

Taxon: <i>Euphorbia myrsinites</i> L.	Family: Euphorbiaceae
Common Name(s): blue spurge broadleaf glaucous spurge creeping spurge donkey tail myrtle euphorbia myrtle spurge	Synonym(s): Endoisila myrsinites (L.) Raf. Euphorbia curtifolia Chaub. Euphorbia marschalliana Kotschy ex Euphorbia pectinata Albov Euphorbia pontica Prokh. Euphorbia rigida Loisel. Euphorbion myrsinitum (L.) St.-Lag. Galarhoeus myrsinites (L.) Haw. Murtekias myrsinites (L.) Raf. Tithymalus myrsinites (L.) Hill

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 25 Aug 2022
WRA Score: 16.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Biennial Herb, Noxious Weed, Toxic Sap, Ornamental, Autochorous

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)	Intermediate
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	n
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)	y
303	Agricultural/forestry/horticultural weed		
304	Environmental weed	n=0, y = 2*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	n
402	Allelopathic		

Qsn #	Question	Answer Option	Answer
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		
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	n
412	Forms dense thickets		
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		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	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		
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y

Qsn #	Question	Answer Option	Answer
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
	Flora of North America Editorial Committee. (2016). Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae. Oxford University Press, New York and Oxford	[No evidence] " Flowering and fruiting spring–summer. Scrub oak communities, open ground near forests, shrub-steppes; 0–2400 m; introduced; B.C.; Calif., Colo., Idaho, Mont., N.Mex., Oreg., Utah, Wash., Wyo.; s Europe, w Asia. <i>Euphorbia myrsinites</i> is cultivated in much of the flora area, where it can tolerate cold winters. In some areas, it can locally escape from cultivation."

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

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	Intermediate
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 22 Aug 2022]	"Native Asia-Temperate WESTERN ASIA: Turkey Europe EASTERN EUROPE: Ukraine [Krym] SOUTHEASTERN EUROPE: Former Yugoslavia, Albania, Bulgaria, Greece, Italy (incl. Sicily)"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 22 Aug 2022]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	NC State Extension. (2022). <i>Euphorbia myrsinites</i> . https://plants.ces.ncsu.edu/plants/euphorbia-myrsinites/ . [Accessed 23 Aug 2022]	"USDA Plant Hardiness Zone: 5a, 5b, 6b, 6a, 7a, 7b, 8a, 8b, 9b, 9a" [5+ hardiness zones]

Qsn #	Question	Answer
	Flora of North America Editorial Committee. (2016). Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae. Oxford University Press, New York and Oxford	[Broad distribution and elevation range] "Flowering and fruiting spring–summer. Scrub oak communities, open ground near forests, shrub-steppes; 0–2400 m; introduced; B.C.; Calif., Colo., Idaho, Mont., N.Mex., Oreg., Utah, Wash., Wyo.; s Europe, w Asia. <i>Euphorbia myrsinites</i> is cultivated in much of the flora area, where it can tolerate cold winters. In some areas, it can locally escape from cultivation."

204	Native or naturalized in regions with tropical or subtropical climates	n
	Source(s)	Notes
	Flora of North America Editorial Committee. (2016). Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae. Oxford University Press, New York and Oxford	"Flowering and fruiting spring–summer. Scrub oak communities, open ground near forests, shrub-steppes; 0–2400 m; introduced; B.C.; Calif., Colo., Idaho, Mont., N.Mex., Oreg., Utah, Wash., Wyo.; s Europe, w Asia."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Preferred Climate/s: Mediterranean"
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence in the Hawaiian Islands

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Flora of North America Editorial Committee. (2016). Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae. Oxford University Press, New York and Oxford	"Flowering and fruiting spring–summer. Scrub oak communities, open ground near forests, shrub-steppes; 0–2400 m; introduced; B.C.; Calif., Colo., Idaho, Mont., N.Mex., Oreg., Utah, Wash., Wyo.; s Europe, w Asia. <i>Euphorbia myrsinites</i> is cultivated in much of the flora area, where it can tolerate cold winters. In some areas, it can locally escape from cultivation."
	Stevens, M. T., & Young, D. T. (2022). A Comparison of Mechanical Versus Chemical Control of the Invasive Species Myrtle Spurge (<i>Euphorbia myrsinites</i>). <i>Natural Areas Journal</i> , 42(2), 120-123	"Myrtle spurge (<i>Euphorbia myrsinites</i> L.) is an herbaceous, short-lived perennial that has become invasive in western North America. It was introduced from Eurasia as a drought-tolerant ornamental plant for rock gardens, but it has escaped cultivation and is widespread as an invasive plant."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Ogle, C. C., de Lange, P., Cameron, E. K., Parris, B. S., & Champion, P. D. (2021). Checklist of dicotyledons, gymnosperms and pteridophytes Naturalised or Casual in New Zealand: Additional records 2007–2019. <i>Perspectives in Biosecurity</i> , 5, 45–116	" <i>Euphorbia myrsinites</i> L. myrtle spurge NEW RECORD: CHR 604461, C. C. Ogle 5502 & C. R. Higgin, 30 Dec 2008, Whanganui, Fordell, Pōhutukawa Lane, Paloma Gardens. NOTES: Cultivation Escape. Occasional seedlings as much as 5 m down-slope from planted clumps of <i>E. myrsinites</i> ."

