

Taxon: <i>Geranium maderense</i> Yeo	Family: Geraniaceae
Common Name(s): giant herb-Robert Madeira cranesbill	Synonym(s):

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 20 Sep 2022
WRA Score: 5.0	Designation: EVALUATE	Rating: Evaluate

Keywords: Monocarpic Herb, Naturalized Elsewhere, Shade-Tolerant, Self-Fertile, Dehiscent Seed Dispersal

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	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	y
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	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	y

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	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
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/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	[No evidence] " <i>Geranium maderense</i> is widely cultivated in Madeira, in gardens, and is naturalized near cities. It is, however, very rare in the wild. <i>Geranium maderense</i> was first discovered by Costa in 1934 (Pereira, 1967). This author collected the plant "...nas rochas escarpadas do litoral das Achadas da Cruz..." in the northwestern part of the island."

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"	High
	Source(s)	Notes
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	"Distribution and habitat. This species is present in Madeira; it is found on maritime cliffs or in the shade of laurel forests at 800–1450 m"
	Bowler, J. (2018). <i>Wildlife of Madeira and the Canary Islands</i> . Princeton University Press, Princeton, New Jersey	"Madeira and the Canaries are often known as the islands of eternal spring. They are located in the subtropics, so are warm year-round. They enjoy a typical Mediterranean climate, yet this is moderated at all times by the Atlantic Ocean, so they are never subject to the extremes of high and cold temperatures experienced on the adjacent mainland of North Africa."

202	Quality of climate match data	High
	Source(s)	Notes
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	"Distribution and habitat. This species is present in Madeira; it is found on maritime cliffs or in the shade of laurel forests at 800–1450 m"

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	"Distribution and habitat. This species is present in Madeira; it is found on maritime cliffs or in the shade of laurel forests at 800–1450 m"

Qsn #	Question	Answer
	Online Atlas of the British and Irish flora. (2022). <i>Geranium maderense</i> . https://plantatlas.brc.ac.uk/plant/geranium-maderense . [Accessed 16 Sep 2022]	"It is sensitive to frost, and is only grown in areas with a mild climate."
	LLIFLE - Encyclopedia of living forms. (2022). <i>Geranium maderense</i> . http://www.llifle.net . [Accessed 16 Sep 2022]	"Temperatures: It grows well in Mediterranean climates free of heavy frosts (Hardy to about – 6° C USDA 8-9), It do not grow well in humid tropical areas. Drought rating: Very tough."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	"Distribution and habitat. This species is present in Madeira; it is found on maritime cliffs or in the shade of laurel forests at 800–1450 m" ... " <i>Geranium maderense</i> is widely cultivated in Madeira, in gardens, and is naturalized near cities."
	Bowler, J. (2018). <i>Wildlife of Madeira and the Canary Islands</i> . Princeton University Press, Princeton, New Jersey	"Madeira and the Canaries are often known as the islands of eternal spring. They are located in the subtropics, so are warm year-round. They enjoy a typical Mediterranean climate, yet this is moderated at all times by the Atlantic Ocean, so they are never subject to the extremes of high and cold temperatures experienced on the adjacent mainland of North Africa. Average temperatures at sea level are remarkably constant year-round, typically ranging from 14° to 28° C, with hotter periods in the summer when the dry easterly Calima (Canaries) or Leste (Madeira) winds, often laden with dust, blow off the Sahara. Winds predominantly come from the north-east, particularly in summer, but westerlies associated with the passage of Atlantic depressions occur in late autumn–winter, bringing the bulk of the rain. Levels of precipitation are low in the Canaries, at generally less than 250 mm per year, but are higher on Madeira at around 600 mm per year. The Western and Central Canaries and Madeira receive much more rainfall than the Eastern Canaries and Porto Santo, as a result of their higher relief and their greater exposure to Atlantic storms."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Sykes, W.R. (1982) Checklist of dicotyledons naturalised in New Zealand 15. Annonales, Berberidales, Cactales, Fagales, some Geraniales, Juglandales, Laurales, Rurales, Salicales, Sapindales, Tiliales, Nyctaginaceae, and Zygophyllaceae. <i>New Zealand Journal of Botany</i> , 20(4): 333-341	" <i>G. maderense</i> has been widely cultivated in N.Z. in recent years. Seedlings are sometimes so numerous that they are a nuisance."

