Taxon: Euphorbia makallensis S. Carter **Family:** Euphorbiaceae

Common Name(s): hamat kolkwal
sausage plant

Synonym(s):

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 16 Mar 2021

WRA Score: 1.0 **Designation:** L **Rating:** Low Risk

Keywords: Low Shrub, Succulent, Spiny, Toxic Sap, Full Sun

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	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	y
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	y
406	Host for recognized pests and pathogens		
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

Qsn #	Question	Answer Option	Answer
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	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	y=1, n=0	n
602	Produces viable seed		
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation		
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
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		
705	Propagules water dispersed	y=1, n=-1	n
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/m2)	y=1, n=-1	n
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**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	[No evidence of domestication] "During the course of a development study in 1974, an unusual cushion-forming succulent was seen on the fringes of small-scale cultivation of cereal crops. Specimens submitted to the Ethiopian National Herbarium and to Kew were eventually identified as a new species named as Euphorbia makallensis. The species was first known from a very small area around its original discovery site but another group of plants was found 75km to the north of the original one in 2011. The plant is rare and limited in numbers and distribution, but it is not disturbed by local farmers outside the areas they use for growing food crops and is probably not endangered in the wild."

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**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 16 Mar 2021]	"Native Africa NORTHEAST TROPICAL AFRICA: Ethiopia [Tigray]"

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 16 Mar 2021]	

203	**Broad climate suitability (environmental versatility)**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Carter, S., Wilson, R. T., & Lewis, J. G. (1981). A new species of succulent Euphorbia from Ethiopia, with ecological notes. Kew Bulletin, 36(1): 31-38	"Location. Euphorbia makallensis is known from a small area in Tigrai Province, Ethiopia, around the village of Igre Hariba, located about 2 km east of the main north-south Asmara to Addis Ababa highway, centred on 13° 28' 30" N, 39° 34' 04" E. The altitude varies from about 2260 m to 2385 m." … "The subject area is about 150 m-260 m higher than Makalle and the mean monthly minimum temperatures are likely to be lower, especially in winter. Absolute maxima at Makalle are in excess of 31 °C in May and absolute minima of less than 2°C have been recorded in November: diurnal variations greater than 26°C are not uncommon. The potential evapotranspiration figures (adapted from Asmara climatic data) show that a water deficit can be expected in 10 out of the 12 months of the year."

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	Carter, S., Wilson, R. T., & Lewis, J. G. (1981). A new species of succulent Euphorbia from Ethiopia, with ecological notes. Kew Bulletin, 36(1): 31-38	[Higher elevation tropical latitudes] "Location. Euphorbia makallensis is known from a small area in Tigrai Province, Ethiopia, around the village of Igre Hariba, located about 2 km east of the main north-south Asmara to Addis Ababa highway, centred on 13° 28' 30" N, 39° 34' 04" E. The altitude varies from about 2260 m to 2385 m."
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	Not reported from the Hawaiian Islands

205	**Does the species have a history of repeated introductions outside its natural range?**	**?**
	Source(s)	**Notes**
	Dave's Garden. (2021). Sausage Plant - Euphorbia makallensis. https://davesgarden.com/guides/pf/go/63809/. [Accessed 16 Mar 2021]	"This plant is said to grow outdoors in the following regions: Phoenix, Arizona"
	Planet Desert. (2021). Euphorbia makallensis. https://planetdesert.com/products/euphorbia-makallensis. [Accessed 16 Mar 2021]	[Plants are sold commercially at this and similar websites] "This plant comes in a 3.5 inch pot. All of our plants are grown under the same conditions, although not all the plants are the same. You will receive a similar plant in size and shape to the ones in the pictures. Our plants are hand-picked and carefully selected to bring you the best quality possible. Please allow us up to 3 business days to process your order. If you wish to receive your order on a specific date, or have special instructions, please add a note at the checkout . The plant is shipped in its pot to prevent any damage to the roots"
	WRA Specialist. (2021). Personal Communication	Rare in the wild, but sold on commercial websites. Unclear how widely this plant has been cultivated in outdoor settings outside native range

301	**Naturalized beyond native range**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	The National Gardening Association. (2021).Sausage Plant (Euphorbia makallensis). garden.org/plants/	"Uses: Will Naturalize" [Although no evidence found where cultivated to date]
	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	y
	Source(s)	**Notes**
	Weber, E. (2017). Invasive Plant Species of the World, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Euphorbia esula] "Leafy spurge has become one of the worst invaders in northern America causing both ecological and economic damage."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Numerous Euphorbia species have become invasive weeds

401	Produces spines, thorns or burrs	y
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	"Stems 4(–5)-sided up to 3cm thick. Spine-shields continuous along ribs, whitish; prickles rudimentary; spines paired, up to 2.5mm long, 3–7mm apart."

