

**Family:** Cucurbitaceae

**Taxon:** Momordica charantia

**Synonym:** Momordica charantia var. abbreviata Ser.  
Momordica zeylanica Mill.  
Momordica muricata Willd.

**Common Name** bitter melon  
bitter gourd  
balsam-apple  
momordique  
bálsamo

**Questionnaire :** current 20090513      **Assessor:** Chuck Chimera      **Designation:** H(Hawai'i)  
**Status:** Assessor Approved      **Data Entry Person:** Chuck Chimera      **WRA Score 13**

101	Is the species highly domesticated?	y=-3, n=0	y
102	Has the species become naturalized where grown?	y=1, n=-1	y
103	Does the species have weedy races?	y=1, n=-1	y
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	y
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	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
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)	y
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	y=1, n=0	n
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	y
405	Toxic to animals	y=1, n=0	y
406	Host for recognized pests and pathogens	y=1, n=0	y
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	y
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	y=1, n=0	n

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	y
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	
604	Self-compatible or apomictic	y=1, n=-1	y
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	y=1, n=-1	n
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/m2)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	

Designation: H(Hawai'i)

WRA Score 13

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**Supporting Data:**

101	2010. Janick, J.. Horticultural Reviews. Volume 37.. John Wiley and Sons, New York, NY	"The center of bitter gourd domestication likely lies in eastern Asia, possibly eastern India or southern China...Both the domesticated and putative wild bitter gourd progenitors of bitter gourd are listed in floras of India, tropical Africa and Asia as well as the New World tropics" [highly domesticated forms exist]
102	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"naturalized in disturbed sites, 0-300 m, on all of the main islands" [Hawaiian Islands]
103	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"The naturalized populations have been referred to var. abbreviata, characterized by the smaller, more warty fruit and smaller, less sharply cut leaves. The fruit and young shoots of the wild plants are edible only in small quantities. A cultivated form with much larger fruit is grown in Hawaii and is popular in Chinese and Filipino cooking."
201	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"M. charantia is native to the old world tropics but is now a weed in tropical and subtropical regions in most of Latin America, all of Asia and parts of Africa."
202	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	M. charantia highly suited to tropical and subtropical climates.
203	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"grows from sea level to nearly 1000 m. It grows where annual precipitation is as low as 480 mm to as much as 4100 mm, where mean temperatures are as low as 12.5 degrees C to as high as 25 degrees C, and in soil with pHs from 4.3 to 8.7" [exhibits environmental versatility]
204	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"M. charantia is native to the old world tropics but is now a weed in tropical and subtropical regions in most of Latin America, all of Asia and parts of Africa."
205	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"now a weed in tropical and subtropical regions in most of Latin America, all of Asia and parts of Africa" [history of repeated introductions outside its natural range]
301	1981. Smith, A.C.. Flora Vitiensis Nova - A New Flora of Fiji (Spermatophytes Only). Volume 2.. Pacific Tropical Botanical Garden, Lawai, HI	"occurring in coastal thickets or along creeks and rivers up to an elevation of perhaps 100 m"
301	1999. McMullen, C. K.. Flowering plants of the Galápagos. Comstock Pub. Assoc., Ithaca, NY	Arid lowlands in the Galápagos Islands
301	1999. Wagner, W. L./Herbst, D. R./Sohmer, S. H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"widely naturalized in disturbed sites, 0-300 m"
302	2010. WRA Specialist. Personal Communication.	A weed with negative impacts for agriculture [see 3.03]
303	1975. Henty, E. E./Pritchard, G. H.. Weeds of New Guinea and their control. 2nd edition. Department of Forests, Division of Botany, Lae, Papua New Guinea	"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"
303	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"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."
304	2007. Randall, R.P.. Global Compendium of Weeds - Momordica charantia. Hawaii Ecosystems at Risk Project (HEAR), <a href="http://www.hear.org/gcw/species/momordica_charantia/">http://www.hear.org/gcw/species/momordica_charantia/</a>	Listed as an environmental weed, but most negative impacts are associated with agriculture [see 3.03]
305	2003. Dave's Garden. PlantFiles: Picture #9 of Balsam Apple, Cundeamor (Momordica balsamina). Dave's Garden, <a href="http://davesgarden.com/guides/pf/showimage/19852/">http://davesgarden.com/guides/pf/showimage/19852/</a>	"These invasive and virtually indestructible vines are all over peoples' yards and fences here in Florida. This photo shows a ripe and few green ones hanging from a chain link fence."
305	2003. Padrón Soroa, J.. Assessment and regulations for preventing entry of exotic weeds into Cuba.	Table 1. List of Main Weed Species in Cuba [includes Momordica balsamina]

