a minor weed] "This species is regarded as potentially invasive or moderately invasive in tropical regions of the world. It has escaped from gardens in northern Australia, and is currently naturalised in north Queensland and northern Western Australia. Currently, it is considered a minor weed in northern Australia, but its status may change over time. <i>Moringa oleifera</i> appears to spread relatively slowly, eventually forming dense thickets around parent trees. Like other tree species with similar ecological characteristics, it may pose a long term threat to certain natural ecosystems in the wet/dry tropics of northern Australia. The large scale commercial cultivation of this species might accelerate the rate of naturalisation and population development in northern Australia."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 13 May 2015]	"Small, deciduous tree up to 10(-18) m tall with a swollen bole and short branches near the top; bark whitish, containing resin. Leaves alternate, 3-pinnate; stipules absent; petiole 10-15 cm long, stalks of pinnae 2-3 cm long, petiolules 3-4 mm long, all glabrous and with glands at base; leaflets opposite, ovate to oblong, 15-30 mm x 5-12 mm, base cuneate, apex acute, glabrous, bright green."

402	Allelopathic	n

Qsn #	Question	Answer
	Source(s)	Notes
	Hossain, M. M., Miah, G., Ahamed, T., & Sarmin, N. S. (2012). Allelopathic effect of <i>Moringa oleifera</i> on the germination of <i>Vigna radiata</i> . <i>Intl. J. Agri. Crop Sci</i> , 4(3): 114-121	[Unknown for <i>M. drouhardii</i> . Allelopathic properties documented in <i>M. oleifera</i>] "Abstract: The objectives of the study were to examine the allelopathic effect of different concentrations of leaf, root, bark, fruit kernel and seed aqueous extracts of <i>Moringa oleifera</i> on the germination of <i>Vigna radiata</i> cv. BU Mung 4 In germination test of mungbean at laboratory, five sets of experiment each for leaf, root, bark, fruit kernel and seed aqueous extracts were conducted simultaneously. There were six treatments having different concentrations of extracts (2.5, 5.0, 7.5, 10.0, 12.5 and 15.0%) of these plant parts and one control treatment (distilled water). Growth and yield performances experiment were conducted with root extract only having four different concentrations (2.5, 5.0, 7.5 and 10.0%) and one control treatment. Both laboratory and field (pot) experiments were conducted in Completely Randomized Design (CRD) with four replications. The control treatment was only distilled water. The result showed that the rate of germination of <i>V. radiata</i> decreased with the increase of aqueous extract concentration, irrespective of plant parts. The rate of germination was found to suffer more when treated with 10.0, 12.5 and 15.0% extracts. Among the plant parts root and bark aqueous extract were found to inhibit mungbean germination more than the other plant parts used. The inhibitory effect of leaf, fruit kernel and seed aqueous extracts were almost similar, while those were relatively less than bark and root extracts. The effects of light and dark conditions on the rate of germination were not distinct. Therefore, the study revealed that allelochemicals released from different plant parts of <i>M. oleifera</i> impeded the rate of germination in laboratory condition."

403	Parasitic	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	"Small, deciduous tree up to 10(–18) m tall with a swollen bole and short branches near the top; bark whitish, containing resin." [No evidence. Moringaceae]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Navie, S. & Csurhes, S. 2010. Weed Risk Assessment. Horseradish tree. <i>Moringa oleifera</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	[<i>Moringa oleifera</i> highly palatable] "It is also highly prized as a fodder tree in developing countries, where its leaves are fed to cattle, sheep, camels, goats, pigs, poultry and donkeys (RBG Kew 1999; HDRA 2002). The branches are often lopped for fodder, and animals are also known to browse the bark and young shoots of this species (Qaiser 1973; HDRA 2002). <i>Moringa oleifera</i> is used as a green manure in developing countries, where it is said to significantly enrich agricultural land (Price 2000)."

Qsn #	Question	Answer
	Omotesho, K. F., Sola-Ojo, F. E., Fayeye, T. R., Babatunde, R. O., Otunola, G. A., & Aliyu, T. H. (2013). The potential of Moringa tree for poverty alleviation and rural development: Review of evidences on usage and efficacy. International Journal of Development and Sustainability 2 (2): 799-813	[This publication lists all Moringa species, including M. drouhardii, under the moniker "Moringa tree" and considers all as actual or potential fodder sources] "The leaves and twigs are used as fodder for cattle, sheep, goats and camels in many parts of its range (Mahatab et al., 1987; Negi, 1977)."

