Taxon: Euphorbia officinarum subsp. echinus (Hook.f. & Coss.) Vindt

Family: Euphorbiaceae

Common Name(s): tikiwt

Synonym(s): Euphorbia echinus Hook.f. & Coss.
Euphorbia echinus var. chlorantha
Euphorbia hernandez-pachecoi
Euphorbia officinarum var.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 22 Mar 2021

WRA Score: 3.0 **Designation:** EVALUATE **Rating:** Evaluate

Keywords: Shrub, Succulent, Spiny, Toxic Latex, Dehiscent Capsules

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
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
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
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
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
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	?
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
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n

Qsn #	Question	Answer Option	Answer
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	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
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
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	y
401	Produces spines, thorns or burrs	y=1, n=0	y
402	Allelopathic		
402	Allelopathic		
403	Parasitic	y=1, n=0	n
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	y
404	Unpalatable to grazing animals	y=1, n=-1	y
405	Toxic to animals	y=1, n=0	y
405	Toxic to animals	y=1, n=0	y
406	Host for recognized pests and pathogens		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	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
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
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	n
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	n
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
502	Grass	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
503	Nitrogen fixing woody plant	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
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
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
603	Hybridizes naturally		
604	Self-compatible or apomictic		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)		
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal		
704	Propagules adapted to wind dispersal		
705	Propagules water dispersed	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird 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
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n

Qsn #	Question	Answer Option	Answer
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)		
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		
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**
	Carter, S. (2005). Euphorbias of southern Morocco. Cactus and Succulent Journal, 77(1), 34-37	No evidence
	Eggli, U. 2002. Illustrated handbook of succulent plants: Dicotyledons. Springer-Verlag, Berlin - Heidelberg - New York	No evidence

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 19 Mar 2021]	"Native Africa NORTHERN AFRICA: Morocco"

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 19 Mar 2021]	

203	**Broad climate suitability (environmental versatility)**	**n**
	Source(s)	**Notes**
	Eggli, U. 2002. Illustrated handbook of succulent plants: Dicotyledons. Springer-Verlag, Berlin - Heidelberg - New York	"D: S Morocco (Anti-Atlas); littoral region." [Limited native range]

Qsn #	Question	Answer
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	"Hardiness: Protect from frost. During winter month, put them in a cool luminous place and encourage them to enter winter dormancy by withholding water and fertiliser over the winter as they will etiolate, or become thin, due to lower levels of light."
	Dave's Garden. (2021). Euphorbia officinarum subsp. echinus. https://davesgarden.com/guides/pf/go/64001/. [Accessed 19 Mar 2021]	"Hardiness: USDA Zone 9b: to -3.8 °C (25 °F) USDA Zone 10a: to -1.1 °C (30 °F) USDA Zone 10b: to 1.7 °C (35 °F) USDA Zone 11: above 4.5 °C (40 °F)"

204	Native or naturalized in regions with tropical or subtropical climates	y
	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 19 Mar 2021]	"Native Africa NORTHERN AFRICA: Morocco"
	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**
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	"Euphorbia echinus is another easy plant to grow often sold at garden outlet centers. It makes great potted specimens."
	Dave's Garden. (2021). Euphorbia officinarum subsp. echinus. https://davesgarden.com/guides/pf/go/64001/. [Accessed 19 Mar 2021]	"This plant is said to grow outdoors in the following regions: Reseda, California Spring Valley, California"
	WRA Specialist. (2021). Personal Communication	Unclear how often this is cultivated in an outdoor setting where it could potentially naturalize

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

Qsn #	Question	Answer
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**
	Carter, S. (2005). Euphorbias of southern Morocco. Cactus and Succulent Journal, 77(1), 34-37	"The species is currently described as growing to between 10 cm and 1 m (or exceptionally 1.5 m high), forming rounded cushion-shaped mounds; its branches are usually 5--8-angled, but can be up to 12-angled; its spine-shields are usually confluent, with spines to 2 cm long, or occasionally nil; cyathial glands range in color from yellow-green to brownish-purple; and the capsule is purplish."