401	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	No spines, thorns or burrs
402	2001. Kohli, R. K./Singh, D.P./Batish, D.R.. Allelopathy in agroecosystems. Food Products Press, Binghamton, NY	Without strong allelopathic properties [see Table 2, p.264]
403	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	No evidence of parasitism
404	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"cattle seemed to avoid eating this weed, probably due to its offensive odor."
405	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"cattle seemed to avoid eating this weed, probably due to its offensive odor." [apparently unpalatable, but no evidence of toxicity to cattle reported]
405	2001. Burrows, G.E./Tyrl, R.J.. Toxic plants of North America. Iowa State University Press, Ames, IA	"The mature seeds and fruits...are believed to cause severe digestive tract disturbance. They appear to be a particular problem in dogs, which also may exhibit prominent neurologic signs".
406	2002. Douglas, J.. Balsam pear. Crop & Food Research. 102: .	Pests and diseases: No diseases were recorded during trials in Hastings, but aphids caused some damage. Cucurbit fungal diseases, like powdery mildew, will affect balsam pear.
406	2002. Muniappan, R./Cruz, J./Bamba, J.. Invasive Plants and Their Control in Micronesia. Micronesica Suppl.. 6: 85-92.	It is native to Tropical Asia or Africa. This vine has yellow flowers and orange fruits. It has spread along roadsides and other disturbed areas. It can also be seen growing on cliffs and orchards. It is propagated by seeds only. It serves as a wild host for the melonfly, <i>Bactrocera cucurbitae</i> (Coquillett) (Diptera: Tephritidae) a serious pest of fruit crops and also of quarantine importance.
407	1967. Morton, J.F.. The balsam pear - an edible, medicinal and toxic plant. Economic Botany. 21 (1): 57-68.	"In South Florida, there have been several instances of illness in children from eating the ripe fruits of the wild vine.
407	1996. Neuwinger, H.D.. African ethnobotany: poisons and drugs : chemistry, pharmacology, toxicology. CRC Press, Boca Raton, FL	"Toxicology: In India the juice of the plant caused the death of a child through sever vomiting and purging. "
407	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"Leaves or fruit are eaten in several Asian and Latin American countries." [no evidence of allergens or toxicity to humans, but see Neuwinger 1996]
408	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	Increased fire hazards not listed among problems associated with <i>M. charantia</i>
409	2010. Dave's Garden. PlantFiles: Bitter Gourd, Bitter Melon, Balsam Pear. Dave's Garden, <a href="http://davesgarden.com/guides/pf/go/121045/">http://davesgarden.com/guides/pf/go/121045/</a>	Sun Exposure: Full Sun
409	2010. Fine Gardening. <i>Momordica charantia</i> . The Taunton Press, Inc., Newtown, CT <a href="http://www.finegardening.com/plantguide/momordica-charantia-bitter-melon.aspx">http://www.finegardening.com/plantguide/momordica-charantia-bitter-melon.aspx</a>	Light: Full Sun Only
409	2010. Tropilab Inc.. <i>Momordica charantia</i> L. - Bitter Melon. Tropilab Inc., <a href="http://www.tropilab.com/momordica-cha.html">http://www.tropilab.com/momordica-cha.html</a>	Full sun / light shade; rich moist soil.
410	2010. College of Natural Resources. Bitter gourd - ( <i>Momordica charantia</i> ). Royal University of Bhutan, <a href="http://cms.cnr.edu.bt/cms/files/docs/File/vegetable%20production/Study%20guides/Bitter%20gourd_HandOuts.pdf">http://cms.cnr.edu.bt/cms/files/docs/File/vegetable%20production/Study%20guides/Bitter%20gourd_HandOuts.pdf</a>	Bitter gourd tolerates a wide range of soils but prefers a well-drained sandy loam soil that is rich in organic matter. The optimum soil pH is 6.0-6.7, but plants tolerate alkaline soils up to pH 8.0.
411	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"an annual creeping or climbing, herbaceous vine with a strong, foul odor; root a taproot; stems 2 to 3 m long, often forming a dense carpet over other plants"
412	2010. WRA Specialist. Personal Communication.	Climbing and smothering [see 4.11]
501	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	Terrestrial vine