405	Toxic to animals	n
	Source(s)	Notes
	Omotesho, K. F., Sola-Ojo, F. E., Fayeye, T. R., Babatunde, R. O., Otunola, G. A., & Aliyu, T. H. (2013). The potential of Moringa tree for poverty alleviation and rural development: Review of evidences on usage and efficacy. International Journal of Development and Sustainability 2 (2): 799-813	[No evidence] "The leaves and twigs are used as fodder for cattle, sheep, goats and camels in many parts of its range (Mahatab et al., 1987; Negi, 1977). Moringa Leaves are rich in vitamin A and C and are considered useful in Scurvy and respiratory ailments, It is also used as an emetic remedy (Roloff et al., 2009). The juice extracted from the leaves has strong antibacterial and antimalarial properties."

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	Olson, M.E. 2015. The International Moringa Germplasm Collection. Universidad Nacional Autónoma de México, México DF. http://www.moringaceae.org/ . [Accessed]	"Moringas planted out in the ground tend to have few pests, at least here far from their native range. Here at the collection the only real problem are leafcutter ants."
	Navie, S. & Csurhes, S. 2010. Weed Risk Assessment. Horseradish tree. Moringa oleifera. The State of Queensland, Department of Employment, Economic Development and Innovation	[Unknown for M. drouhardii] "One record from the Torres Strait notes that this species is a host for the spiralling whitefly (<i>Aleurodicus dispersus</i>) (EPA 2007), a relatively new and potentially serious pest of bananas and horticultural crops in northern Australia (Botha et al. 2000). Spiralling whitefly is currently regarded as an emerging pest in northern Queensland and the Northern Territory (Chin et al. 2007; Lambkin 2007), and as a potential pest in Western Australia (Botha et al. 2000)."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Olson, M.E. 1999. Moringa Home Page. http://www.mobot.org/gradstudents/olson/moringahome.html . [Accessed 13 May 2015]	[No evidence] "Like other moringas in other parts of the world, Moringa drouhardii is used medicinally. The gouges on the trunk of one of the trees shown below are where locals regularly remove the very strongly scented bark and wood for treatment of colds and coughs. "
	Munyanziza, E., 2007. Moringa drouhardii Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	[No evidence] "The seeds yield an oil that is used as a base for cosmetic products and as a medicinal massage oil. The very strongly scented bark and wood are used for treatment of colds and coughs. The tree is often planted on field boundaries."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

Qsn #	Question	Answer
408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 13 May 2015]	[Fire ecology unknown] "The natural habitat is very dry forest. Rainfall may be as low as 200 mm per year and very unreliable. Completely dry years are not uncommon. <i>Moringa drouhardii</i> occurs on calcareous soils."

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Bihrmann's Caudiciforms. 2015. <i>Moringa drouhardii</i> . http://www.bihrmann.com/caudiciforms/subs/mor-dro-sub.asp . [Accessed 13 May 2015]	"Sun: Maximum"
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 13 May 2015]	[Grows in open spaces] "Growth of young trees is very fast, allowing <i>Moringa drouhardii</i> to occupy open spaces in the forest."
	Olson, M.E. 1999. <i>Moringa</i> Home Page. http://www.mobot.org/gradstudents/olson/moringahome.html . [Accessed 13 May 2015]	[Growth in gaps suggests tree is light demanding] "It grows in scattered stands that can number hundreds of individuals, usually on limestone. I found many young trees in gaps in the dry forest in the southeast of the island. In cultivation, <i>M. drouhardii</i> grows extremely fast, surpassing three meters in its first year. This fast growth rate may permit it to exploit these gaps in the forest."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed]	" <i>Moringa drouhardii</i> occurs on calcareous soils."
	Bihrmann's Caudiciforms. 2015. <i>Moringa drouhardii</i> . http://www.bihrmann.com/caudiciforms/subs/mor-dro-sub.asp . [Accessed 13 May 2015]	"Soil: Limestone, Mix"

411	Climbing or smothering growth habit	n
	Source(s)	Notes

Qsn #	Question	Answer
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	"Small, deciduous tree up to 10(-18) m tall with a swollen bole and short branches near the top; bark whitish, containing resin."