Qsn #	Question	Answer
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	" <i>Geranium maderense</i> is widely cultivated in Madeira, in gardens, and is naturalized near cities. It is, however, very rare in the wild."
	Online Atlas of the British and Irish flora. (2022). <i>Geranium maderense</i> . https://plantatlas.brc.ac.uk/plant/geranium-maderense . [Accessed 16 Sep 2022]	"This dramatic plant is the largest <i>Geranium</i> species. It was introduced into cultivation in Britain in c. 1950 and was first recorded from the wild in 1978 (Guernsey). It is sensitive to frost, and is only grown in areas with a mild climate."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Online Atlas of the British and Irish flora. (2022). <i>Geranium maderense</i> . https://plantatlas.brc.ac.uk/plant/geranium-maderense . [Accessed]	"A large perennial herb found as a naturalised garden escape on sea cliffs and waste ground. Reproduction is by seed. Lowland."
	Webb, C. J., Sykes, W. R., & Garnock-Jones, P. J. (1988). <i>Flora of New Zealand Volume IV. Botany Division, DSIR, Christchurch, New Zealand</i>	" <i>G. maderense</i> has been widely cultivated in N.Z. in recent years. Seedlings are sometimes so numerous that they are a nuisance. In N.Z. this plant is sometimes known as <i>G. anemonifolium</i> , a synonym of <i>G. palmatum</i> Cav., a related Madeiran endemic. "
	Stace, C. (2010). <i>New Flora of the British Isles. Third Edition. Cambridge University Press, Cambridge, UK</i>	" <i>G. maderense</i> Yeo - Giant Herb-Robert. Erect perennial to 1(2)m, like a giant <i>G. yeoi</i> with stem up to 5cm wide; petioles >30cm; leaves >25cm; inflorescence >50cm across; flowers >3cm across; petals 15-22 x 10-18mm incl. claw only 2-2.5mm; and stamens c. as long as sepals. Intrad-natd; well natd and increasing on cliffs in dense low vegetation in Scilly; records from Man need checking; Madeira. Records from Guernsey were errors for <i>G. reuteri</i> ."
	Sykes, W.R. (1982) Checklist of dicotyledons naturalised in New Zealand 15. Annonales, Berberidales, Cactales, Fagales, some Geraniales, Juglandales, Laurales, Rurales, Salicales, Sapindales, Tiliales, Nyctaginaceae, and Zygophyllaceae. <i>New Zealand Journal of Botany</i> , 20(4): 333-341	" <i>Geranium maderense</i> Yeo DISTRIBUTION: Occasional escape from cultivation; Dunedin, Stewart I. (Halfmoon Bay). FIRST RECORD: New record, e.g., CHR 322321, Queen's Drive, Dunedin, L. Esler, Feb. 1978. REGION OF ORIGIN: Madeira."
	Howell, C. J., & Sawyer, J. W. (2006). <i>New Zealand naturalised vascular plant checklist. New Zealand Plant Conservation Network, Wellington, NZ</i>	Fully naturalised
	Imada, C. (2019). <i>Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI</i>	No evidence from the Hawaiian Islands as of 2019

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Webb, C. J., Sykes, W. R., & Garnock-Jones, P. J. (1988). <i>Flora of New Zealand Volume IV. Botany Division, DSIR, Christchurch, New Zealand</i>	" <i>G. maderense</i> has been widely cultivated in N.Z. in recent years. Seedlings are sometimes so numerous that they are a nuisance." [Possibly a minor garden nuisance]

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes

Qsn #	Question	Answer
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No description or evidence of impacts
	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
	CABI. (2022). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	No description or evidence of impacts to date [Last updated: 10 Feb 2022]
	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
	Shirk, R. Y., & Hamrick, J. L. (2014). High but variable outcrossing rates in the invasive <i>Geranium carolinianum</i> (Geraniaceae). <i>American Journal of Botany</i> , 101(7): 1200-1206	" <i>Geranium carolinianum</i> (Geraniaceae), Carolina cranesbill, is native to North America and is a common weed in fields, lawns, and roadsides in the southeastern United States. Flowers are visited by generalist insect pollinators (Fiz et al., 2008). Fruits are dry, five-seeded schizocarps with explosive dispersal. It is naturalized in the eastern plains region of China, where it grows in similar habitats and is considered a minor invasive with low environmental impacts, although it is a common weed in agricultural fields (S. Qiang, Nanjing Agricultural University, personal communication)."
	Shirk, R. Y., Hamrick, J. L., Zhang, C., & Qiang, S. (2014). Patterns of genetic diversity reveal multiple introductions and recurrent founder effects during range expansion in invasive populations of <i>Geranium carolinianum</i> (Geraniaceae). <i>Heredity</i> , 112(5): 497-507	"In China, <i>G. carolinianum</i> is the only <i>Geranium</i> species listed as invasive, although to date it has had minor environmental impact (Liu et al., 2006). It is reported in 11 provinces in the eastern plains region (Weber et al., 2008) and is largely a roadside and agricultural weed."
	Spencer, E.R. (2013). <i>All About Weeds</i> . Dover Publications, Mineola, NY	"There are several wild geraniums, but the worst weed of the lot is the one known to the botanists as the Carolina Cranesbill." ... "The weed is at its worst in gardens, strawberry beds, and in sparsely set clover and alfalfa fields. In the well-kept gardens it serves as a fertilizer, but in the other places mentioned it crowds out and down the crop plants. It also does what all rapid-growing weeds are able to do: it filches from the soil the necessary plant foods intended for the crop plants."