Qsn #	Question	Answer
	Stevens, M. T., & Young, D. T. (2022). A Comparison of Mechanical Versus Chemical Control of the Invasive Species Myrtle Spurge (<i>Euphorbia myrsinites</i>). <i>Natural Areas Journal</i> , 42(2), 120-123	"Myrtle spurge (<i>Euphorbia myrsinites</i> L.) is an herbaceous, short-lived perennial that has become invasive in western North America. It was introduced from Eurasia as a drought-tolerant ornamental plant for rock gardens, but it has escaped cultivation and is widespread as an invasive plant."
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence in the Hawaiian Islands

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	Lowry, B. J., Ransom, C. V., Whitesides, R. E. and Olsen, H. (2017). <i>Noxious Weed Field Guide for Utah</i> , 4th Edition. Utah State University Extension, Logan, UT	"Native to Eurasia, myrtle spurge is a weed of gardens, dry natural hillsides, waste areas, and public lands. It is drought tolerant and thrives in nutrient poor, sandy, and rocky soils. The plant contains a milky sap toxic to cattle and humans."

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	Stevens, M. T., & Young, D. T. (2022). A Comparison of Mechanical Versus Chemical Control of the Invasive Species Myrtle Spurge (<i>Euphorbia myrsinites</i>). <i>Natural Areas Journal</i> , 42(2), 120-123	[Impacts the natural environment] "Myrtle spurge is particularly problematic in the foothills of the Wasatch Mountains in Utah, in which the northern mountainbrush community (Van Buren et al. 2011) is characterized by native shrubs including Gambel oak (<i>Quercus gambelii</i> Nutt.) and netleaf hackberry (<i>Celtis reticulata</i> Torr.). The study area (elevation $\frac{1}{4}$ 1573 m) is rocky and dry, receiving an annual average of 43.7 cm of precipitation and having an annual average temperature of 12.6 8C (1991–2020) (NOAA-NWS 2020)."
	Lowry, B. J., Ransom, C. V., Whitesides, R. E. and Olsen, H. (2017). <i>Noxious Weed Field Guide for Utah</i> , 4th Edition. Utah State University Extension, Logan, UT	[Toxic to cattle. Could impact rangelands] "Native to Eurasia, myrtle spurge is a weed of gardens, dry natural hillsides, waste areas, and public lands. It is drought tolerant and thrives in nutrient poor, sandy, and rocky soils. The plant contains a milky sap toxic to cattle and humans."
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

304	Environmental weed	y
	Source(s)	Notes
	Godfrey, A. E. (2016). <i>Toxic beauty: Exotic invaders versus native beauty on Colorado's front range</i> . Masters Thesis. University of Colorado Boulder	"Myrtle spurge is an invasive ornamental that is native to Eurasia. It is popular with xeriscapes and rock gardens, preferring sunny to partly sunny areas and well drained soils. Myrtle spurge rapidly escapes gardens and invades sensitive ecosystems, out competing native vegetation and reducing wildlife forage."

Qsn #	Question	Answer
	<p>Stevens, M. T., & Young, D. T. (2022). A Comparison of Mechanical Versus Chemical Control of the Invasive Species Myrtle Spurge (<i>Euphorbia myrsinites</i>). <i>Natural Areas Journal</i>, 42(2), 120-123</p>	<p>"Myrtle spurge is particularly problematic in the foothills of the Wasatch Mountains in Utah, in which the northern mountainbrush community (Van Buren et al. 2011) is characterized by native shrubs including Gambel oak (<i>Quercus gambelii</i> Nutt.) and netleaf hackberry (<i>Celtis reticulata</i> Torr.). The study area (elevation ¼ 1573 m) is rocky and dry, receiving an annual average of 43.7 cm of precipitation and having an annual average temperature of 12.6 8C (1991–2020) (NOAA-NWS 2020). In terms of invasive-species management in the area, myrtle spurge was listed as a Salt Lake County (Utah) Noxious Weed in 2007 (Salt Lake County Weed Control Program 2007). That same year, the Bonneville Cooperative Weed Management Area started a program to offer native plants in exchange for bags of myrtle spurge that Salt Lake County residents removed from their yards in a “Purge Your Spurge” event that brought in more than 3000 kg of myrtle spurge in one year (Bureau of Land Management et al. 2007). Purge Your Spurge events continue in Utah and public awareness of the problems associated with myrtle spurge have increased over time and expanded beyond one county. Currently, myrtle spurge is prohibited in the state of Utah and has been included on the state’s noxious weed list (Utah Department of Agriculture and Food 2019), in part because it outcompetes native plants such as sego lily (<i>Calochortus nuttalli</i> Torr. & A. Gray), Utah’s state flower. In adjacent Colorado, myrtle spurge must be eradicated by state law (Colorado Department of Agriculture 2005)."</p>