412	Forms dense thickets	
	Source(s)	Notes
	Olson, M.E. 1999. <i>Moringa</i> Home Page. http://www.mobot.org/gradstudents/olson/moringahome.html . [Accessed 13 May 2015]	[Unknown if scattered stands can exclude other vegetation] "With its bloated bright white trunks, <i>Moringa drouhardii</i> is a conspicuous element of the southern Malagasy dry forest. It grows in scattered stands that can number hundreds of individuals, usually on limestone. I found many young trees in gaps in the dry forest in the southeast of the island."

501	Aquatic	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	[Terrestrial tree] "The natural habitat is very dry forest."

502	Grass	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	Family: Moringaceae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Olson, M.E. 2014. Does <i>Moringa</i> fix nitrogen? The International <i>Moringa</i> Germplasm Collection, Mexico City, Mexico. http://moringaceae.org/1/post/2014/02/does-moringa-fix-nitrogen.html . [Accessed 12 May 2015]	"Moringaceae is a member of the mustard-oil plants, the great group of families that includes the mustards, the capers, the papayas, and a lot else besides. None of these plants seem to have learned the trick of living with nitrogen fixing bacteria."

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n

Qsn #	Question	Answer
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	"Small, deciduous tree up to 10(-18) m tall with a swollen bole and short branches near the top; bark whitish, containing resin."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	" <i>Moringa drouhardii</i> is still fairly common in its natural habitat and is commonly planted. It does not seem to be endangered or vulnerable."

602	Produces viable seed	y
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	"Propagation by seed is straightforward. Seeds are sown in fertile soil in a nursery. During the dry season seedlings can be transplanted into the field without irrigation, even into dry places with poor soil."

603	Hybridizes naturally	
	Source(s)	Notes
	Dogra, P. D., Pal, A. & Tandon, S. 1975: Studies on breeding systems in <i>Moringa</i> . 3. Fruit-, seed-set and seed germination in two flowering periods of one year of the Baramassi <i>Moringa oleifera</i> and chromosomal pairing in the F1 hybrid from <i>M. oleifera</i> X <i>M. concanensis</i> . Incompatibility Newsletter 6: 46-51	[Hybridization documented in genus] "F1 meiosis was normal, and pollen and seed fertility was good. "

604	Self-compatible or apomictic	
	Source(s)	Notes

Qsn #	Question	Answer
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	"Flowers bisexual..."
	East, E. M. 1940. The distribution of self-sterility in the flowering plants. Proceedings of the American Philosophical Society 82: 449-518	[Unknown for <i>M. drouhardii</i>] " <i>Moringa oleifera</i> Lam. is self-fertile though slightly protandrous."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed]	"Flowers bisexual, regular, 5-merous, yellowish white; pedicel up to 2 mm long; sepals free, obovate, 5–6 mm × c. 2 mm, narrowing to the base, apex rounded, glabrous; petals free, ovate, –10 mm × c. 2 mm, apex incurved, glabrescent outside, slightly short-hairy inside; stamens 5, free, 6–8 mm long, hairy, alternating with 5 staminodes c. 4 mm long; ovary superior, stalked, ovoid, c. 1.5 mm long, 1-celled, style slender, 3–4 mm long."
	Verdcourt, B. (1985). A synopsis of the Moringaceae. Kew Bulletin 40(1): 1-23	"The smooth pollen and narrow stylar canal opening down to the ovary cavity are striking characters particularly as the very sweet-scented flowers are clearly insect-pollinated."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 13 May 2015]	"Propagation by seed is straightforward." [No evidence]

607	Minimum generative time (years)	3
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 12 May 2015]	"Growth of young trees is very fast, allowing <i>Moringa drouhardii</i> to occupy open spaces in the forest. In cultivation it grows at a rate of more than 1 m per year. Trees start bearing 3 years after planting when they have reached a height of 3–4 m. "

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

Qsn #	Question	Answer
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 13 May 2015]	[Unlikely. No means of external attachment] "Fruit an elongate capsule 30–50 cm long, somewhat trigonous, narrowed between the seeds, with a beak, glabrous, dehiscent with 3 valves. Seeds trigonous to ovoid, 2–2.5 cm × c. 2 cm, whitish, glabrous."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Healing Moringa Tree. 2015. <i>Moringa Drouhardii</i> Tree Seeds. https://www.healingmoringatree.com/store/p34/Moringa_Drouhardii_Tree_Seeds!_.html . [Accessed 13 May 2015]	Seeds available for on-line purchase

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 13 May 2015]	[Unlikely. Fruits & seeds relatively large] "Fruit an elongate capsule 30–50 cm long, somewhat trigonous, narrowed between the seeds, with a beak, glabrous, dehiscent with 3 valves. Seeds trigonous to ovoid, 2–2.5 cm × c. 2 cm, whitish, glabrous."