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

Qsn #	Question	Answer
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	[No evidence] "Herbs perennial, monocarpic, 60–180(–200) cm tall. Rootstock 20–25(–60) mm in diam., 6 vertical. Stem erect, leafy, usually glabrous, sometimes with scattered, patent, glandular hairs 0.7–0.9 mm. Basal leaves in persistent rosette, cauline leaves opposite; leaf laminas (16–)20–30(–45) 3 17–48 cm, palmatisect, polygonal in outline, base cordate, with eglandular hairs on nerves of adaxial surface and glabrous on abaxial surface; segments 5, middle segment rhombic, 1.2–2.5 mm wide at base, (145–)209- to 260(to 460)-lobed in distal half; petioles up to 39 cm, terete, with swollen base, deflexed and remaining turgid after lamina death, glabrous or with scattered patent, glandular hairs 0.1–0.2 mm; stipules (5.2–)5.5–11.5(–11.8) 3 2.4–5.2 mm, ovate, obtuse, reddish brown, with scattered glandular and eglandular hairs on abaxial surface and on margin, glabrous adaxially."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	"Herbs perennial, monocarpic, 60–180(–200) cm tall." [Geraniaceae. No evidence]

404	Unpalatable to grazing animals	y
	Source(s)	Notes
	Country Farm Perennials. (2022). <i>Geranium maderense</i> . https://www.countryfarmperennials.com.au/product/geranium-maderense-madeira-cranesbill/ . [Accessed 19 Sep 2022]	"Deer & Rabbit resistant: The aromatic leaves smell nice to us but are not appetising to deer or rabbits."
	Special Plants. (2022). <i>Geranium maderense</i> . https://www.specialplants.net/shop/seeds/geranium_maderense/ . [Accessed 19 Sep 2022]	"Good For: Slug Resistant Good For: Rabbit Resistant Good For: Deer Resistant" [Multiple horticultural websites list this species as deer resistant, suggesting plants are unpalatable to browsing animals]

Qsn #	Question	Answer
405	Toxic to animals	n
	Source(s)	Notes
	PictureThis. (2022). Is giant herb-robert poisonous? https://www.picturethisai.com/ask/Geranium_maderense-4.html . [Accessed 19 Sep 2022]	"Is giant herb-robert poisonous? While giant herb-robert contains several chemically active compounds, none of them are present in concentrations high enough to cause poisoning in humans and pets."
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Shoot Gardening. (2022). Geranium maderense (Giant herb robert). https://www.shootgardening.co.uk . [Accessed 19 Sep 2022]	"Watch out for Specific pests Sawflies , Slugs , Snails , Vine weevil Specific diseases Powdery mildew "

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	PictureThis. (2022). Is giant herb-robert poisonous? https://www.picturethisai.com/ask/Geranium_maderense-4.html . [Accessed 19 Sep 2022]	"Is giant herb-robert poisonous? While giant herb-robert contains several chemically active compounds, none of them are present in concentrations high enough to cause poisoning in humans and pets."
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Bowler, J. (2018). Wildlife of Madeira and the Canary Islands. Princeton University Press, Princeton, New Jersey	"Forest fires are not uncommon in the pine forest, but these generally pass through quickly and do not kill the trees." [Geranium maderense not an important component of pine forests. Fires otherwise not common in native ecosystems]
	Aedo, C. (2017). Taxonomic Revision of Geranium Sect. Ruberta and Unguiculata (Geraniaceae). Annals of the Missouri Botanical Garden, 102(3), 409-465	"This species is present in Madeira; it is found on maritime cliffs or in the shade of laurel forests at 800–1450 m" [Unlikely. An understory plant of shaded sites]

