

Taxon: <i>Momordica cochinchinensis</i> (Lour.) Spreng.	Family: Cucurbitaceae
Common Name(s): balsam-pear Chinese bitter-cucumber Chinese-cucumber gac giant spine gourd spiny bitter-cucumber sweet gourd	Synonym(s): <i>Momordica ovata</i> Cogn. <i>Muricia cochinchinensis</i> Lour.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 7 Mar 2016
WRA Score: 4.0	Designation: EVALUATE	Rating: Evaluate

Keywords: Tropical Vine, Edible Fruit, Dioecious, Tuberos Roots, Bird-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		
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	n=0, y = 1*multiplier (see Appendix 2)	y
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		

Qsn #	Question	Answer Option	Answer
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	n
411	Climbing or smothering growth habit	y=1, n=0	y
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	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	y=1, n=-1	n
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	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m 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
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	[No evidence of domestication] " <i>Momordica cochinchinensis</i> occurs wild and cultivated from India to Japan and throughout Malesia."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 7 Mar 2016]	"Native: Asia-Temperate China: China - Anhui, - Zhejiang, - Fujian, - Hunan, - Jiangxi, - Jiangsu, - Guangdong, - Guizhou, - Sichuan, - Yunnan, - Guangxi, - Xizang Eastern Asia: Taiwan Asia-Tropical Indian Subcontinent: Bangladesh; India - Assam, - Nagaland, - Tamil Nadu, - Uttar Pradesh, - West Bengal Indo-China: Cambodia; Laos; Myanmar; Thailand; Vietnam Malesia: Indonesia; Malaysia; Papua New Guinea; Philippines North Indian Ocean: India - Andaman and Nicobar Australasia Australia: Australia - Queensland"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 7 Mar 2016]	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forest margins and roadsides on mountain slopes; 400–1100 m."
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	" <i>Momordica cochinchinensis</i> prefers a warm humid climate with temperatures ranging from 20-35 C and an average rainfall of 1500-2500 mm."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Forest margins and roadsides on mountain slopes; 400–1100 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangsu, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [Bangladesh, India, Malaysia, Myanmar]."

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 7 Mar 2016]	Cultivated: [Unclear. Cultivated and native ranges overlap] "Asia-Temperate China: China Eastern Asia: Japan - Ryukyu Islands Asia-Tropical Indian Subcontinent: India Indo-China: Indochina; Thailand Malesia: Indonesia; Malaysia"

301	Naturalized beyond native range	
	Source(s)	Notes
	Bharathi, L.K. & Joseph John, K. 2013. <i>Momordica</i> genus in Asia - An Overview. Springer India, New Delhi	"it has long been cultivated and naturalised throughout much of southeastern Asia." [Possibly. Distinction between native & cultivated range unclear]

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	Listed in common weeds of Vietnam. Impacts unspecified

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	y
	Source(s)	Notes
	Holm, L.G., Doll, J., Holm, E., Pancho, J.V. & Herberger, J.P. 1997. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	[<i>Momordica charantia</i>] "a weed in 22 crops in over 50 countries, frequently reported in sugarcane and other plantation crops. It is a principal weed of bananas in Surinam; cacao in Ecuador; citrus in the southern United States; cotton soybeans etc."
	Henty, E.E. & Pritchard, G.H. 1975. Weeds of New Guinea and their control. 2nd edition. Department of Forests, Division of Botany, Lae, Papua New Guinea	[<i>Momordica charantia</i>] "useful as a ground cover, particularly under cocoa, but forming a blanket over other vegetation when uncontrolled; a weed in grazing land, unpalatable to stock. Widespread at low altitudes but only locally common"

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Fruits are spinescent] "Climbers, strong, to 15 m. Root tuberous. Stem and branches glabrous or puberulent, sometimes tomentose at nodes. Tendrils robust, simple. Petiole robust, 5–10 cm, slightly yellow- brown pubescent or glabrescent, 2–4-glandular at base or middle; leaf blade cordate or broadly ovate-orbicular, 10–20 × 10–20 cm, 3–5-lobed; median lobe obovate or oblong-lanceolate, 6–10(–15) × 3–6(–9) cm, margin undulate-dentate, apex acute or acuminate; lateral lobes ovate or oblong-lanceolate, 3–7(–11) × 2–4(–7) cm, base cordate." ... "Fruit red, ovoid, 12–15 cm in diam., fleshy, densely spinescent, apex rostellate."