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

403	Parasitic	n
	Source(s)	**Notes**
	Eggli, U. 2002. Illustrated handbook of succulent plants: Dicotyledons. Springer-Verlag, Berlin - Heidelberg - New York	"Shrubs to 30 cm, densely branched from the base" [Euphorbiaceae. No evidence]

404	Unpalatable to grazing animals	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	[Toxicity and spines likely render plants unpalatable] "Spine shields: 4-5 mm in diameter, pale buff, joined in a horny margin. Spines: Slender, paired, very pointed, 4-10(-15) mm long, about 6 mm apart." … "Warning: As with all other Euphorbias when a plant get damaged it exudes a thick white milky sap known as latex. This latex is poisonous and particularly dangerous for the eyes, skin and mucous membranes. So pay extreme attention not to get any in your eyes or mouth. Cultivated plants must be handled carefully."

405	Toxic to animals	y
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	"Warning: As with all other Euphorbias when a plant get damaged it exudes a thick white milky sap known as latex. This latex is poisonous and particularly dangerous for the eyes, skin and mucous membranes. So pay extreme attention not to get any in your eyes or mouth. Cultivated plants must be handled carefully."

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	Consulta Plantas. (2021). Euphorbia echinus or Euphorbia officinarum subs echinus | Care and Growing. http://www.consultaplantas.com. [Accessed 19 Mar 2021]	"They are resistant plants to the usual pests and diseases."

407	Causes allergies or is otherwise toxic to humans	y
	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	"Vesicant, irritant."
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	"Warning: As with all other Euphorbias when a plant get damaged it exudes a thick white milky sap known as latex. This latex is poisonous and particularly dangerous for the eyes, skin and mucous membranes. So pay extreme attention not to get any in your eyes or mouth. Cultivated plants must be handled carefully. "

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	[No evidence. Unlikely given succulent, water-storing habit] "Habitat: Sub-Mediterranean Shrubland and degraded dry forest in the littoral region of the stone desert of Tindouf and Zemmour, often on rocky hillsides and pebble and gravel lower scree slopes, but also, on shallow rocky soils and in wind-swept places near the sea. The succulent water-storing stems and its low transpiration rate ensures that sufficient water is retained until the next rains."

409	Is a shade tolerant plant at some stage of its life cycle	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	"Exposure: Need bright light (also blasting sun in summer) to partial shade for best appearance. It responds well to warmth, with its active growth period in the late spring and summer months. If grown indoor provide 4 to 6 hours, or more, direct morning or afternoon sun."
	Dave's Garden. (2021). Euphorbia officinarum subsp. echinus. https://davesgarden.com/guides/pf/go/64001/. [Accessed 19 Mar 2021]	"Sun Exposure: Full Sun"

410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**n**
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	"Soil: Likes porous substrata with adequate drainage. Outdoors it does well on poor, rocky soils."

411	**Climbing or smothering growth habit**	**n**
	Source(s)	**Notes**
	Eggli, U. 2002. Illustrated handbook of succulent plants: Dicotyledons. Springer-Verlag, Berlin - Heidelberg - New York	"Shrubs to 30 cm, densely branched from the base, with up to 100 Br forming compact clumps; Br to l m, 4 - 5 cm Ø, 5- to 8-angled, angles shallow; SpS to + 5 mm Ø, joined in a horny margin; Sp 5 - 15 mm; cymes solitary, 1- to 2-forked; peduncles short; Cy ± 3 mm Ø; NGI elliptic, dark red; Fr subglobose, ± 4 mm Ø, Ped exserted, recurved:; Se irregularly wrinkled."

412	**Forms dense thickets**	**n**
	Source(s)	**Notes**
	Carter, S. (2005). Euphorbias of southern Morocco. Cactus and Succulent Journal, 77(1), 34-37	"There was not the great number of succulent Euphorbia species in Morocco that occurs in most countries south of the Sahara, but what we saw was full of interest, in particular the wide variation in E. echinus and its extraordinarily extensive coverage. This succulent species, at least, is certainly not endangered !" [Common, but no description of dense thickets in this publication]
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	[No evidence] "Habitat: Sub-Mediterranean Shrubland and degraded dry forest in the littoral region of the stone-desert of Tindouf and Zemmour, often on rocky hillsides and pebble and gravel lower scree slopes, but also, on shallow rocky soils and in wind-swept places near the sea. The succulent water-storing stems and its low transpiration rate ensures that sufficient water is retained until the next rains. It is quite common and is often found along with Euphorbia beaumierana, Euphorbia regis-jubae, Euphorbia resinifera, and Senecio anteuphorbium."

