

<b>Taxon:</b> <i>Moringa rivae</i> Chiov.	<b>Family:</b> Moringaceae
<b>Common Name(s):</b> lorsanjo wamo	<b>Synonym(s):</b>

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 11 Mar 2021
<b>WRA Score:</b> -2.0	<b>Designation:</b> L	<b>Rating:</b> Low Risk

**Keywords:** Small Tree, Unarmed, Swollen Root, Seed-Propagated, 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	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		
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		
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		

Qsn #	Question	Answer Option	Answer
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	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		
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	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 <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
	Habtemariam, S. (2017). The African and Arabian Moringa Species: Chemistry, Bioactivity and Therapeutic Applications. Elsevier, Amsterdam	[No evidence of domestication] "M. rivae is another example of the less investigated Moringa species."
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2021). 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
	Habtemariam, S. (2017). The African and Arabian Moringa Species: Chemistry, Bioactivity and Therapeutic Applications. Elsevier, Amsterdam	"M. rivae is another example of the less investigated Moringa species. With a small often slender shrub or tree appearance, it is known to occur in the southern region of Ethiopia and also in Kenya."
202	Quality of climate match data	High
	Source(s)	Notes
	Habtemariam, S. (2017). The African and Arabian Moringa Species: Chemistry, Bioactivity and Therapeutic Applications. Elsevier, Amsterdam	
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Vivero, J.L., Kelbessa, E., & Demissew, S. (2005). The Red List of Endemic Trees & Shrubs of Ethiopia and Eritrea. Fauna & Flora International, Cambridge, UK	"Moringa rivae Chiov. subsp. longisiliqua Verdc. Moringaceae VU B2ab(i,ii,iii,iv) SD, BA, HA A tree of deep rocky gorges and limestone slopes, growing at 1100-1300 m."
	Verdcourt, B. (1985). A synopsis of the Moringaceae. Kew Bulletin 40(1): 1-23	Native to a relatively narrow latitudinal range in Ethiopia and Kenya, at elevations from 600-1350 m
204	Native or naturalized in regions with tropical or subtropical climates	y

Qsn #	Question	Answer
	Source(s)	Notes
	Habtemariam, S. (2017). The African and Arabian Moringa Species: Chemistry, Bioactivity and Therapeutic Applications. Elsevier, Amsterdam	"M. rivae is another example of the less investigated Moringa species. With a small often slender shrub or tree appearance, it is known to occur in the southern region of Ethiopia and also in Kenya."

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	Notes
	Olson, M.E. (1999). Moringa Home Page. <a href="http://www.mobot.org/gradstudents/olson/moringahome.html">http://www.mobot.org/gradstudents/olson/moringahome.html</a> . [Accessed 11 Mar 2021]	[Moringa rivae is an obscure species with no evidence of widespread cultivation] "This is the most taxonomically frustrating taxon in the family. It is native from southern Lake Turkana to Mandera District in Kenya and throughout southeastern Ethiopia. It doesn't seem to extend far into Somalia. Subspecies rivae is recognized as having creamy petals with brownish tips and short fruits. Subspecies longisiliqua has yellow flowers and very long fruits. I am currently testing the status of these entities but much collecting still remains to be done in southeastern Ethiopia and northeastern Kenya to resolve the issue. "

301	Naturalized beyond native range	n
	Source(s)	Notes
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

305	Congeneric weed	

Qsn #	Question	Answer
	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 naturalization and population development in northern Australia."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Thulin, M. (ed.). (1993). Flora of Somalia Volume 1. Royal Botanic Gardens, Kew, Richmond, UK	[No evidence] "Small slender tree. Leaves 2–3-pinnate, with 4–5 pairs of pinnae; leaflets 3–5 per pinna, oblong to elliptic, 0.9–4.3 x 0.4–2.5 cm, acute at the apex, rounded to cuneate at the base, glabrous or pubescent. Flowers yellowish or reddish, appearing when the plant is leafless; receptacle 2–3 mm long. Sepals 1–1.4 cm long, glabrous or pubescent. Petals 1.2–2 cm long, clawed. Ovary glabrous. Fruits 24–32(–40) x 0.7–1.6 cm. Seed-body 0.9–1.1 cm long, with broad wings 5–7 mm long"

