

Taxon: *Moringa longituba* Engl.

Family: Moringaceae

Common Name(s): mawe

Synonym(s): *Hyperanthera longituba* (Engl.) Chiov.

Assessor: Chuck Chimera

Status: Assessor Approved

End Date: 8 Feb 2022

WRA Score: -1.0

Designation: L

Rating: Low Risk

Keywords: Tuberous Shrub, Tropical, Unarmed, Medicinal, Wind-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	?
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed		
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		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans		
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)	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	y
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	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
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	[No evidence of domestication] "Like that of other <i>Moringa</i> species, <i>M. longituba</i> is also used as therapeutic plants in the Horn of Africa; especially, to cure intestinal disorders of camels and goats, <i>M. longituba</i> roots are internally administrated."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2022). 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
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>Moringa longituba</i> Engler., is found in northeastern Kenya, southeastern Ethiopia and several parts of Somalia."

202	Quality of climate match data	High
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>Moringa longituba</i> Engler., is found in northeastern Kenya, southeastern Ethiopia and several parts of Somalia."

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	KewScience. (2022). Plants of the World Online - <i>Moringa longituba</i> . <a href="http://powo.science.kew.org">http://powo.science.kew.org</a> . [Accessed 7 Feb 2022]	" Distribution N1–3; C1, 2; S1–3; E Ethiopia, Kenya Ecology Altitude range 30–740 m."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes

Qsn #	Question	Answer
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>Moringa longituba</i> Engler., is found in northeastern Kenya, southeastern Ethiopia and several parts of Somalia."
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Seeds sold online, but unclear how widely this tree has been introduced and cultivated outside its native range

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
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	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
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. <a href="http://www.cabi.org/isc">www.cabi.org/isc</a>	No evidence

305	Congeneric weed	
	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	[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
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	[No evidence] " <i>Moringa longituba</i> Engler., is found in northeastern Kenya, southeastern Ethiopia and several parts of Somalia. It has a small shoot (60–75 cm) and a relatively large tuber. It generated pubescent 2–3 pinnate leaves with 2 pairs of pinnae and 3–5 leaflets per pinna. Leaves are generally oblong to obovate (2.5–6 x 1.5–4.5 cm), rounded to emarginate at the top, cuneate to subcordate at the bottom, glabrous or pubescent (when leaves are young). <i>M. longituba</i> flowers are bright red in colour, which appear when the plant is leafless and has a long, tubular hypanthium as the bases of petals and sepals are fused. The receptacle is tubular which is normally 1.3–3 cm long. It has 0.9–1.2 cm long sepals that are pubescent at the top and 1.2–1.5 cm long petals with a glabrous ovary. <i>M. longituba</i> produces pods with a size of 13.5–30 x 1.2–1.4 cm and has 1–1.3 cm long seeds with wings (measures about 2–3 cm)."

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> . <i>Intl. J. Agri. Crop Sci</i> , 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."

Qsn #	Question	Answer
403	Parasitic	n
	Source(s)	Notes
	KewScience. (2022). Plants of the World Online - <i>Moringa longituba</i> . <a href="http://powo.science.kew.org">http://powo.science.kew.org</a> . [Accessed 7 Feb 2022]	"Shrub or subshrub, 0.1–3 m tall, from a tuberous rootstock, pubescent when young, glabrescent "

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Olson, M.E. (1999). <i>Moringa</i> Home Page. <a href="http://www.mobot.org/gradstudents/olson/moringahome.html">http://www.mobot.org/gradstudents/olson/moringahome.html</a> . [Accessed 7 Feb 2022]	"Like other <i>Moringa</i> species in the Horn of Africa, <i>M. longituba</i> is used medicinally, particularly for treating intestinal disorders of camels and goats, for which the root is given internally."

405	Toxic to animals	
	Source(s)	Notes
	Olson, M.E. (1999). <i>Moringa</i> Home Page. <a href="http://www.mobot.org/gradstudents/olson/moringahome.html">http://www.mobot.org/gradstudents/olson/moringahome.html</a> . [Accessed 7 Feb 2022]	"Like other <i>Moringa</i> species in the Horn of Africa, <i>M. longituba</i> is used medicinally, particularly for treating intestinal disorders of camels and goats, for which the root is given internally." [No evidence in this post]
	Olson, M.E. (2013). India 2016: <i>Moringa longituba</i> germinating! 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 8 Feb 2022]	[Unknown, but this post suggests the possibility of toxicity] " <i>Moringa longituba</i> is generally regarded as inedible, and possibly even poisonous, and is used only as medicine by local people in its native habitat."