Qsn #	Question	Answer
402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

403	Parasitic	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Climbers, strong, to 15 m." [Cucurbitaceae . No evidence]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Rai, N., Asati, B. S., Patel, R. K., Patel, K. K., & Yadav, D. S. (2005). Underutilized horticultural crops in north eastern region. ENVIS Bulletin Himalayan Ecology, 3(1), 46-52	"Their immature tender green fruits are cooked as vegetable. Young leaves, flowers and seeds are also edible." [Possibly. Palatable to humans]

405	Toxic to animals	
	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	"Seed poisonous" [Toxicity to animals unknown]
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	"Seeds are indicated as cooling, resolvent, laxative and poisonous." [Toxicity to animals unknown]

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	[Potentially] "Diseases and pests Serious diseases of bitter gourd are Cercospora leaf spot, downy mildew (caused by Pseudoperonospora cubensis) and bacterial wilt (caused by Pseudomonas solanacearum). Fruit fly (<i>Dacus cucurbitae</i>) is the most destructive insect pest of bitter gourd, whereas root-knot nematodes (<i>Meloidogyne incognita</i>) also attack the crop."

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes

Qsn #	Question	Answer
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Seeds poisonous; plants as pesticide."
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	[Edible & medicinal uses, but possibly toxic in certain doses] "Seeds of <i>Momordica cochinchinensis</i> are used in local medicine in Burma (Myanmar), Thailand and the Philippines to treat chest complaints, whereas in China and Peninsular Malaysia they are a remedy for abdominal pains, dysentery, mesenteric enlargements, obstructions of liver and spleen and haemorrhoids. They are further used to treat chronic malaria, and after being ground and soaked in alcohol or water they are applied externally to wounds, bruises, burns, skin trouble, ulcers, breast cancer, abscesses, mumps and lumbago. Seeds are indicated as cooling, resolvent, laxative and poisonous. The root is used as an expectorant. Roots and leaves have been reported to be useful in the treatment of oedema of the legs, a kind of rheumatism. The immature fruits of <i>Momordica charantia</i> and <i>Momordica cochinchinensis</i> are a well-known vegetable, whereas leaves and flowers are also eaten as a vegetable or flavouring agent."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	" <i>Momordica cochinchinensis</i> prefers a warm humid climate with temperatures ranging from 20-35 C and an average rainfall of 1500-2500 mm." [No evidence. Grows in relatively wet habitats]

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 2, Fruits. Springer, New York	"It is hygrophilous, prefers sunny positions but is slightly shade tolerant."
	Lin, L.J., Hsiao, Y.Y., & Kuo, C.G. 2009. Discovering indigenous treasures: Promising indigenous vegetables from around the world. AVRDC – The World Vegetable Center Publication No. 09-720. AVRDC – The World Vegetable Center, Shanhua, Taiwan	"Light requirement: full or partial sun"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	"It does not tolerate waterlogging and grows well in fertile, well-drained, sandy loams with pH near neutral."

Qsn #	Question	Answer
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 2, Fruits. Springer, New York	"It does well in the lowlands in fertile organic, humus-rich and moist but well-drained soils, e.g. around ponds, rice-fi elds, and abandoned areas, and home backyards."
	Lin, L.J., Hsiao, Y.Y., & Kuo, C.G. 2009. Discovering indigenous treasures: Promising indigenous vegetables from around the world. AVRDC– The World Vegetable Center Publication No. 09-720. AVRDC– The World Vegetable Center, Shanhua, Taiwan	"soil type: sandy, loamy, clayey"

411	Climbing or smothering growth habit	y
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Climbers, strong, to 15 m."