305	Congeneric weed	y
	Source(s)	Notes
	<p>Weber, E. (2017). <i>Invasive Plant Species of the World</i>, 2nd Edition: A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK</p>	<p>[<i>Euphorbia esula</i>] "Leafy spurge has become one of the worst invaders in northern America causing both ecological and economic damage."</p>
	<p>Randall, R.P. (2017). <i>A Global Compendium of Weeds</i>. 3rd Edition. Perth, Western Australia. R.P. Randall</p>	<p>Numerous <i>Euphorbia</i> species have become invasive weeds</p>

401	Produces spines, thorns or burrs	n
	Source(s)	Notes

Qsn #	Question	Answer
	Flora of North America Editorial Committee. (2016). Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae. Oxford University Press, New York and Oxford	[No evidence] "Herbs, usually perennial, occasionally biennial, with taproot. Stems erect or semiprostrate, unbranched or branched, 15–40 cm, succulent, glabrous. Leaves: petiole 0–2 mm; blade obovate, obovate-oblong, lanceolate, orbiculate, or suborbiculate, 2–30 × 3–17 mm, fleshy, base truncate or attenuate, margins entire or finely denticulate, apex acute to obtuse, cuspidate or strongly mucronate, surfaces glabrous; venation and midvein inconspicuous. Cyathial arrangement: terminal pleiochasial branches 2–12, each 1–2 times 2-branched; pleiochasial bracts similar in shape and size to distal leaves; dichasial bracts distinct, suborbiculate or reniform, base truncate, margins entire or minutely denticulate, apex obtuse, mucronulate; axillary cymose branches 0–4. Cyathia: peduncle 0.5–1 mm. Involucre campanulate, 2.4–2.6 × 2.3–2.5 mm, glabrous; glands 4, trapezoidal, 1–1.5 × 1.5–2.5 mm; horns divergent, thick, tips rounded, dilated, 0.5–0.9 mm. Staminate flowers 6–12. Pistillate flowers: ovary glabrous; styles 2.5–2.8 mm, usually unbranched. Capsules subglobose, 5–7 × 5–6 mm, unlobed; cocci rounded to subangular, smooth, glabrous; columella 4.5–5 mm. Seeds brownish to grayish, oblong, 2.8–4.5 × 2–3.2 mm, vermiculate-rugose; caruncle substipitate, trapezoidal or mushroom-shaped, 1.3–1.5 × 0.6–0.8 mm."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown. Other Euphorbia species have been reported to possess allelopathic properties

403	Parasitic	n
	Source(s)	Notes
	Flora of North America Editorial Committee. (2016). Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae. Oxford University Press, New York and Oxford	"Herbs, usually perennial, occasionally biennial, with taproot." [Euphorbiaceae. No evidence]

404	Unpalatable to grazing animals	y
	Source(s)	Notes
	Gardenia. (2022). Euphorbia myrsinites (Myrtle Spurge). https://www.gardenia.net/plant/euphorbia-myrsinites-myrtle-spurge . [Accessed 24 Aug 2022]	"deer or rabbit resistant and is easy to care for."
	Godfrey, A. E. (2016). Toxic beauty: Exotic invaders versus native beauty on Colorado's front range. Masters Thesis. University of Colorado Boulder	"One gardener described suffering intense burning from exposure to the latex, two trips to the hospital and corneal damage but concludes, "No wonder the deer don't eat it. I don't know if I'll get rid of this plant, but I'll definately (sic) wear a HAZ MAT suit when trimming it!"
	NC State Extension. (2022). Euphorbia myrsinites. https://plants.ces.ncsu.edu/plants/euphorbia-myrsinites/ . [Accessed 24 Aug 2022]	"Particularly Resistant To (Insects/Diseases/Other Problems): deer and drought resistant"