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Olson, M.E. (2014). India 2016: Spider mites love moringas. 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 8 Feb 2022]	"Spider mites are very fond of moringas, especially when they get stressed. Sooner or later, most moringaphiles have to deal with these evil little creatures. Fortunately, as we will see below, treating them is easy."

Qsn #	Question	Answer
	Boopathi, N. M., Raveendran, M., & Kole, C. (2021). <i>Moringa</i> and Its Genome: Future Prospects. In <i>The Moringa Genome</i> (pp. 181-185). Springer, Cham	[Possibly. Generic description of pests and pathogens] "Furthermore, global <i>Moringa</i> production also experiences the following hurdles, which seriously affects the <i>Moringa</i> leaf or biomass production: (i) non-availability of suitable cultivars that are adapted to the local environment, (ii) occasional incidence of pests (for example, budworm ( <i>Noorda Moringae</i> ), leaf caterpillar ( <i>Noorda blitealis</i> ), hairy caterpillar ( <i>Eupterote mollifera</i> ), fruit fly ( <i>Gitonadi stigmata</i> ) and tea mosquito bug ( <i>Helopeltis theivora</i> ) are found to be devastating pests in Southern India), and (iii) diseases (examples of diseases that occur in <i>Moringa</i> includes brown leaf spot ( <i>Cercospora moringicola</i> ), septoria leaf spot ( <i>Septoria lycopersici</i> Speg.), alternaria leaf spot ( <i>Alternaria solani</i> Sorauer), powdery mildew ( <i>Leveillula taurica</i> Lev. Arn.), root rot ( <i>Diplodia</i> sp.), fusarium wilt ( <i>Fusarium oxysporium</i> f. sp. <i>Moringae</i> ), fusarium wilt ( <i>Fusarium oxysporium</i> f. sp. <i>Moringae</i> ), fruit rot ( <i>Cochliobolus hawaiiensis</i> Alcorn), damping off ( <i>Rhizoctonia solani</i> Kuehn), dieback ( <i>Fusarium semitectum</i> Berk), anthracnose ( <i>Colletotrichum chlorophyti</i> Chandra), twig canker ( <i>Fusarium pallidoroseum</i> Cooke Sacc.) and rust ( <i>Puccinia Moringae</i> Koorders))."

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	Olson, M.E. (2013). India 2016: <i>Moringa longituba</i> germinating! 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 8 Feb 2022]	[Unknown] " <i>Moringa longituba</i> is generally regarded as inedible, and possibly even poisonous, and is used only as medicine by local people in its native habitat."

408	Creates a fire hazard in natural ecosystems	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	[No evidence. Unlikely as plant dies back to tuber during periods of drought when other fuels would be prone to burning] "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."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Bihrmann's Caudiciforms. (2022). <i>Moringa longituba</i> . <a href="http://www.bihrmann.com/caudiciforms/subs/mor-lon-sub.asp">http://www.bihrmann.com/caudiciforms/subs/mor-lon-sub.asp</a> . [Accessed 8 Feb 2022]	"It is found in Kenya, south eastern Ethiopia and Somalia, growing in a well drained soil with some water and lots of sun."

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

Qsn #	Question	Answer
	Verdcourt, B. (1985). A synopsis of the Moringaceae. Kew Bulletin 40(1): 1-23	"On a variety of soils, red sandy soil, orange 'Haud' sands, shallow gypsum soils, silty limestone soil, pale brown silt, white alluvial and black cotton plains, stony gravelly plains usually overlying limestone or gypsum or on limestone slopes in mixed woodland, scrub or thicket mainly of Acacia, Delonix and Commiphora; also overgrazed sometimes flooded grassy areas; 150-1260 m."
	Bihrmann's Caudiciforms. (2022). <i>Moringa longituba</i> . <a href="http://www.bihrmann.com/caudiciforms/subs/mor-lon-sub.asp">http://www.bihrmann.com/caudiciforms/subs/mor-lon-sub.asp</a> . [Accessed 7 Feb 2022]	"Soil: Mix"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Olson, M.E. (1999). <i>Moringa</i> Home Page. <a href="http://www.mobot.org/gradstudents/olson/moringahome.html">http://www.mobot.org/gradstudents/olson/moringahome.html</a> . [Accessed 7 Feb 2022]	"If an individual is well-sheltered under a tree, it can scramble through the branches for over three meters."
	KewScience. (2022). Plants of the World Online - <i>Moringa longituba</i> . <a href="http://powo.science.kew.org">http://powo.science.kew.org</a> . [Accessed 7 Feb 2022]	"Shrub or subshrub, 0.1–3 m tall, from a tuberous rootstock, pubescent when young, glabrescent "

412	Forms dense thickets	n
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	[No evidence] " <i>Moringa longituba</i> Engler., is found in northeastern Kenya, southeastern Ethiopia and several parts of Somalia. It has a small shoot (60–75 cm) and a relatively large tuber."