412	Forms dense thickets	n
	Source(s)	Notes
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 2, Fruits. Springer, New York	"The plant is a perennial twining, dioecious vine, with an angular robust, glabrous stem and tuberous roots." [Climbing & potentially smother]

501	Aquatic	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial climber] "Forest margins and roadsides on mountain slopes; 400–1100 m."

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network, 2016. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 7 Mar 2016]	"Family: Cucurbitaceae Tribe: Momordiceae"

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Climbers, strong, to 15 m." [Cucurbitaceae]

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	"At higher latitudes, plants of <i>Momordica cochinchinensis</i> remain dormant in winter and regrow from the tuberous root in spring."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	[No evidence] " <i>Momordica cochinchinensis</i> occurs wild and cultivated from India to Japan and throughout Malesia."

602	Produces viable seed	y
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	"Mean germination of the seeds of <i>Momordica cochinchinensis</i> is 50%, and germination may take up to 1 year; cuttings root for about 80%."
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Seeds numerous, ash gray, ovoid or square, 26–28 × 18–20 mm, 5–6 mm thick, both surfaces sculptured, margin undulate-sublobulate."

603	Hybridizes naturally	
	Source(s)	Notes
	Lim, T.K. 2012. Edible Medicinal and Non-Medicinal Plants. Volume 2, Fruits. Springer, New York	Unknown. None documented

604	Self-compatible or apomictic	n
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	" <i>Momordica cochinchinensis</i> is mainly propagated by its tuberous roots. Since it is dioecious, tubers from male and female plants should be planted together."

Qsn #	Question	Answer
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Plants dioecious. Male flowers solitary or in a short raceme; pedicels robust, 3–5 cm, or 6–12 cm when solitary, bracteate at apex; bract orbicularreniform, 3–5 × 5–8 cm, entire, retuse at apex; calyx tube funnelform; segments broadly lanceolate or oblong, 12–20 × 6–8 mm, apex acute or acuminate; corolla yellow; segments ovateoblong, 5–6 × 2–3 cm, yellow glandular at base, apex acute or acuminate; stamens 3; anther cells reflexed. Female flower solitary; pedicel 5–10 cm, bracteate at middle; bract ca. 2 mm; calyx and corolla as in male flowers; ovary ovoid-oblong, ca. 1 cm, densely spinescent."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	"Flowers of <i>Momordica</i> are pollinated by insects, especially bees."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Parks, S. E., Murray, C. T., Gale, D. L., Al-Khawaldeh, B., & Spohr, L. J. (2013). Propagation and production of Gac (<i>Momordica cochinchinensis</i> Spreng.), a greenhouse case study. <i>Experimental Agriculture</i> , 49(02), 234-243	"Growing plants from seed, then vegetatively increasing the number of productive female plants by cuttings is a means to increase Gac production with limited resources." [No indication or evidence of natural spread through vegetative fragmentation]
	Useful Tropical Plants Database. 2016. <i>Momordica cochinchinensis</i> . http://tropical.theferns.info/viewtropical.php?id=Momordica+cochinchinensis . [Accessed 7 Mar 2016]	"Propagation: Seed"

607	Minimum generative time (years)	1
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	"Flowering of <i>Momordica charantia</i> starts within 2 months from sowing, that of <i>Momordica cochinchinensis</i> after about 2 months."