Qsn #	Question	Answer
409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	LLIFLE - Encyclopedia of living forms. (2022). <i>Geranium maderense</i> . http://www.llifflife.net . [Accessed 16 Sep 2022]	"Exposure: It is a forest plant and prefers shade."
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	"This species is present in Madeira; it is found on maritime cliffs or in the shade of laurel forests at 800–1450 m"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Shoot Gardening. (2022). <i>Geranium maderense</i> (Giant herb robert). https://www.shootgardening.co.uk . [Accessed 19 Sep 2022]	"Soil type - Chalky, Clay, Loamy, Sandy (will tolerate most soil types) Soil drainage - Well-drained Soil pH - Acid, Alkaline, Neutral"
	LLIFLE - Encyclopedia of living forms. (2022). <i>Geranium maderense</i> . http://www.llifflife.net . [Accessed 16 Sep 2022]	"Soil: It like well-drained, well-composted acidic or neutral soils."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	"Herbs perennial, monocarpic, 60–180(–200) cm tall."

412	Forms dense thickets	n
	Source(s)	Notes
	Webb, C. J., Sykes, W. R., & Garnock-Jones, P. J. (1988). <i>Flora of New Zealand</i> Volume IV. Botany Division, DSIR, Christchurch, New Zealand	"Roadside, garden surrounds." ... " <i>G. maderense</i> has been widely cultivated in N.Z. in recent years. Seedlings are sometimes so numerous that they are a nuisance." [No evidence of adult plants forming dense stands in NZ]
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	"This species is present in Madeira; it is found on maritime cliffs or in the shade of laurel forests at 800–1450 m" ... " <i>Geranium maderense</i> is widely cultivated in Madeira, in gardens, and is naturalized near cities. It is, however, very rare in the wild." [No evidence from native range]

501	Aquatic	n
	Source(s)	Notes
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	[Terrestrial] "This species is present in Madeira; it is found on maritime cliffs or in the shade of laurel forests at 800–1450 m"

502	Grass	n
	Source(s)	Notes

Qsn #	Question	Answer
	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 16 Sep 2022]	Genus: <i>Geranium</i> Subgenus: <i>Robertium</i> Section: <i>Anemonifolia</i> Family: Geraniaceae

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 16 Sep 2022]	Genus: <i>Geranium</i> Subgenus: <i>Robertium</i> Section: <i>Anemonifolia</i> Family: Geraniaceae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	"Herbs perennial, monocarpic, 60–180(–200) cm tall. Rootstock 20–25(–60) mm in diam., 6 vertical. Stem erect, leafy, usually glabrous, sometimes with scattered, patent, glandular hairs 0.7–0.9 mm."
	Webb, C. J., Sykes, W. R., & Garnock-Jones, P. J. (1988). <i>Flora of New Zealand Volume IV</i> . Botany Division, DSIR, Christchurch, New Zealand	"Monocarpic or short-lived perennial herb, often with short, stout trunk at flowering (to c. 90 cm high in cultivation) and terminal lf rosette."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Fernandes, F. (2013). <i>Geranium maderense</i> . The IUCN Red List of Threatened Species 2013: e.T162102A5537899. http://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T162102A5537899.en . [Accessed 19 Sep 2022]	[Habitat is threatened] " <i>Geranium maderense</i> is endemic to Madeira with less than 50 remaining mature individuals. The population is stable but the habitat is declining due to urbanisation, infrastructure development, and the encroachment of invasive species. It is therefore classed as Critically Endangered and appropriate conservation measures are urgently needed."

602	Produces viable seed	y
	Source(s)	Notes
	Online Atlas of the British and Irish flora. (2022). <i>Geranium maderense</i> . https://plantatlas.brc.ac.uk/plant/geranium-maderense . [Accessed 16 Sep 2022]	"A large perennial herb found as a naturalised garden escape on sea cliffs and waste ground. Reproduction is by seed. Lowland."

Qsn #	Question	Answer
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	"Fruit (26–)29–36(–39) mm; mericarps 3.8–4.731.3–2.3 mm, without strand of fibers, reticulate, with thin ridges scarcely anastomosing and forming 0 to 1 overlapping, collar-like keels at apex, glabrous; rostrum 17–29 mm, with narrowed apex (6.2–)7–7.8(–9.4) mm, with scattered, patent, eglandular hairs 0.1–0.2 mm and patent, glandular hairs 0.1–0.3 mm restricted to basal half of narrowed apex; stigmatic remnants 2.8–4.2mm, with 5 glabrous lobes. Seeds 2.8–4.1 3 1.4–2 mm."
	Webb, C. J., Sykes, W. R., & Garnock-Jones, P. J. (1988). <i>Flora of New Zealand</i> Volume IV. Botany Division, DSIR, Christchurch, New Zealand	" <i>G. maderense</i> has been widely cultivated in N.Z. in recent years. Seedlings are sometimes so numerous that they are a nuisance."