501	Aquatic	n
	Source(s)	Notes
	Verdcourt, B. (1985). A synopsis of the Moringaceae. Kew Bulletin 40(1): 1-23	[Terrestrial] "On a variety of soils, red sandy soil, orange 'Haud' sands, shallow gypsum soils, silty limestone soil, pale brown silt, white alluvial and black cotton plains, stony gravelly plains usually overlying limestone or gypsum or on limestone slopes in mixed woodland, scrub or thicket mainly of Acacia, Delonix and Commiphora; also overgrazed sometimes flooded grassy areas; 150-1260 m."

502	Grass	n
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	Moringaceae



Qsn #	Question	Answer
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	Moringaceae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y
	Source(s)	Notes
	Olson, M.E. (2013). India 2016: <i>Moringa longituba</i> germinating! The International Moringa Germplasm Collection. Universidad Nacional Autónoma de México, México DF. <a href="http://www.moringaceae.org/">http://www.moringaceae.org/</a> . [Accessed 7 Feb 2022]	"Most tree moringas grow like crazy in height after germination. Not <i>M. longituba</i> . This species lives in an area with very little rain, which falls in two very short seasons. So when water is present, the plants sprout quickly, grow two or three leaves, and invest all the rest of their energies into growing a tuber. The leaves are short lived, and the plants die back to the tuber, riding out the dry season until the next rains fall."
	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."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	[No evidence] " <i>Moringa longituba</i> Engler., is found in northeastern Kenya, southeastern Ethiopia and several parts of Somalia."

602	Produces viable seed	y
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>M. longituba</i> produces pods with a size of 13.5–30 x 1.2–1.4 cm and has 1–1.3 cm long seeds with wings (measures about 2–3 cm)."
	Bihrmann's Caudiciforms. (2022). <i>Moringa longituba</i> . <a href="http://www.bihrmann.com/caudiciforms/subs/mor-lon-sub.asp">http://www.bihrmann.com/caudiciforms/subs/mor-lon-sub.asp</a> . [Accessed 7 Feb 2022]	"Propagate: Seeds/Cuttings"
	Olson, M.E. (2013). India 2016: <i>Moringa longituba</i> germinating! The International Moringa Germplasm Collection. Universidad Nacional Autónoma de México, México DF. <a href="http://www.moringaceae.org/">http://www.moringaceae.org/</a> . [Accessed 7 Feb 2022]	"The <i>Moringa longituba</i> seeds planted on 12 September 2013 have all sprouted"

603	Hybridizes naturally	
-----	----------------------	--

Qsn #	Question	Answer
	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 8 Feb 2022]	[Unknown. 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> "

604	Self-compatible or apomictic	
	Source(s)	Notes
	Olson, M. E. (2003). Ontogenetic origins of floral bilateral symmetry in Moringaceae (Brassicales). <i>American Journal of Botany</i> , 90(1), 49-71	"Little is known regarding breeding systems in <i>Moringa</i> , although <i>M. oleifera</i> is known to outcross and occasionally self (G. Muluvi, Kenya Forestry Research Institute, personal communication)."
	East, E. M. (1940). The distribution of self-sterility in the flowering plants. <i>Proceedings of the American Philosophical Society</i> 82: 449-518	[Unknown. Self-fertility reported in genus] " <i>Moringa oleifera</i> Lam. is self-fertile though slightly protandrous."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Verdcourt, B. (1985). A synopsis of the Moringaceae. <i>Kew Bulletin</i> 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." [Generic description]
	Kubitzki, K. & Bayer, C. (eds.). (2003). The Families and genera of vascular plants. Volume V. Flowering Plants. Dicotyledons: Capparales, Malvales and Non-betain 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
	Olson, M.E. (2013). India 2016: <i>Moringa longituba</i> germinating! 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 8 Feb 2022]	[No evidence of vegetative spread. Resprouts from tubers] "Most tree moringas grow like crazy in height after germination. Not <i>M. longituba</i> . This species lives in an area with very little rain, which falls in two very short seasons. So when water is present, the plants sprout quickly, grow two or three leaves, and invest all the rest of their energies into growing a tuber. The leaves are short lived, and the plants die back to the tuber, riding out the dry season until the next rains fall."