Qsn #	Question	Answer
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Fruit red, ovoid, 12–15 cm in diam., fleshy, densely spinescent, apex rostellate. Seeds numerous, ash gray, ovoid or square, 26–28 × 18–20 mm, 5–6 mm thick, both surfaces sculptured, margin undulate-sublobulate." [No evidence. Fruits & seeds relatively large & lack means of external attachment]
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Amazon.com. 2016. 20 Gac fruit Seeds - Momordica Cochinchinensis Spreng - (Southeast Asian fruit) - Original from Thailand. http://www.amazon.com/Gac-fruit-Seeds-Momordica-Cochinchinensis/dp/B00FAPG8YW . [Accessed 7 Mar 2016]	[Seeds sold through various commercial websites]
703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Fruit red, ovoid, 12–15 cm in diam., fleshy, densely spinescent, apex rostellate. Seeds numerous, ash gray, ovoid or square, 26–28 × 18–20 mm, 5–6 mm thick, both surfaces sculptured, margin undulate-sublobulate." [No evidence. Fruits & seeds relatively large & unlikely to be inadvertently dispersed as a seed contaminant]
704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[No evidence. Fleshy-fruited] "Fruit red, ovoid, 12–15 cm in diam., fleshy, densely spinescent, apex rostellate. Seeds numerous, ash gray, ovoid or square, 26–28 × 18–20 mm, 5–6 mm thick, both surfaces sculptured, margin undulate-sublobulate."
705	Propagules water dispersed	
	Source(s)	Notes
	Ecocrop. 2007. <i>Momordica cochinchinensis</i> . FAO. http://ecocrop.fao.org/ecocrop/srv/en/cropView?id=7797 . [Accessed 7 Mar 2016]	"It prefers warm humid conditions and in the wild it can often be found in open places on lowland riverbanks." [Possible that fruit may be dispersed by water along rivers. Buoyancy unknown]
706	Propagules bird dispersed	y
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Fruit red, ovoid, 12–15 cm in diam., fleshy, densely spinescent, apex rostellate. Seeds numerous, ash gray, ovoid or square, 26–28 × 18–20 mm, 5–6 mm thick, both surfaces sculptured, margin undulate-sublobulate."

Qsn #	Question	Answer
	Sharma, T., Jayakumar, V., Purthi, N., & Ganeshiah, K. (2013). Alien flora into the fragile ecosystem of Andaman and Nicobar Islands: A major concern. Journal of the Andaman Science Association 18(1), 25-31	"Many species of forests completely depend on birds for their seed dispersal. Important species like <i>Momordica cochinchinensis</i> requires a bird's gut passing of its seeds for germination."
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	" <i>Momordica</i> fruits may be shattered and eaten by large birds or mammals." [Probably yes, although seeds are relatively large]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Sharma, T., Jayakumar, V., Purthi, N., & Ganeshiah, K. (2013). Alien flora into the fragile ecosystem of Andaman and Nicobar Islands: A major concern. Journal of the Andaman Science Association 18(1), 25-31	"Many species of forests completely depend on birds for their seed dispersal. Important species like <i>Momordica cochinchinensis</i> requires a bird's gut passing of its seeds for germination." [Adapted for frugivory & internal dispersal]

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica</i> L. [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	"Indehiscent <i>Momordica</i> fruits may be shattered and eaten by large birds or mammals." [[Feral pigs may disperse seeds in the Hawaiian Islands]
	Sharma, T., Jayakumar, V., Purthi, N., & Ganeshiah, K. (2013). Alien flora into the fragile ecosystem of Andaman and Nicobar Islands: A major concern. Journal of the Andaman Science Association 18(1), 25-31	"Many species of forests completely depend on birds for their seed dispersal. Important species like <i>Momordica cochinchinensis</i> requires a bird's gut passing of its seeds for germination."