Qsn #	Question	Answer
405	Toxic to animals	y
	Source(s)	Notes
	Cal-IPC. (2022). <i>Euphorbia myrsinites</i> . https://www.cal-ipc.org/plants/profile/euphorbia-myrnsinites/ . [Accessed 24 Aug 2022]	"Myrtle spurge is listed as noxious weed in Colorado, Oregon, Washington and Utah, as well as California. It's leaves contain a latex that is a skin irritant and toxic to animals."
	Lowry, B. J., Ransom, C. V., Whitesides, R. E. and Olsen, H. (2017). Noxious Weed Field Guide for Utah, 4th Edition. Utah State University Extension, Logan, UT	"Native to Eurasia, myrtle spurge is a weed of gardens, dry natural hillsides, waste areas, and public lands. It is drought tolerant and thrives in nutrient poor, sandy, and rocky soils. The plant contains a milky sap toxic to cattle and humans."
	Dave's Garden. (2022). <i>Euphorbia</i> Species, Creeping Spurge, Donkey Tail, Myrtle Spurge - <i>Euphorbia myrsinites</i> . https://davesgarden.com/guides/pf/go/781/ . [Accessed 24 Aug 2022]	"On Jun 24, 2016, Adtuesdays from Nampa, ID wrote: My puppy, being as playful as puppies are, was chasing a reflection and ran straight into the plant, face first. When we moved in, the plant was already there. We didn't think much of it until he broke out in hives all over his face, which soon began to spread on his legs and back. They just keep growing, and he is in so much pain. He is usually insanely hyper when people come over, and he didn't even budge when people came inside. All he is doing is sleeping and every so often, pawing at his face. Poor pup!"
	NC State Extension. (2022). <i>Euphorbia myrsinites</i> . https://plants.ces.ncsu.edu/plants/euphorbia-myrnsinites/ . [Accessed 24 Aug 2022]	"Poison Symptoms: Causes low toxicity if eaten. Causes minor skin irritation that can last a few minutes. When ingested, nausea, vomiting, and diarrhea can result. Following skin contact, redness, swelling, and blisters can occur after some delay."

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	NC State Extension. (2022). <i>Euphorbia myrsinites</i> . https://plants.ces.ncsu.edu/plants/euphorbia-myrnsinites/ . [Accessed 23 Aug 2022]	"Diseases, Insects, and Other Plant Problems: The leafy spurge flea beetle is a threat to the plant; other than that, there are no known plant problems. This plant is listed as a noxious weed in some western states and as invasive in others."
	Wisconsin Horticulture. (2022). <i>Euphorbia myrsinites</i> . https://hort.extension.wisc.edu/articles/euphorbia-myrnsinites/ . [Accessed 23 Aug 2022]	"This plant has few pest problems, although aphids and mealybugs will sometimes attack, and bacterial or fungal rots can occur in moist conditions."

Qsn #	Question	Answer
407	Causes allergies or is otherwise toxic to humans	y
	Source(s)	Notes
	Burrows, G. E., & Tyrl, R. J. (2013). Toxic Plants of North America. Second Edition. Wiley-Blackwell, Hoboken, NJ	"Euphorbia myrsinites is reported to be a cause of skin swelling (edema) and blistering of several days' duration in children (Spoerke and Temple 1979)."
	Spoerke, D.G. & Smolinske, S.C. (1990). Toxicity of Houseplants. CRC Press, Boca Raton, FL	"Exposing the skin to the latex of these plants may cause an immediate slight burning or itching sensation. but in many cases there is no immediate reaction. Within the next 2 to 8 h after exposure, the skin may become erythematous, edematous, and develop papules, blisters or bullae. Pruritus is often reported."
	NC State Extension. (2022). Euphorbia myrsinites. https://plants.ces.ncsu.edu/plants/euphorbia-myrsinites/ . [Accessed 23 Aug 2022]	"Poison Symptoms: Causes low toxicity if eaten. Causes minor skin irritation that can last a few minutes. When ingested, nausea, vomiting, and diarrhea can result. Following skin contact, redness, swelling, and blisters can occur after some delay."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	University of Nevada Cooperative Extension. (2017). Choosing the Right Plants for Northern Nevada's High Fire Hazard Areas Lake Tahoe Basin. The University of Nevada, Reno	[Euphorbia myrsinites included among a list of plants recommended for high fire risk areas] "A key component of an effective defensible space is the selection and use of less hazardous plants in the residential landscape. This publication presents and describes some good landscape plant choices for northern Nevada's high fire hazard areas."
	Wisconsin Horticulture. (2022). Euphorbia myrsinites. https://hort.extension.wisc.edu/articles/euphorbia-myrsinites/ . [Accessed 24 Aug 2022]	[No evidence. A succulent, so unlikely to readily burn] "Variously called creeping spurge, donkey tail, myrtle spurge and other common names, Euphorbia myrsinites is an interesting succulent perennial in the family Euphorbiaceae (spurge family) native to rocky and grassy places of southeastern Europe and Asia Minor. "
	Arianoutsou, M., Christopoulou, A., Kazanis, D., Tountas, T., Ganou, E., Bazos, I., & Kokkoris, Y. (2010). Effects of fire on high altitude coniferous forests of Greece. In VI International Forest Fire Research Conference, Coimbra, Portugal	[Recovers after fire. No mention of flammability or contribution to fuel load or fire risk] "However, fir forests of Mount Taygetos, presenting different plant species composition in their understory, do have certain shrubs and trees that regenerate after fire, such as Euphorbia myrsinites, Dorycnium hirsutum, Quercus coccifera, Phillyrea latifolia and Crataegus monogyna."