402	Allelopathic	
	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> . Intl. J. Agri. Crop Sci, 4(3): 114-121	[Unknown. 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> ... 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
	Thulin, M. (ed.). (1993). Flora of Somalia Volume 1. Royal Botanic Gardens, Kew, Richmond, UK	"Small slender tree." [No evidence. Moringaceae]

404	Unpalatable to grazing animals	
	Source(s)	Notes

Qsn #	Question	Answer
	Vivero, J.L., Kelbessa, E., & Demissew, S. (2005). The Red List of Endemic Trees & Shrubs of Ethiopia and Eritrea. Fauna & Flora International, Cambridge, UK	[Edible to people. Probably edible to browsing animals] "Some threatened woody plants are commonly considered as edible for hungry people, such as the endemic <i>Moringa rivae</i> subsp. <i>longisiliqua</i> (VU) or the near endemic <i>Cordeauxia edulis</i> (VU), see Box 1."
	Van Wyk, B. & Van Wyk, P. 1997. Field Guide to Trees of Southern Africa. Struik Publishers, Cape Town, South Africa	[Other species are palatable] "The leaves and fruit are browsed by elephant, giraffe and springbok. Bark, wood, and root eaten by small stock and porcupine. Root edible, but sour-tasting."
	WRA Specialist. (2021). Personal Communication	Palatability unknown, but other species are browsed or grazed by animals

405	Toxic to animals	n
	Source(s)	Notes
	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
	Olson, M.E. (2014). Leafcutter ants! The International Moringa Germplasm Collection. <a href="http://moringaceae.org/imgc-moringa-blog/archives/12-2014">http://moringaceae.org/imgc-moringa-blog/archives/12-2014</a> . [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. ... Once the trees get bigger, a few leafcutters won't make much of a difference. " ... "Some species seem more susceptible than others. I haven't had mite trouble with <i>M. peregrina</i> , but <i>M. concanensis</i> and <i>M. oleifera</i> are susceptible."
	Mridha, M. A. U., & Barakah, F. N. (2015). Diseases and pests of moringa: a mini review. ISHS Acta Horticulturae 1158: 117-124	"The multipurpose uses of moringa - as medicinal plant, its antimicrobial activities, being a source of nutrition for human food and animal feed and other environmental, industrial uses - make this crop very important. Cultivation of <i>Moringa oleifera</i> is spreading across the world under different climatic conditions that may expose the plants to different pests and diseases. The present paper highlights the status of pests and diseases of moringa. Moringa plants suffer from fruit rots, stem rots, root rot, twig canker, etc. Major pests include pod fly, budworm, hairy caterpillars, red mites, etc."

Qsn #	Question	Answer
	Joshi, R. C., David, B. V., & Kant, R. (2016). A review of the insect and mite pests of <i>Moringa oleifera</i> Lam. Agriculture Development, 29: 5 pp	[Affected by spider mites] "The spider mites ( <i>Tetranychus</i> spp) (Figure 6) infesting <i>Moringa</i> continue to be studied (Dao et al, 2015; Monjaras- Barrera et al, 2015). Apparently, just after hatching (which takes 15 to 20 minutes) the mite remains motionless for some time and then starts feeding by inserting its stylet and sucking the sap. Olson (2014) observed in January 2014, at the International <i>Moringa</i> Germplasm Collection of the National University, Mexico, spider mites severely infesting leaves of <i>Moringa rivae</i> . Severe infestation of spider mites was also noted on the <i>Moringa</i> grown in the glasshouse at AgResearch Palmerston North, New Zealand (R Kant, Palmerston North, New Zealand, personal communication). Some <i>Moringa</i> species seem more susceptible than others: there has been no mite trouble with <i>Moringa peregrina</i> , but <i>Moringa concanensis</i> and <i>M. oleifera</i> are susceptible. The northeast African species seem particularly vulnerable, but even among them there seems to be variation: <i>M. rivae</i> is particularly sensitive, whereas <i>M. borziana</i> seems tolerant to spider mites."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Vivero, J.L., Kelbessa, E., & Demissew, S. (2005). The Red List of Endemic Trees & Shrubs of Ethiopia and Eritrea. Fauna & Flora International, Cambridge, UK	[Edible to people. No evidence] "Some threatened woody plants are commonly considered as edible for hungry people, such as the endemic <i>Moringa rivae</i> subsp. <i>longisiliqua</i> (VU) or the near endemic <i>Cordeauxia edulis</i> (VU), see Box 1."
	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	
	Source(s)	Notes
	Habtemariam, S. (2017). The African and Arabian <i>Moringa</i> Species: Chemistry, Bioactivity and Therapeutic Applications. Elsevier, Amsterdam	" <i>M. rivae</i> is reported to favor rocky hillsides in tall scrubs habitats" [Fire ecology unknown]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Bihrmann's Caudiciforms. (2021). <i>Moringa rivae</i> . <a href="http://www.bihrmann.com/caudiciforms/subs/mor-riv-sub.asp">http://www.bihrmann.com/caudiciforms/subs/mor-riv-sub.asp</a> . [Accessed 11 Mar 2021]	"Sun: Medium"
	Vivero, J.L., Kelbessa, E., & Demissew, S. (2005). The Red List of Endemic Trees & Shrubs of Ethiopia and Eritrea. Fauna & Flora International, Cambridge, UK	[Deep gorges may provide shaded habitats] "A tree of deep rocky gorges and limestone slopes, growing at 1100- 1300 m."