Qsn #	Question	Answer
501	**Aquatic**	**n**
	Source(s)	**Notes**
	Eggli, U. 2002. Illustrated handbook of succulent plants: Dicotyledons. Springer-Verlag, Berlin - Heidelberg - New York	[Terrestrial] "Shrubs to 30 cm, densely branched from the base"

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 19 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 19 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**
	Eggli, U. 2002. Illustrated handbook of succulent plants: Dicotyledons. Springer-Verlag, Berlin - Heidelberg - New York	"Shrubs to 30 cm, densely branched from the base"

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Carter, S. (2005). Euphorbias of southern Morocco. Cactus and Succulent Journal, 77(1), 34-37	"There was not the great number of succulent Euphorbia species in Morocco that occurs in most countries south of the Sahara, but what we saw was full of interest, in particular the wide variation in E. echinus and its extraordinarily extensive coverage. This succulent species, at least, is certainly not endangered !"

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	"Reproduction: It is propagated by cuttings or seeds. The seeds may be germinated and grown in containers. Their main requirements consist of high humidity levels, free-draining soil mix, and enough water, light, and nutrition."

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

604	**Self-compatible or apomictic**	
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	"Inflorescence: Solitary cymes, 1- to 2-forked; peduncles short. Flowers: Cyathia 3-4 mm on diameter, dull red; Nectar gland elliptic, dark red."
	Faboyede, A. O. (2015). Biosystematic studies in the genus euphorbia L. in Nigeria, PhD Dissertation. University of Lagos	[Unknown. Self-compatibility documented in E. hyssopifolia, E. heterophylla and E. hirta.] "Fruit sets were observed in all the bagged inflorescences. These were taken as indication of self compatibility. The seeds were allowed to dry and planted inside petri- dishes lined with cotton wool pre- soaked in distilled water. This was done to determine the viability of the seeds. Germination was observed in all the petri- dishes."

Qsn #	Question	Answer
605	**Requires specialist pollinators**	**n**
	Source(s)	**Notes**
	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"
	Terrab, A., Marconi, A., Bettar, I., Msanda, F., & Díez, M. J. (2014). Palynological characterisation of Euphorbia honeys from Morocco. Palynology, 38(1), 138-146	[Visited by honeybees] "Pollen was analysed in 30 unifloral Euphorbia honey samples from the Ifni Massif Region (Anti Atlas, Morocco). The honey samples were directly provided by beekeepers. The quantitative analyis showed that nectar is the main honey source in the samples studied. The qualitative analysis of the samples showed the presence of 35 taxa belonging to 17 families. The Moroccan Euphorbia honeys of the studied region are characterized by their low– medium number of pollen grains (NGP; mean ¼ 5700), 76% of the honeys belong to Class I and II of Maurizio, and by their low honeydew indicator (HDE/NGPn < 0.28), wich indicates their floral origin. For the Euphorbia officinarum subsp. echinus honeys, the most characteristic accompanying species are Eryngium ilicifolium, present in > 90% of the samples, followed by Bellis sp., Capsella f. and Reseda sp. (85%). However, for the E. regis-jubae honeys, the most characteristic accompanying species are Crepis f., present in 100% of the samples."

606	**Reproduction by vegetative fragmentation**	**n**
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 22 Mar 2021]	[Vegetative propagation methods suggests natural vegetative spread would be unlikely] "Reproduction: It is propagated by cuttings or seeds. The seeds may be germinated and grown in containers. Their main requirements consist of high humidity levels, free-draining soil mix, and enough water, light, and nutrition. It is recommend taking Euphorbia cuttings in Spring/Summer when the plant is growing so that they have a better chance of success. They key is heat & good air circulation. These cuttings should be dipped in Hormone powder (but it is not needed) and left for a period of 3-4 weeks to callous. Then pot the cutting and don't water (or kept slightly moist) until rooted. These will root just fine, if you can put the pot outside in the summer, or put pot on a heating pad."