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	NC State Extension. (2022). Euphorbia myrsinites. https://plants.ces.ncsu.edu/plants/euphorbia-myrsinites/ . [Accessed 24 Aug 2022]	"Light: Full sun (6 or more hours of direct sunlight a day)"
	Gardenia. (2022). Euphorbia myrsinites (Myrtle Spurge). https://www.gardenia.net/plant/euphorbia-myrsinites-myrtle-spurge . [Accessed 24 Aug 2022]	"Performs best in full sun in dry, well-drained soils."
	Dave's Garden. (2022). Euphorbia Species, Creeping Spurge, Donkey Tail, Myrtle Spurge - Euphorbia myrsinites. https://davesgarden.com/guides/pf/go/781/ . [Accessed 24 Aug 2022]	"Sun Exposure: Full Sun"

Qsn #	Question	Answer
	Wisconsin Horticulture. (2022). <i>Euphorbia myrsinites</i> . https://hort.extension.wisc.edu/articles/euphorbia-myrsinites/ . [Accessed 24 Aug 2022]	"This plant prefers hot, dry sites, although it will grow in almost any sunny area. It is drought tolerant and does well in poor, rocky soil. It is well suited to sunny banks, dry walls, and rock gardens."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Shoot Gardening. (2022). <i>Euphorbia myrsinites</i> (Broad-leaved glaucous spurge). https://www.shootgardening.co.uk . [Accessed 24 Aug 2022]	"Soil type - Chalky, Clay, Loamy, Sandy (will tolerate most soil types)"
	Wisconsin Horticulture. (2022). <i>Euphorbia myrsinites</i> . https://hort.extension.wisc.edu/articles/euphorbia-myrsinites/ . [Accessed 24 Aug 2022]	"This plant prefers hot, dry sites, although it will grow in almost any sunny area. It is drought tolerant and does well in poor, rocky soil."
	NC State Extension. (2022). <i>Euphorbia myrsinites</i> . https://plants.ces.ncsu.edu/plants/euphorbia-myrsinites/ . [Accessed 24 Aug 2022]	"You will have more success growing the plant under full sun in dry, well-drained soils; however, it tolerates poor soils, including rocky and sandy soils, and drought."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Flora of North America Editorial Committee. (2016). <i>Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae.</i> Oxford University Press, New York and Oxford	"Herbs, usually perennial, occasionally biennial, with taproot."

412	Forms dense thickets	
	Source(s)	Notes
	Umatilla County Soil & Water Conservation. (2014). <i>Invasive Plants. First Edition.</i> CTUIR Department of Natural Resources Range, Agriculture and Forestry Program, Pendleton, OR	"Forms colonies from a deep root system that grows from central taproot." [Possibly. Can exclude other vegetation]
	Godfrey, A. E. (2016). <i>Toxic beauty: Exotic invaders versus native beauty on Colorado's front range.</i> Masters Thesis. University of Colorado Boulder	"Myrtle spurge rapidly escapes gardens and invades sensitive ecosystems, out competing native vegetation and reducing wildlife forage." [Possibly. Competitive exclusion suggests formation of dense cover]

501	Aquatic	n
	Source(s)	Notes
	Flora of North America Editorial Committee. (2016). <i>Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae.</i> Oxford University Press, New York and Oxford	[Terrestrial] "Scrub oak communities, open ground near forests, shrub-steppes"

502	Grass	n
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Qsn #	Question	Answer
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 22 Aug 2022]	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. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 22 Aug 2022]	Family: Euphorbiaceae Subfamily: Euphorbioideae Tribe: Euphorbieae Subtribe: Euphorbiinae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Flora of North America Editorial Committee. (2016). Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae. Oxford University Press, New York and Oxford	"Herbs, usually perennial, occasionally biennial, with taproot." [No bulbs, corms, or tubers, although may persist from taproot]

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Flora of North America Editorial Committee. (2016). Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae. Oxford University Press, New York and Oxford	[No evidence] "Flowering and fruiting spring–summer. Scrub oak communities, open ground near forests, shrub-steppes; 0–2400 m; introduced; B.C.; Calif., Colo., Idaho, Mont., N.Mex., Oreg., Utah, Wash., Wyo.; s Europe, w Asia. <i>Euphorbia myrsinites</i> is cultivated in much of the flora area, where it can tolerate cold winters. In some areas, it can locally escape from cultivation."