Qsn #	Question	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	<b>Source(s)</b>	<b>Notes</b>
	Verdcourt, B. (1985). A synopsis of the Moringaceae. Kew Bulletin 40(1): 1-23	"ETHIOPIA. Ogaden: Dabanah, Ruspoli & Riva 1017 (lectotype FT, photograph K); 3.2 km from Dik on Daror road, lava outcrops in red sandy soils with Commiphora-Grewia etc.,"
	Healing Moringa Tree. (2021). Learn about other Moringa tree species! <a href="http://www.healingmoringatree.com/other-moringa-species.html">http://www.healingmoringatree.com/other-moringa-species.html</a> . [Accessed 11 Mar 2021]	"Moringa Species tolerate most soil types and grow well in full sun."
	Bihrmann's Caudiciforms. (2021). <i>Moringa rivae</i> . <a href="http://www.bihrmann.com/caudiciforms/subs/mor-riv-sub.asp">http://www.bihrmann.com/caudiciforms/subs/mor-riv-sub.asp</a> . [Accessed 11 Mar 2021]	"Soil: Grit - Mix"

411	Climbing or smothering growth habit	n
	<b>Source(s)</b>	<b>Notes</b>
	Thulin, M. (ed.). (1993). Flora of Somalia Volume 1. Royal Botanic Gardens, Kew, Richmond, UK	"Small slender tree."

412	Forms dense thickets	n
	<b>Source(s)</b>	<b>Notes</b>
	Vivero, J.L., Kelbessa, E., & Demissew, S. (2005). The Red List of Endemic Trees & Shrubs of Ethiopia and Eritrea. Fauna & Flora International, Cambridge, UK	[No evidence] "A tree of deep rocky gorges and limestone slopes, growing at 1100- 1300 m."
	Verdcourt, B. (1985). A synopsis of the Moringaceae. Kew Bulletin 40(1): 1-23	[No evidence] "On steep rocky slopes either basement complex or pure lava rocks in bushland of <i>Delonix elata</i> , <i>Acacia</i> , <i>Commiphora</i> , <i>Euphorbia</i> , <i>Aloe</i> with <i>Acanthaceae</i> ; 600-1100 m."

501	Aquatic	n
	<b>Source(s)</b>	<b>Notes</b>
	Olson, M. E., & Carlquist, S. (2001). Stem and root anatomical correlations with life form diversity, ecology, and systematics in <i>Moringa</i> (Moringaceae). Botanical Journal of the Linnean Society, 135(4), 315-348	[Terrestrial] "Rocky hillside in tall scrub"

502	Grass	n
	<b>Source(s)</b>	<b>Notes</b>
	WFO (2021). World Flora Online. Published on the Internet; <a href="http://www.worldfloraonline.org">http://www.worldfloraonline.org</a> . [Accessed 10 Mar 2021]	Moringaceae



Qsn #	Question	Answer
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	WFO (2021). World Flora Online. Published on the Internet; <a href="http://www.worldfloraonline.org">http://www.worldfloraonline.org</a> . [Accessed 10 Mar 2021]	Moringaceae