502	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	Cucurbitaceae [not a grass]
503	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	Cucurbitaceae [not a nitrogen fixing woody plant]
504	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"root a taproot" [but not a true geophyte]
601	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	No evidence of substantial reproductive failure in native habitat
602	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"seeds light brown to black, embedded in sticky, moist, crimson pulp (aril), 5 to 9 mm long, 2.5 to 6 mm wide with ridged or pitted surface and thick ragged margin as though carved."
603	2005. Behera, T. K.. Heterosis in Bittergourd. Journal of New Seeds. 6: 2 & 3: 217 - 221.	Bittergourd is an important cucurbit fruit vegetable grown in the tropics. It has rich nutritional and medicinal value. Hybrids are becoming popular in this crop. Gynoecey is also reported in this crop which could be a useful tool to exploit heterosis on commercial scale with more cheaper rates. But at present hybrid seed is produced by hand pollination without emasculation. [ability to hybridize naturally unknown]
603	2010. College of Natural Resources. Bitter gourd - (Momordica charantia). Royal University of Bhutan, <a href="http://cms.cnr.edu.bt/cms/files/docs/File/vegetable%20production/Study%20guides/Bitter%20gourd_HandOuts.pdf">http://cms.cnr.edu.bt/cms/files/docs/File/vegetable%20production/Study%20guides/Bitter%20gourd_HandOuts.pdf</a>	Numerous hybrid and open pollinated varieties are available. Hybrid usually produce higher yields but their seeds are relatively expensive and must be purchased for every planting. Open- pollinated varieties have the advantage that their seeds may be saved and used for future plantings.
604	2008. Behera, T.K./Singh, A.K./Staub, J.E.. Comparative analysis of genetic diversity in Indian bitter gourd (Momordica charantia L.) using RAPD and ISSR markers for developing crop improvement strategies. Scientia Horticulturae. 115: 209–217.	Thirty-eight morphologically and geographically distinct M. charantia L. accessions (Table 1) were collected from different Indian states, and then grown in summer 2006 and maintained at the Research Farm of the Indian Agricultural Research Institute, New Delhi, India. All accessions examined herein were self-pollinated three times before evaluation. [capable of self-pollination]
605	2009. Deyto, R. C. /Cervancia, C. R.. Floral Biology and Pollination of Ampalaya (Momordica charantia L.). The Philippine Agricultural Scientist. 92(1): 8-18.	Floral traits such as anthesis, anther dehiscence, pollen morphology and viability, and pollination of ampalaya or bitter gourd (Momordica charantia L.) were observed from November 2006 to March 2007 at the Central Experimental Station, University of the Philippines Los Baños. Insect pollinators were identified and the fruit and seed sets in insect pollinated and hand-pollinated plants were compared. Flowering of M. charantia started 38 + 3.5 d after planting with the development of male flowers earlier than the female flowers. The ratio of male to female flower was 19:1. Flowers started to open at about 0300 h, and were fully opened at 0530-1200 h. A successfully pollinated female flower started to set fruit after 2-5 d. Unpollinated flowers dried up completely after 5 d. The pollinator species were honey bees (Apis mellifera and Apis cerana), stingless bees (Trigona spp.) and Halictus spp. The foraging period synchronized with anthesis, and peaked at 0700-0800 h. Fruit set in insect pollinated (78%) and hand-pollinated (80%) flowers did not significantly vary. Likewise, there was no significant difference in fruit weight, length, diameter and number of seeds between both methods. Flowers that were not visited by pollinators did not set fruit.
606	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"...the plant propagates only by seed and is frequently grown as a crop." [no reproduction by vegetative fragmentation]
607	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"Flowering can begin 30 to 35 days after planting and fruits mature 15 to 20 days later (Purseglove 1968)."
701	2001. Doijode, S.J.. Seed storage of horticultural crops. Food Product Press, Inc., Binghamton, NY	"Seeds are brown, 1 to 1.5 cm long, and oval with flattened arils." [no evidence, and unlikely with relatively large fruits and seeds]
702	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"The most widespread use of M. charantia is as a vegetable and occasionally as an ornamental."
703	2010. WRA Specialist. Personal Communication.	No evidence that relatively large seeds have become a contaminant of produce