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Kubitzki, K. & Bayer, C. (eds.). 2003. The Families and genera of vascular plants. Volume V. Flowering Plants. Dicotyledons: Capparales, Malvales and Non-betalain Caryophyllales. Springer Verlag, Berlin, Heidelberg, New York	"Dispersal for species with alate seeds is by wind; <i>M. stenopetala</i> is probably water-dispersed."
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 13 May 2015]	"Fruit an elongate capsule 30–50 cm long, somewhat trigonous, narrowed between the seeds, with a beak, glabrous, dehiscent with 3 valves. Seeds trigonous to ovoid, 2–2.5 cm × c. 2 cm, whitish, glabrous."

705	Propagules water dispersed	
	Source(s)	Notes

Qsn #	Question	Answer
	Navie, S. & Csurhes, S. 2010. Weed Risk Assessment. Horseradish tree. <i>Moringa oleifera</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	[<i>M. oleifera</i> possibly water dispersed. Unknown if <i>M. drouhardii</i> could be dispersed in a similar manner] "While the seeds are relatively large, they are strongly winged. This may allow them to be spread short distances from the parent tree by wind. It may also aid their dispersal downstream in water during floods (the mature pods may also float in water), as populations are sometimes found growing along waterways."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 13 May 2015]	[No evidence. Not fleshy-fruited] "Fruit an elongate capsule 30–50 cm long, somewhat trigonous, narrowed between the seeds, with a beak, glabrous, dehiscent with 3 valves. Seeds trigonous to ovoid, 2–2.5 cm × c. 2 cm, whitish, glabrous."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Munyanziza, E., 2007. <i>Moringa drouhardii</i> Jum. [Internet] Record from PROTA4U. van der Vossen, H.A.M. & Mkamilo, G.S. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. http://www.prota4u.org/search.asp . [Accessed 13 May 2015]	[No evidence. No means of external attachment] "Fruit an elongate capsule 30–50 cm long, somewhat trigonous, narrowed between the seeds, with a beak, glabrous, dehiscent with 3 valves. Seeds trigonous to ovoid, 2–2.5 cm × c. 2 cm, whitish, glabrous."

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. <i>Plant Protection Quarterly</i> , 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 adapted for wind or gravity dispersal]

801	Prolific seed production (>1000/m ²)	n
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes
	Royal Botanic Gardens Kew. 2008. Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/ . [Accessed 13 May 2015]	"Storage Behaviour: Orthodox" [Longevity in soil seed bank unknown]

Qsn #	Question	Answer
	Navie, S. & Csurhes, S. 2010. Weed Risk Assessment. Horseradish tree. <i>Moringa oleifera</i> . The State of Queensland, Department of Employment, Economic Development and Innovation	[<i>M. oleifera</i> loses viability rapidly] "HDRA (2002) states that 'seeds can be planted as soon as they are mature but should only be kept for up to 3 months in natural conditions'. Hence, they probably do not have any significant innate dormancy and begin to lose their viability after a relatively short period of time. Germination rates for fresh seeds are around 80%, going down to about 50% after 12 months storage, with no seeds usually being viable after 2 years of storage (Bosch 2004)."

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
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Unknown for <i>M. drouhardii</i> . <i>M. oleifera</i> able to coppice] " <i>Moringa oleifera</i> " ... "Frequent pruning, lopping, coppicing or pollarding increases and maintains leaf production as the leaves sprout back profusely."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Grows in tropical climates
- Gap colonizer
- Other *Moringa* species have weedy traits & tendencies
- Reproduces by seeds
- Rapid growth rate (1 m/yr)
- Reaches maturity in 3+ years
- Seeds possibly dispersed by wind, gravity & intentionally by people
- Limited ecological information may limit 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)
- Provides fodder for livestock
- Medicinal uses
- Light demanding
- Grows on calcareous soils in native range
- Not reported to spread vegetatively