801	Prolific seed production (>1000/m ²)	
	Source(s)	Notes
	Wu, Z. Y., P. H. Raven & D. Y. Hong, (eds). 2011. Flora of China. Vol. 19 (Cucurbitaceae through Valerianaceae, with Annonaceae and Berberidaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Fruit red, ovoid, 12–15 cm in diam., fleshy, densely spinescent, apex rostellate. Seeds numerous, ash gray, ovoid or square, 26–28 × 18–20 mm, 5–6 mm thick, both surfaces sculptured, margin undulate-sublobulate."
	Lin, L.J., Hsiao, Y.Y., & Kuo, C.G. 2009. Discovering indigenous treasures: Promising indigenous vegetables from around the world. AVRDC– The World Vegetable Center Publication No. 09-720. AVRDC– The World Vegetable Center, Shanhua, Taiwan	"fruit round or oblong, 5-10 x 10-15 cm, rind hard, covered in small spines, green but red or dark orange upon ripening, fleshy middle part of fruit wall dark red with six cartilaginous carpels containing 10 -20 seeds; seeds compressed, sculptured, 2.5 x 2 x 0.5 cm, dark brown." ... "yield: 30-60 gourds/plant in one season, 1-3 kg each." [60-120 seeds per fruit. Potentially 7200 seeds produced per plant]

802	Evidence that a persistent propagule bank is formed (>1 yr)	

Qsn #	Question	Answer
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica L.</i> [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	"Mean germination of the seeds of <i>Momordica cochinchinensis</i> is 50%, and germination may take up to 1 year"
	Pandey, S., Devi, C., Kak, A., Khan, Y. J., & Gupta, V. (2013). Breaking seed dormancy in sweet gourd (<i>Momordica cochinchinensis</i>). <i>Seed Science and Technology</i> , 41(1), 133-136	"Seed dormancy in wild cucurbit species very often interferes with the results of routine germination tests conducted by genebanks. Seed coat impermeability to water causes physical dormancy in <i>Momordica cochinchinensis</i> . To ensure conservation of rare and important germplasm, it is important to determine the most suitable means of overcoming physical dormancy which can promote rapid and uniform germination, freshly harvested, dried seeds of <i>M. cochinchinensis</i> were subjected to different dormancy breaking treatments. Removal of the entire seed coat increased germination from 0% (control) to 89%. This increase may be due to the removal of the restriction of water entry by the seed coat into the seed. Chemical scarification with concentrated sulphuric acid and hot water treatment were less effective in promoting germination." [but viability from field conditions unknown]

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species. Herbicides effective on other <i>Momordica</i> species may be similarly effective

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	Nguyen Huu Hien & Widodo, S.H., 1999. <i>Momordica L.</i> [Internet] Record from Proseabase. de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. http://www.proseanet.org . [Accessed 7 Mar 2016]	"At higher latitudes, plants of <i>Momordica cochinchinensis</i> remain dormant in winter and regrow from the tuberous root in spring."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2016. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Possibly naturalized, but distinction between native & cultivated range is unclear
- Other *Momordica* species are invasive
- Spiny fruit
- Seeds are reported to be toxic
- Climbing & -potentially smothering habit
- Reproduces by seeds & resprouts from tuberous roots
- Reaches maturity in approximately 2 months
- Seeds dispersed by birds & intentionally by people
- Potentially prolific seed production
- Seeds possess dormancy & could possibly form a seed bank
- Limited ecological information may limit accuracy of risk prediction

Low Risk Traits

- No confirmed reports of invasiveness, but no evidence of widespread introduction outside native range
- Edible fruit & leaves
- Dioecious (requiring both male & female plants for seed set)
- Not reported to spread vegetatively

Second Screening Results for Vines

(A) Shade tolerant or known to form dense stands?> Possibly. Reported to be slightly shade tolerant

(B) Bird-dispersed?> Dispersed by birds

(C) Life cycle <4 years? Yes. 2 months

(D) Reported as a weed of cultivated lands? Possibly. Unconfirmed

Outcome = Evaluate Further

TAXON: *Momordica*
cochinchinensis (Lour.) Spreng.

SCORE: 4.0

RATING: *Evaluate*