602	Produces viable seed	y
	Source(s)	Notes
	Wisconsin Horticulture. (2022). <i>Euphorbia myrsinites</i> . https://hort.extension.wisc.edu/articles/euphorbia-myrsinites/ . [Accessed]	" <i>E. myrsinites</i> readily reseeds and can be an aggressive plant, taking over large areas under favorable conditions if not deadheaded. The seedlings are relatively easy to control by pulling or hoeing, though."
	Stevens, M. T., & Young, D. T. (2022). A Comparison of Mechanical Versus Chemical Control of the Invasive Species Myrtle Spurge (<i>Euphorbia myrsinites</i>). <i>Natural Areas Journal</i> , 42(2), 120-123	"Myrtle spurge has a high potential to continue to spread throughout western North America (Alexander 2013) for several reasons: (1) it has hybrid vigor, having been sourced from a wide area in Eurasia (Alexander 2013), (2) it produces seeds that are ejected up to 4.5 m from seed capsules, (3) it can reproduce asexually from root fragments, and (4) it tolerates both dry and nutrient-poor soil conditions (Lowry et al. 2017)."

Qsn #	Question	Answer
603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	
	Source(s)	Notes
	Gardenia. (2022). <i>Euphorbia myrsinites</i> (Myrtle Spurge). https://www.gardenia.net/plant/euphorbia-myrnsinites-myrtle-spurge . [Accessed 25 Aug 2022]	"Self-seeds freely if not deadheaded." [Possibly. May be producing seeds from outcrossing, or selfing. Unspecified]
	Flora of North America Editorial Committee. (2016). <i>Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae.</i> Oxford University Press, New York and Oxford	[Potentially] "Cyathial arrangement: terminal pleiochasial branches 2–12, each 1–2 times 2-branched; pleiochasial bracts similar in shape and size to distal leaves; dichasial bracts distinct, suborbiculate or reniform, base truncate, margins entire or minutely denticulate, apex obtuse, mucronulate; axillary cymose branches 0–4. Cyathia: peduncle 0.5–1 mm. Involucre campanulate, 2.4–2.6 × 2.3–2.5 mm, glabrous; glands 4, trapezoidal, 1–1.5 × 1.5–2.5 mm; horns divergent, thick, tips rounded, dilated, 0.5–0.9 mm. Staminate flowers 6–12. Pistillate flowers: ovary glabrous; styles 2.5–2.8 mm, usually unbranched."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Falch, M., Schönswetter, P., & Frajman, B. (2019). Both vicariance and dispersal have shaped the genetic structure of Eastern Mediterranean <i>Euphorbia myrsinites</i> (Euphorbiaceae). <i>Perspectives in Plant Ecology, Evolution and Systematics</i> , 39, 125459	" <i>Euphorbia</i> species do not have any specialised pollinators, but cyathia of different species are commonly visited by Hymenoptera, Coleoptera and Diptera (Traveset and Sáez, 1997; Frajman and Fišer, 2001)."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Stevens, M. T., & Young, D. T. (2022). A Comparison of Mechanical Versus Chemical Control of the Invasive Species Myrtle Spurge (<i>Euphorbia myrsinites</i>). <i>Natural Areas Journal</i> , 42(2), 120-123	"it can reproduce asexually from root fragments"
	Lowry, B. J., Ransom, C. V., Whitesides, R. E. and Olsen, H. (2017). <i>Noxious Weed Field Guide for Utah</i> , 4th Edition. Utah State University Extension, Logan, UT	"The plants can also regenerate from root fragments."

Qsn #	Question	Answer
607	Minimum generative time (years)	2
	Source(s)	Notes
	Flora of North America Editorial Committee. (2016). Flora of North America North of Mexico. Volume 12. Magnoliophyta: Vitaceae to Garryaceae. Oxford University Press, New York and Oxford	"Herbs, usually perennial, occasionally biennial, with taproot." [1-2 years]
	Walker, T. (2013). Plant Conservation: Why It Matters and How It Works. Timber Press, Portland, OR	"species such as <i>Euphorbia myrsinites</i> and <i>Euphorbia characias</i> do have these biennial shoots that grow vegetatively for one year and then die back to ground level after flowering in the next year."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Peregrym, M. (2020). Escaping of <i>Euphorbia myrsinites</i> from cultivation in Eger (E Hungary). <i>Kitaibelia</i> , 25(2), 253-256	[Mower dispersed] "The local dispersal of <i>E. myrsinites</i> is presumably connected to the mowing of these areas by string trimmers which scatter the seeds within a few meters."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Stevens, M. T., & Young, D. T. (2022). A Comparison of Mechanical Versus Chemical Control of the Invasive Species Myrtle Spurge (<i>Euphorbia myrsinites</i>). <i>Natural Areas Journal</i> , 42(2), 120-123	"Myrtle spurge (<i>Euphorbia myrsinites</i> L.) is an herbaceous, short-lived perennial that has become invasive in western North America. It was introduced from Eurasia as a drought-tolerant ornamental plant for rock gardens, but it has escaped cultivation and is widespread as an invasive plant."