402	Allelopathic	
	Source(s)	**Notes**
	WRA Specialist. (2021). Personal Communication	Unknown. No evidence found

Qsn #	Question	Answer
403	**Parasitic**	**n**
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	“Low shrub with close-packed erect stems up to 50cm high forming cushions up to 1.5m across." [Euphorbiaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	**Notes**
	The National Gardening Association. (2021).Sausage Plant (Euphorbia makallensis). garden.org/plants/	"Resistances: Rabbit Resistant" "Toxicity: Other: All members of the genus Euphorbia produce a milky sap called latex that is toxic and can range from a mild irritant to very poisonous."
	WRA Specialist. (2021). Personal Communication	Spines and sap would likely make this plant unpalatable to most browsing animals

405	Toxic to animals	y
	Source(s)	**Notes**
	Dave's Garden. (2021). Sausage Plant - Euphorbia makallensis. https://davesgarden.com/guides/pf/go/63809/. [Accessed 16 Mar 2021]	"Danger: Parts of plant are poisonous if ingested"
	The National Gardening Association. (2021).Sausage Plant (Euphorbia makallensis). garden.org/plants/	"Toxicity: Other: All members of the genus Euphorbia produce a milky sap called latex that is toxic and can range from a mild irritant to very poisonous."

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	WRA Specialist. (2021). Personal Communication	Unknown

407	Causes allergies or is otherwise toxic to humans	y
	Source(s)	**Notes**
	Dave's Garden. (2021). Sausage Plant - Euphorbia makallensis. https://davesgarden.com/guides/pf/go/63809/. [Accessed 16 Mar 2021]	"On Sep 1, 2003, Happenstance from Northern California, CA wrote: Like all Euphorbia HANDLE WITH CARE, the latex/sap is dangerous and can cause skin rash, itching and general discomfort."
	The National Gardening Association. (2021).Sausage Plant (Euphorbia makallensis). garden.org/plants/	"Toxicity: Other: All members of the genus Euphorbia produce a milky sap called latex that is toxic and can range from a mild irritant to very poisonous."

Qsn #	Question	Answer
408	**Creates a fire hazard in natural ecosystems**	**n**
	Source(s)	**Notes**
	Carter, S., Wilson, R. T., & Lewis, J. G. (1981). A new species of succulent Euphorbia from Ethiopia, with ecological notes. Kew Bulletin, 36(1): 31-38	"cushion-forming succulent" [No evidence. Unlikely given succulent, low-growing habit]

409	**Is a shade tolerant plant at some stage of its life cycle**	**n**
	Source(s)	**Notes**
	Dave's Garden. (2021). Sausage Plant - Euphorbia makallensis. https://davesgarden.com/guides/pf/go/63809/. [Accessed 16 Mar 2021]	"Sun Exposure: Sun to Partial Shade"
	The National Gardening Association. (2021).Sausage Plant (Euphorbia makallensis). garden.org/plants/	"Sun Requirements: Full Sun"
	Planet Desert. (2021). Euphorbia makallensis. https://planetdesert.com/products/euphorbia-makallensis. [Accessed 16 Mar 2021]	"These are widely adaptable, able to take full sun that helps the plants to keep their compact growth-form."

410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y**
	Source(s)	**Notes**
	Planet Desert. (2021). Euphorbia makallensis. https://planetdesert.com/products/euphorbia-makallensis. [Accessed 16 Mar 2021]	"They grow well in a very draining mineral potting substrate, but they aren't picky about soil."

411	**Climbing or smothering growth habit**	**n**
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	""Low shrub with close-packed erect stems up to 50cm high forming cushions up to 1.5m across. Stems 4(–5)-sided up to 3cm thick. Spine-shields continuous along ribs, whitish; prickles rudimentary; spines paired, up to 2.5mm long, 3–7mm apart."