607	Minimum generative time (years)	
	Source(s)	Notes
	WRA Specialist. (2022). 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
-----	--	---

Qsn #	Question	Answer
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>M. longituba</i> produces pods with a size of 13.5– 30 x 1.2–1.4 cm and has 1–1.3 cm long seeds with wings (measures about 2–3 cm)." [No means of external attachment. Winged seeds. Presumably wind-dispersed]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	rarepalmseeds.com. (2022). <i>Moringa longituba</i> . <a href="https://www.rarepalmseeds.com/moringa-longituba">https://www.rarepalmseeds.com/moringa-longituba</a> . [Accessed 7 Feb 2022]	Seeds sold online

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>M. longituba</i> produces pods with a size of 13.5– 30 x 1.2–1.4 cm and has 1–1.3 cm long seeds with wings (measures about 2–3 cm)." [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]
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>M. longituba</i> produces pods with a size of 13.5– 30 x 1.2–1.4 cm and has 1–1.3 cm long seeds with wings (measures about 2–3 cm)." [Winged seeds. Presumably wind-dispersed]

705	Propagules water dispersed	
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>M. longituba</i> produces pods with a size of 13.5– 30 x 1.2–1.4 cm and has 1–1.3 cm long seeds with wings (measures about 2–3 cm)." [Winged seeds. Presumably wind-dispersed, although water could potentially result in secondary dispersal]

706	Propagules bird dispersed	n
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>M. longituba</i> produces pods with a size of 13.5– 30 x 1.2–1.4 cm and has 1–1.3 cm long seeds with wings (measures about 2–3 cm)." [Winged seeds. Presumably wind dispersed]

707	Propagules dispersed by other animals (externally)	n
-----	--	---

Qsn #	Question	Answer
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>M. longituba</i> produces pods with a size of 13.5– 30 x 1.2–1.4 cm and has 1–1.3 cm long seeds with wings (measures about 2–3 cm)." [Winged seeds. Presumably wind dispersed. No means of external attachment]

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>M. longituba</i> produces pods with a size of 13.5– 30 x 1.2–1.4 cm and has 1–1.3 cm long seeds with wings (measures about 2–3 cm)." [Winged seeds. Presumably wind dispersed. No evidence of consumption]

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Boopathi, N. M., & Abubakar, B. Y. (2021). Botanical Descriptions of <i>Moringa</i> spp. In <i>The Moringa Genome</i> (pp. 11-20). Springer, Cham	" <i>M. longituba</i> produces pods with a size of 13.5– 30 x 1.2–1.4 cm and has 1–1.3 cm long seeds with wings (measures about 2–3 cm)." [Numbers unknown, but based on stature of plant, probably unlikely]

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Boopathi, N. M., Harshith, J. D., Santhanakrishnan, V. P., & Raveendran, M. (2021). Tissue Culture and Genetic Engineering in <i>Moringa</i> . In <i>The Moringa Genome</i> (pp. 67-83). Springer, Cham	[Unknown, but possibly no based on generic storage data] "It should also be noted that <i>Moringa</i> seed lose its viability, if they are stored for more than 2 months. Sharma and Raina (1982) reported loss of <i>Moringa</i> seed germination at the rate of 50%, 48%, and 7.5% when they are sowed after 1, 2, and 3 months, respectively, of seed collection due to its high oil content (and also in certain cases, due to storage pest infestation). Thus, long-term storage of <i>Moringa</i> seeds critically affects the germination process, and hence, keeping the seeds even for the next season may have adverse effect on the germination."

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

Qsn #	Question	Answer
804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	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	[Unknown but may be able to resprout from tuberous root if damaged by cutting or fire] "Tuberous shrubs ( <i>M. borziana</i> , <i>M. longituba</i> , <i>M. pygmaea</i> , <i>M. rivaie</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."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2022). 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

Possible toxic properties

May be able to persist from tuberous root

Reproduces by seeds

Seeds dispersed by wind, gravity and 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)

Grows in high light environments (dense shade may inhibit ability to spread)