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	Lowry, B. J., Ransom, C. V., Whitesides, R. E. and Olsen, H. (2017). Noxious Weed Field Guide for Utah, 4th Edition. Utah State University Extension, Logan, UT	[Seeds from cultivated plants could potentially be spread in potted plant growing in the vicinity] "Myrtle spurge is sold as an ornamental." ... "Seeds are ejected up to 15 feet when the seed capsules open."

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Lowry, B. J., Whitesides, R. E., Dewey, S. A., Ransom, C. V. & Banner, R. E. (2011). Common Weeds of the Yard and Garden. Utah State University Cooperative Extension, Logan, UT	"Myrtle spurge reproduces by seed, but can also regenerate from root fragments. The plant produces an abundance of seeds that are forcefully discharged up to 15 feet from the parent plant when the seed capsules open." [Not specifically wind-dispersed, although wind may influence the distance and direction of dispersed seed]

Qsn #	Question	Answer
	Falch, M., Schönschwetter, P., & Frajman, B. (2019). Both vicariance and dispersal have shaped the genetic structure of Eastern Mediterranean <i>Euphorbia myrsinites</i> (Euphorbiaceae). <i>Perspectives in Plant Ecology, Evolution and Systematics</i> , 39, 125459	[Autochorous and ant-dispersed] "two mechanisms are likely responsible, as in many other <i>Euphorbia</i> species, that is, autochory through explosive dehiscence of fruits and myrmecochory, dispersal by ants (Webster, 1994; Narbona et al., 2005). In both cases the dispersal distance is usually up to a few meters only (Narbona et al., 2005) even if seed dispersal distances of up to 180m have been evidenced for ants (Gómez and Espadaler, 2013)."

705	Propagules water dispersed	y
	Source(s)	Notes
	Peregrym, M. (2020). Escaping of <i>Euphorbia myrsinites</i> from cultivation in Eger (E Hungary). <i>Kitaibelia</i> , 25(2), 253-256	"Two individuals along a rainwater drainage channel (May 2020; N47.90327° E20.38705°; CEU: 8088.3). These plants grow about 100 m from the first location and 110 m from the second one." ... "Rainwater also can sweep away the seeds – the last-mentioned plants in the channel most probably emerged from seeds like this."

706	Propagules bird dispersed	
	Source(s)	Notes
	Peregrym, M. (2020). Escaping of <i>Euphorbia myrsinites</i> from cultivation in Eger (E Hungary). <i>Kitaibelia</i> , 25(2), 253-256	[Possibly. Not adapted for bird dispersal, and pigeons are eating unripe fruits prior to dehiscence. Unclear if viable seeds would be internally dispersed in this manner] "It is worth to note that urban birds, especially feral pigeons, actively eat the ripe fruits of <i>E. myrsinites</i> , thus ornitochory potentially also can support the dispersal of this plant."

707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	Falch, M., Schönschwetter, P., & Frajman, B. (2019). Both vicariance and dispersal have shaped the genetic structure of Eastern Mediterranean <i>Euphorbia myrsinites</i> (Euphorbiaceae). <i>Perspectives in Plant Ecology, Evolution and Systematics</i> , 39, 125459	"Similarly as most species of <i>Euphorbia</i> also <i>E. myrsinites</i> possesses a caruncle, which functions as elaisome to attract ants for dispersal (Webster, 1994). The species grows on rocky and stony slopes, pine woods and mountain pastures from sea level up to 2200m (Radcliff-Smith, 1982)."

708	Propagules survive passage through the gut	
	Source(s)	Notes
	Peregrym, M. (2020). Escaping of <i>Euphorbia myrsinites</i> from cultivation in Eger (E Hungary). <i>Kitaibelia</i> , 25(2), 253-256	[Possibly. Not adapted for bird dispersal, and pigeons are eating unripe fruits prior to dehiscence. Unclear if viable seeds would be internally dispersed in this manner] "It is worth to note that urban birds, especially feral pigeons, actively eat the ripe fruits of <i>E. myrsinites</i> , thus ornitochory potentially also can support the dispersal of this plant."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes

Qsn #	Question	Answer
	Lowry, B. J., Whitesides, R. E., Dewey, S. A., Ransom, C. V. & Banner, R. E. (2011). Common Weeds of the Yard and Garden. Utah State University Cooperative Extension, Logan, UT	"The plant produces an abundance of seeds that are forcefully discharged up to 15 feet from the parent plant when the seed capsules open." [Densities unknown]

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	Notes
	Umatilla County Soil & Water Conservation. (2014). Invasive Plants. First Edition. CTUIR Department of Natural Resources Range, Agriculture and Forestry Program, Pendleton, OR	"It has small seeds that can be projected from plant up to 15 feet and can survive in soil for about 8 years."
	Godfrey, A. E. (2016). Toxic beauty: Exotic invaders versus native beauty on Colorado's front range. Masters Thesis. University of Colorado Boulder	"The soil seed reserve of myrtle spurge is estimated to be eight years. The site must be monitored for at least nine years after the last flowering adult plants have been eliminated and treatments repeated when necessary."