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Olson, M. E., & Carlquist, S. (2001). Stem and root anatomical correlations with life form diversity, ecology, and systematics in <i>Moringa</i> (Moringaceae). <i>Botanical Journal of the Linnean Society</i> , 135(4), 315-348	"Tuberous shrubs ( <i>M. borziana</i> , <i>M. longituba</i> , <i>M. pygmaea</i> , <i>M. rivae</i> ; Figs 37–52). Stems of three species are short-lived and persist only through favorable years, dying back to the large underground tuber during periods of extended drought. Only <i>M. rivae</i> is likely to form permanent shoots with age but nevertheless also has a very large, very soft tuber underground. The root is much greater in diameter than the stem, is much softer, and has softer, paler bark that is more prone to forming polygonal plates rather than longitudinal fissures." [A tuberous shrub that may function as a geophyte]

Qsn #	Question	Answer
601	Evidence of substantial reproductive failure in native habitat	
	Source(s)	Notes
	WFO (2021). World Flora Online. Published on the Internet; <a href="http://www.worldfloraonline.org">http://www.worldfloraonline.org</a> . [Accessed 11 Mar 2021]	"IUCN Red List Status - Near threatened" [Reason for IUCN Red listing not specified. Presumably due to habitat loss]

Qsn #	Question	Answer
602	Produces viable seed	y
	Source(s)	Notes
	Habtemariam, S. (2017). <i>The African and Arabian Moringa Species: Chemistry, Bioactivity and Therapeutic Applications</i> . Elsevier, Amsterdam	"fruits appear as nine-ribbed pendulous pods often 30-45 cm long and tomentose when young; seeds embedded in the pits of the valves and are three angled, winged, blackish in color and rounded."
	Bihrmann's Caudiciforms. (2021). <i>Moringa rivae</i> . <a href="http://www.bihrmann.com/caudiciforms/subs/mor-riv-sub.asp">http://www.bihrmann.com/caudiciforms/subs/mor-riv-sub.asp</a> . [Accessed 11 Mar 2021]	"Propagate: Seeds"

Qsn #	Question	Answer
603	Hybridizes naturally	
	Source(s)	Notes
	Olson, M.E. (2015). April flowers in the <i>Moringa</i> botanical garden. The International <i>Moringa</i> Germplasm Collection. Universidad Nacional Autónoma de México, México DF. <a href="http://www.moringaceae.org/">http://www.moringaceae.org/</a> . [Accessed 11 Mar 2021]	[Hybridization documented in genus] "Flowers of a pretty and very vigorous <i>Moringa oleifera</i> X <i>Moringa concanensis</i> hybrid. They have the wide petals of <i>M. oleifera</i> and the pink streaks of <i>M. concanensis</i> "

Qsn #	Question	Answer
604	Self-compatible or apomictic	
	Source(s)	Notes

Qsn #	Question	Answer
	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. borziana</i> ] "Moringa oleifera Lam. is self-fertile though slightly protandrous."
	Thulin, M. (ed.). (1993). Flora of Somalia Volume 1. Royal Botanic Gardens, Kew, Richmond, UK	[Unknown] "Flowers yellowish or reddish, appearing when the plant is leafless; receptacle 2–3 mm long. Sepals 1–1.4 cm long, glabrous or pubescent. Petals 1.2–2 cm long, clawed. Ovary glabrous."

605	Requires specialist pollinators	n
	Source(s)	Notes
	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."
	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	[Family description] "The sweet-scented flowers are clearly bee-pollinated, and nectar secretion seems to take place on the inside of the receptacle"

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Bihrmann's Caudiciforms. (2021). <i>Moringa rivae</i> . <a href="http://www.bihrmann.com/caudiciforms/subs/mor-riv-sub.asp">http://www.bihrmann.com/caudiciforms/subs/mor-riv-sub.asp</a> . [Accessed 11 Mar 2021]	"Propagate: Seeds"
	Olson, M.E. (1999). Moringa Home Page. <a href="http://www.mobot.org/gradstudents/olson/moringahome.html">http://www.mobot.org/gradstudents/olson/moringahome.html</a> . [Accessed 11 Mar 2021]	"The individuals I have seen have all been large shrubs to 3 meters tall with greatly swollen roots." [No evidence of vegetative spread from habit and morphology]

607	Minimum generative time (years)	n
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	Unknown. Other species reported to flower in 3 or more years

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Thulin, M. (ed.). (1993). Flora of Somalia Volume 1. Royal Botanic Gardens, Kew, Richmond, UK	"Fruits 24–32(–40) x 0.7–1.6 cm. Seed-body 0.9–1.1 cm long, with broad wings 5–7 mm long." [No evidence. Seeds lack means of external attachment]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	Seeds sometimes available for purchase online from a limited number of websites

703	Propagules likely to disperse as a produce contaminant	n
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Qsn #	Question	Answer
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	No evidence. Unlikely. Rare in cultivation and not grown with produce

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" [General family description]
	Thulin, M. (ed.). (1993). Flora of Somalia Volume 1. Royal Botanic Gardens, Kew, Richmond, UK	[Presumably yes. Winged-seeds] "Fruits 24–32(–40) x 0.7–1.6 cm. Seed-body 0.9–1.1 cm long, with broad wings 5–7 mm long."