412	**Forms dense thickets**	**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	[No evidence] "A shrub that grows in a very limited area of rocky limestone habitat at altitudes of 2260-2385 m."
	Carter, S., Wilson, R. T., & Lewis, J. G. (1981). A new species of succulent Euphorbia from Ethiopia, with ecological notes. Kew Bulletin, 36(1): 31-38	[Observation that plant densities would be insufficient for erosion control suggests plants will not form dense, impenetrable stands that exclude other vegetation] "The plant has no apparent local economic use. The plant could possibly be used in anti-erosion measures but if the recorded density is the best that can be sustained (?root competition, inhibiting toxin) it would be of little use unless in conjunction with other species."

Qsn #	Question	Answer
501	**Aquatic**	**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	[Terrestrial] "A shrub that grows in a very limited area of rocky limestone habitat at altitudes of 2260-2385 m."

502	Grass	n
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 16 Mar 2021]	Family: Euphorbiaceae Subfamily: Euphorbioideae Tribe: Euphorbieae Subtribe: Euphorbiinae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 16 Mar 2021]	Family: Euphorbiaceae Subfamily: Euphorbioideae Tribe: Euphorbieae Subtribe: Euphorbiinae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	"Low shrub with close-packed erect stems up to 50cm high forming cushions up to 1.5m across. Stems 4(–5)-sided up to 3cm thick. Spine-shields continuous along ribs, whitish; prickles rudimentary; spines paired, up to 2.5mm long, 3–7mm apart."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	**Notes**
	Carter, S., Wilson, R. T., & Lewis, J. G. (1981). A new species of succulent Euphorbia from Ethiopia, with ecological notes. Kew Bulletin, 36(1): 31-38	[No evidence, but limited distribution] "Conservation status The vernacular name at Igre Hariba is a possibly affectionate 'hamat kolkwal' or, literally, the mother-in-law of'kolkwal' which is Tigrinya for Euphorbia candelabrum. Local people do not, in general, disturb the plant where it is not growing in their arable areas. This, together with the fact that two disjunct populations are now known, including the Hawzen one reported here for the first time, probably means that E. makallensis, climate change notwithstanding, is safe for the time being."

602	Produces viable seed	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	"Capsule not exserted from involucre, similar to that of E. polyacantha. Seeds not seen."
	The National Gardening Association. (2021).Sausage Plant (Euphorbia makallensis). garden.org/plants/	"Propagation: Other methods: Cuttings: Stem" [No mention of seed availability]
	WRA Specialist. (2021). Personal Communication	Unknown if seeds are produced in cultivation

603	Hybridizes naturally	
	Source(s)	**Notes**
	WRA Specialist. (2021). Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	
	Source(s)	**Notes**
	Selbo, S. M., & Carmichael, J. S. (1999). Reproductive biology of leafy spurge (Euphorbia esula L.): breeding system analysis. Canadian Journal of Botany, 77(11), 1684-1688	[Unknown. Self-compatibility documented in genus] "This study provides evidence that leafy spurge is self-compatible, with selfed plants producing roughly half as many seeds as outcrossed plants."

605	Requires specialist pollinators	n
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	"Cymes solitary, subsessile; cyathia 3×4.5mm, involucre cup-shaped; glands bright yellow, outer margin slightly emarginate; ovary with minute calyx. Capsule not exserted from involucre, similar to that of E. polyacantha.Seeds not seen."
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	"Euphorbs with fully pseudanthial inflorescences have either "normal" unisexual flowers (Dalechampia, Pera) or highly reduced unisexual flowers united in a cyathium (Euphorbia and relatives in Euphorbieae). In the latter case the staminate flowers are reduced to a single stamen and the pistillate flowers to a single pistil, with perianth absent in both cases. In both situations, pollinators visit the clusters of flowers as if they were a single flower—hence, application of the term pseudanthium (false flower) or blossom. Pollination of euphorbs with pseudanthial inflorescences is often highly generalized."
	Zomlefer, W.B. 1994. Guide to Flowering Plant Families. The University of North Carolina Press, Chapel Hill & London	"Most euphorbs easily attract pollinators (mostly flies) with the nectar secreted by the extrastaminal disc or glands"