803	Well controlled by herbicides	y
	Source(s)	Notes
	Umatilla County Soil & Water Conservation. (2014). Invasive Plants. First Edition. CTUIR Department of Natural Resources Range, Agriculture and Forestry Program, Pendleton, OR	"Chemical Control: Various herbicides are available for use."
	Stevens, M. T., & Young, D. T. (2022). A Comparison of Mechanical Versus Chemical Control of the Invasive Species Myrtle Spurge (<i>Euphorbia myrsinites</i>). <i>Natural Areas Journal</i> , 42(2), 120-123	"The chemical treatment involved applying Roundup Weed & Grass Killer (Monsanto Lawn & Garden Products, Marysville, Ohio, USA) to each myrtle spurge plant following the manufacturer's directions for use. The active ingredients in this commercially available formulation of Roundup were glyphosate (2.0%) and pelargonic acid (2.0%)." ... "Both mechanical and chemical treatments significantly reduced the percent cover (Figure 1) of myrtle spurge in our quadrats compared to the controls (P=0.001) and did not differ from each other (P=0.708). The mechanical treatment reduced percent cover by 84% and the chemical treatment reduced percent cover by 88%, compared to the controls. Similar to our results for percent cover, both mechanical and chemical treatments reduced the stalk count (Figure 2) of myrtle spurge in our quadrats compared to the controls (P=0.001) and did not differ from each other (P = 0.623). The mechanical treatment caused a 78% reduction in the number of myrtle spurge stalks and the chemical treatment resulted in an 85% reduction in the number of stalks, compared to the controls."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Stevens, M. T., & Young, D. T. (2022). A Comparison of Mechanical Versus Chemical Control of the Invasive Species Myrtle Spurge (<i>Euphorbia myrsinites</i>). <i>Natural Areas Journal</i>, 42(2), 120-123</p>	<p>"The mechanical treatment entailed the hand pulling of each myrtle spurge plant (including at least 10 cm of root) with the assistance of shovels." ... "Both mechanical and chemical treatments significantly reduced the percent cover (Figure 1) of myrtle spurge in our quadrats compared to the controls (P = 0.001) and did not differ from each other (P = 0.708). The mechanical treatment reduced percent cover by 84% and the chemical treatment reduced percent cover by 88%, compared to the controls. Similar to our results for percent cover, both mechanical and chemical treatments reduced the stalk count (Figure 2) of myrtle spurge in our quadrats compared to the controls (P = 0.001) and did not differ from each other (P = 0.623). The mechanical treatment caused a 78% reduction in the number of myrtle spurge stalks and the chemical treatment resulted in an 85% reduction in the number of stalks, compared to the controls."</p>
	<p>Lowry, B. J., Whitesides, R. E., Dewey, S. A., Ransom, C. V. & Banner, R. E. (2011). <i>Common Weeds of the Yard and Garden</i>. Utah State University Cooperative Extension, Logan, UT</p>	<p>[Able to resprout if roots are not dug up and removed, suggesting plants tolerating repeated top-damage] "Myrtle spurge is dealt with most effectively by digging or hand-pulling before flower production takes place in the second year. Seedlings are easily hand-pulled (use gloves, eye and skin protection!), but when digging more mature plants, the entire root must be removed or root pieces might produce new growth. Several years of digging/hand-pulling are often required to eliminate the plant. If myrtle spurge is blooming at the time of removal it should be discarded in the trash. Tilling or hoeing before flower development gives some temporary control, though this must be done repeatedly to deal with root regeneration. Mowing is not an acceptable form of control, since it promotes seed dispersal."</p>

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

Summary of Risk Traits:

High Risk / Undesirable Traits

- Grows in temperate and Mediterranean climates
- Naturalized in North America, and elsewhere, but no evidence in the Hawaiian Island to date
- A garden weed due to its ability to spread, and its toxic sap making removal hazardous
- A potential pasture weed that may reduce forage due to toxic properties
- An environmental weed in North America that competes with native and desirable vegetation
- Other *Euphorbia* species are invasive weeds
- Unpalatable to browsing and grazing animals (due to toxic sap)
- Sap toxic to humans and animals
- Tolerates many soil types
- Reproduces by seeds and vegetatively by root fragments
- Reaches maturity in two growing seasons (biennial)
- Seeds dispersed by explosive dehiscence, by mowing equipment, by water, possibly by birds, by ants, and through intentional cultivation
- Seeds may form a persistent seed bank (up to 8 years)
- Tolerates cutting and mowing (resprouts from roots)

Low Risk Traits

- May only be invasive at cooler, higher elevations in tropical island ecosystems
- Unarmed (no spines, thorns, or burrs)
- Grows best in high light environments (dense shade may inhibit spread)
- Herbicides may provide effective control