705	Propagules water dispersed	
	Source(s)	Notes
	Verdcourt, B. (1985). A synopsis of the Moringaceae. Kew Bulletin 40(1): 1-23	[Possibly. Distribution along rives in part of range suggests water may play a role in secondary dispersal] "granite areas along the river, Acacia-Commiphora- Terminalia orbicularis woodland,"

706	Propagules bird dispersed	n
	Source(s)	Notes
	Thulin, M. (ed.). (1993). Flora of Somalia Volume 1. Royal Botanic Gardens, Kew, Richmond, UK	"Fruits 24–32(–40) x 0.7–1.6 cm. Seed-body 0.9–1.1 cm long, with broad wings 5–7 mm long." [No evidence]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Thulin, M. (ed.). (1993). Flora of Somalia Volume 1. Royal Botanic Gardens, Kew, Richmond, UK	"Fruits 24–32(–40) x 0.7–1.6 cm. Seed-body 0.9–1.1 cm long, with broad wings 5–7 mm long." [Unlikely. No means of external attachment]

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Thulin, M. (ed.). (1993). Flora of Somalia Volume 1. Royal Botanic Gardens, Kew, Richmond, UK	"Fruits 24–32(–40) x 0.7–1.6 cm. Seed-body 0.9–1.1 cm long, with broad wings 5–7 mm long." [No evidence. Winged seeds presumably adapted for wind dispersal]

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes

Qsn #	Question	Answer
	Thulin, M. (ed.). (1993). Flora of Somalia Volume 1. Royal Botanic Gardens, Kew, Richmond, UK	[Seed production unknown, but unlikely given small stature of trees] "Small slender tree. Leaves 2–3-pinnate, with 4–5 pairs of pinnae; leaflets 3–5 per pinna, oblong to elliptic, 0.9–4.3 x 0.4–2.5 cm, acute at the apex, rounded to cuneate at the base, glabrous or pubescent. Flowers yellowish or reddish, appearing when the plant is leafless; receptacle 2–3 mm long. Sepals 1–1.4 cm long, glabrous or pubescent. Petals 1.2–2 cm long, clawed. Ovary glabrous. Fruits 24–32(–40) x 0.7–1.6 cm. Seed-body 0.9–1.1 cm long, with broad wings 5–7 mm long."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Vozzo, J.A. 2002. Tropical Tree Seed Manual. USDA Forest Service, Washington, D.C.	[Unknown. <i>Moringa oleifera</i> may be stored for 1-2 years] "When dry, the brownish-gray seed pods are collected from the trees and are easily shelled by hand. The sticky film coating the seeds is removed by washing in a strainer. Seeds average about 3,000 to 9,000 per kg (Food and Agriculture Organization 1975, Francis and Rodriguez 1993). A single tree may annually yield 1,500 to 24,000 seeds (Jahn 1989). The germination rate may be as high as 100 percent, but has decreased 10 to 52 percent after 1 month of storage. Some lots show 25 to 60 percent germination after 1 year, but seeds do not survive 2 years of storage (Verma 1973). However, according to Jahn (1986), seeds in sealed jars remain viable for several years and no pretreatment is necessary."

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. (2021). 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
	Rana, M. K. (2018). Vegetable Crop Science. CRC Press, Boca Raton, FL	"These are large shrubs to a height of 3 m with greatly swollen roots." [Unknown. Other species with swollen roots are able to resprout after dying back, and may be able to tolerate repeated pruning or cutting]

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	Unknown

**Summary of Risk Traits:**

## High Risk / Undesirable Traits

- Grows, and could spread, in regions with tropical climates
- Other *Moringa* species have weedy traits and tendencies
- Reproduces by seeds
- Seeds dispersed by wind, gravity and intentionally by people
- Resprouts from tuberous roots
- 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)
- Not reported to spread vegetatively