607	**Minimum generative time (years)**	

Qsn #	Question	Answer
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	"Growth rate: It grows well, though slowly, but it possible to increase the speed of growth to some extent by providing adequate amount of water, warmth, and a liquid fertilizer diluted half strength during the active growing season, but it's susceptible to rotting if too wet. Most plants will offset readily, and large bushes can be produced in a few years. " [Unknown, but presumably >1 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**
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	"Euphorbia echinus is another easy plant to grow often sold at garden outlet centers. It makes great potted specimens."

703	Propagules likely to disperse as a produce contaminant	
	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)." [Genus description. Theoretically possible if cultivated with other plants, but no evidence found to date]

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)." [Genus description. Possible that wind, if seeds are produced, would aid in dispersal distance and direction]

705	Propagules water dispersed	n
	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)." [Genus description]
	WRA Specialist. (2021). Personal Communication	Unlikely. Does not occur in riparian habitats, although rainfall and overland water flow could theoretically move seeds

706	Propagules bird dispersed	n

Qsn #	Question	Answer
	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)." [Genus description]
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed]	[Not fleshy-fruited] "Fruit: 3-lobed capsules, subglobose, about 4-5 mm in diameter on slender curved stalks. Seeds: Irregularly wrinkled."

707	Propagules dispersed by other animals (externally)	n
	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)." [Genus description. No means of external attachment]

708	Propagules survive passage through the gut	n
	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)." [Genus description. No evidence of consumption or internal dispersal]

801	Prolific seed production (>1000/m2)	
	Source(s)	**Notes**
	LLIFLE - Encyclopedia of living forms. (2021). Euphorbia echinus. http://www.llifle.com/. [Accessed 19 Mar 2021]	[Seed densities unknown] "Description: Euphorbia officinarum subs. echinus, best known as Euphorbia echinus, is a spiny, cactus-like, succulent shrub densely branched from the base, with up to 100 branches forming compact, hemispherical or variously shaped, bunches reaching about 1 metre tall, but perhaps 3 metres across, so that they resemble a giant spiny hedgehog crouching the ground. Stems: Main stem (trunk) shorter than the branches. Branches numerous, green, up to 1 m tall, 4-5 cm in diameter, turned upwards with a slight bow-shaped curve and usually with 5-8 shallow ribs, but occasionally there may be more ribs (up to 13). Spine shields: 4-5 mm in diameter, pale buff, joined in a horny margin. Spines: Slender, paired, very pointed, 4-10(-15) mm long, about 6 mm apart. Inflorescence: Solitary cymes, 1- to 2-forked; peduncles short. Flowers: Cyathia 3-4 mm on diameter, dull red; Nectar gland elliptic, dark red. Fruit: 3-lobed capsules, subglobose, about 4-5 mm in diameter on slender curved stalks. Seeds: Irregularly wrinkled."

Qsn #	Question	Answer
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	
	Source(s)	**Notes**
	WRA Specialist. (2021). Personal Communication	Unknown

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

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

Summary of Risk Traits:

High Risk / Undesirable Traits
• Grows, and could spread, in arid tropical climates
• Other Euphorbia species are invasive
• Spiny branches
• Unpalatable to browsing/grazing animals
• Caustic and toxic latex
• Reproduces by seeds
• Dispersed by explosively dehiscent capsules
• Gaps in biological and ecological information may reduce accuracy of risk prediction

Low Risk Traits
• No reports of invasiveness or naturalization, but limited evidence of widespread introduction outside native range
• Grows best in high light (dense shade may limit ability to spread)
• Not reported to spread vegetatively

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> No. Not known to form dense stands. Grows in full sun to partial shade
(B) Bird or clearly Wind-dispersed?> No. Dispersed by dehiscent capsules
Outcome = Accept (Low Risk)