704	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"fruit an orange to orange-yellow , pendulous, egg-shaped berry covered with small warts, 2 to 7 cm long in wild forms, to 30 cm in cultivated forms...seeds light brown to black, embedded in sticky, moist, crimson pulp (aril), 5 to 9 mm long, 2.5 to 6 mm wide with ridged or pitted surface and thick ragged margin as though carved." [fruits and seeds without any adaptations for wind dispersal]
705	2010. WRA Specialist. Personal Communication.	No evidence of water dispersal
706	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"fruit an orange to orange-yellow , pendulous, egg-shaped berry covered with small warts, 2 to 7 cm long in wild forms, to 30 cm in cultivated forms...The bright red aril which surrounds the seed may attract birds and mammals which then eat and disperse the seeds (Ridley)."
707	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	fruit a "pendulous, egg-shaped berry covered with small warts, 2 to 7 cm long in wild forms, to 30 cm in cultivated forms" [no evidence, and no means of external attachment]
708	1997. Holm, L.G.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"The bright red aril which surrounds the seed may attract birds and mammals which then eat and disperse the seeds (Ridley)."
801	2001. Doijode, S.J.. Seed storage of horticultural crops. Food Product Press, Inc., Binghamton, NY	"Seeds are brown, 1 to 1.5 cm long, and oval with flattened arils." [no evidence that seed densities exceed 1000/m <sup>2</sup> ]
802	2001. Doijode, S.J.. Seed storage of horticultural crops. Food Product Press, Inc., Binghamton, NY	"Bitter gourd seeds remain viable for two to three years at room temperature." [but viability from field conditions unknown]
802	2008. Liu, K./Eastwood, R. J./Flynn, S./Turner, R. M./Stuppy, W. H.. Seed Information Database (release 7.1, May 2008). <a href="http://www.kew.org/data/sid">http://www.kew.org/data/sid</a>	"Seeds kept in dry storage maintained 70 to 80% germination for 6 mo, 60 to 70% for 8 to 12 mo, and 20 to 30% for 24 mo (Doll et al. 1976)."
803	1967. Morton, J.F.. The balsam pear - an edible, medicinal and toxic plant. Economic Botany. 21 (1): 57-68.	"Spraying with 2,4-D (500 ppm.) kills the vine and its roots, but seedlings may spring up and completely shroud the trees anew within three to four weeks unless spraying is repeated."
804	2010. WRA Specialist. Personal Communication.	Unknown if <i>M. charantia</i> tolerates, or benefits from, mutilation, cultivation, or fire
805	2010. WRA Specialist. Personal Communication.	Unknown if any effective natural enemies are present locally [widespread in Hawaii, but pest of Cucurbitaceae are also present]