606	Reproduction by vegetative fragmentation	
	Source(s)	**Notes**
	Planet Desert. (2021). Euphorbia makallensis. https://planetdesert.com/products/euphorbia-makallensis. [Accessed]	"They will rapidly mound, branch and spread." [Unknown. May spread vegetatively in low growing mounds]

Qsn #	Question	Answer
607	**Minimum generative time (years)**	
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	[Unknown] "In early November 2018 both authors visited the two sites. The Igre Hariba site appeared little changed in terms of spatial distribution and size classes of the plants (Figs. 5 & 6). Some plants at Hawzen were in flower (Fig. 7). This appears to confirm that the main flowering period of E. makallensis is in the late dry season of May and June with some flowering taking place post rains in November although local oral evidence indicates that individual plants may not flower every year."

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	
	Source(s)	**Notes**
	WRA Specialist. (2021). Personal Communication	Unknown but not likely. Some Euphorbia species transported in soil attached to vehicles, footwear, or equipment

702	**Propagules dispersed intentionally by people**	**y**
	Source(s)	**Notes**
	WRA Specialist. (2021). Personal Communication	Rare in the wild, but sold on commercial websites

703	**Propagules likely to disperse as a produce contaminant**	**n**
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	"Capsule not exserted from involucre, similar to that of E. polyacantha. Seeds not seen." [No evidence. Rarity of seed production and rarity in cultivation would make seed contamination highly unlikely]

704	**Propagules adapted to wind dispersal**	
	Source(s)	**Notes**
	Kubitzki, K. (ed.). 2014. The Families and Genera of Vascular Plants. Vol. XI. Flowering Plants. Eudicots: Malpighiales. Springer, New York	"The typical Euphorbiaceous fruit (upon drying) dehisces explosively into three 1- or 2-seeded merocarps (cocci)." [Possible that wind, if seeds are produced, would aid in dispersal distance and direction]

705	**Propagules water dispersed**	**n**
	Source(s)	**Notes**
	Carter, S., Wilson, R. T., & Lewis, J. G. (1981). A new species of succulent Euphorbia from Ethiopia, with ecological notes. Kew Bulletin, 36(1): 31-38	"On rocky areas and on steep hillsides which are used for grazing the vegetation comprises low scrubby Acacia etbaica with occasional Euclea schimperi and Echinops spp." [Unlikely. Does not occur in riparian habitats, although rainfall and overland water flow could move seeds, if produced]

706	**Propagules bird dispersed**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	"Capsule not exserted from involucre, similar to that of E. polyacantha. Seeds not seen."

707	**Propagules dispersed by other animals (externally)**	**n**
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	"Capsule not exserted from involucre, similar to that of E. polyacantha. Seeds not seen." [Unlikely, even if seeds are produced]

708	**Propagules survive passage through the gut**	**n**
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	"Capsule not exserted from involucre, similar to that of E. polyacantha. Seeds not seen." [Unlikely to be consumed, even if seeds are produced]

801	**Prolific seed production (>1000/m2)**	**n**
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	"Capsule not exserted from involucre, similar to that of E. polyacantha. Seeds not seen."
	The National Gardening Association. (2021).Sausage Plant (Euphorbia makallensis). garden.org/plants/	"Propagation: Other methods: Cuttings: Stem"

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	
	Source(s)	**Notes**
	Wilson, T., & Munro, N. (2019). Euphorbia makallensis Carter, a northern Ethiopian cushion-forming Euphorbia of very limited distribution. CactusWorld 37(1): 43-46	"Capsule not exserted from involucre, similar to that of E. polyacantha. Seeds not seen." [Unknown, if seeds are produced]

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**
	WRA Specialist. (2021). Personal Communication	Unknown

Qsn #	Question	Answer
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 possibly spread, in high elevation tropical climates
• Many members of the genus are invasive weeds
• Spiny stems
• Sap reported to be toxic and allergenic
• Tolerates many soil types
• Gaps in biological and ecological information reduce accuracy of risk prediction

Low Risk Traits
• No reports of invasiveness or naturalization, but no evidence of widespread introduction outside native range
• Grows best in full sun (dense shade may limit ability to establish or spread)
• Seed production in cultivation may be rare or absent, limiting potential for accidental dispersal

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

(A) Reported as a weed of cultivated lands? No
Outcome = Accept (Low Risk)