603	Hybridizes naturally	
	Source(s)	Notes
	Yeo, P. F. (1973). The biology and systematics of <i>Geranium</i> sections <i>Anemonifolia</i> Knuth and <i>Ruberta</i> Dum. <i>Botanical Journal of the Linnean Society</i> , 67(4), 285-346	[Artificial hybridization possible] "12. Characters of <i>Geranium maderense</i> x <i>G. palmatum</i> , The F ₁ hybrids were uniform and in most characters intermediate between the parents. This is shown for floral characters in Fig. 9, but it also extends to the petiole anatomy (Fig. 3 and Plate 2) and the growth habit, for of the two plants that flowered in 1969, both produced leaves above the inflorescence and flowered again in 1970, but in one of them the 1970 inflorescence was terminal and the plant died after flowering."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Yeo, P. F. (1973). The biology and systematics of <i>Geranium</i> sections <i>Anemonifolia</i> Knuth and <i>Ruberta</i> Dum. <i>Botanical Journal of the Linnean Society</i> , 67(4), 285-346	"In addition to these crosses two flowers of <i>G. maderense</i> were emasculated and pollinated from another plant of the same species; 10 seeds were produced. The failure of <i>G. palmatum</i> to produce fruit when pollinated by <i>G. maderense</i> may be connected with the sensitivity to handling reported by Jackson (see above). I found that 8 flowers that had been allowed to open in a bag failed to set any seed, although two were given extra pollen from another plant of the same sample. This contrasts with the result of bagging flowers of <i>G. canariense</i> (see p. 303) and with the production of selfed seeds by accident in a bagged flower of <i>G. maderense</i> (mentioned above)."
	LLIFLE - Encyclopedia of living forms. (2022). <i>Geranium maderense</i> . http://www.llifle.net . [Accessed 16 Sep 2022]	"Propagation: The mother plant will die after flowering, but pups will usually form at the base and it self-seeds with seedlings frequently spring up nearby. It seems to prefer tight crannies and crevices when it self-sows, and seedlings can be left in situ to replace older plants. "
	Kubitzki, K., Bayer, C. & Stevens, P.F. (2007). <i>The Families and Genera of Vascular Plants: Volume IX. Flowering Plants. Eudicots</i> . Springer-Verlag, Berlin, Heidelberg, New York	[Family traits] "All genera are protandrous. In <i>Erodium</i> and <i>Geranium</i> , most of the species are pollinated by insects but self-pollination is frequent."

605	Requires specialist pollinators	n
	Source(s)	Notes

Qsn #	Question	Answer
	Schüßler, C. (2020). No Tertiary relicts? A biogeographical study on the Macaronesian laurel forest species in <i>Daucus</i> (Apiaceae), <i>Geranium</i> (Geraniaceae), <i>Gesnouinia</i> (Urticaceae), <i>Phyllis</i> (Rubiaceae), <i>Semele</i> (Asparagaceae) and <i>Visnea</i> (Pentaphragaceae). PhD Dissertation. Ruperto Carola University, Heidelberg, Germany	" <i>Geranium maderense</i> , also called <i>Pássaras</i> in Portuguese, is a monocarpic plant with a more or less woody stem up to 1 m in height (Press & Short, 1994). Endemic to the main island of Madeira, it can be found in the laurel forest and on humid cliffs (Aedo, 2017; Borges et al., 2008; Press & Short, 1994). Its flower is purplish pink and has a dark throat (Press & Short, 1994; Yeo, 1973). The blackish-purple to dark-red stamen filaments are shorter than those of <i>G. palmatum</i> , the anthers are of dark red color (Aedo, 2017; Yeo, 1973). Possible pollinators are light-weighted and short-tongued bees (Yeo, 1973). Like in <i>G. maderense</i> , the chromosome number $2n = 68$ (Widler-Kiefer & Yeo, 1987; Yeo, 1973)."
	Yeo, P. F. (1973). The biology and systematics of <i>Geranium</i> sections <i>Anemonifolia</i> Knuth and <i>Ruberta</i> Dum. <i>Botanical Journal of the Linnean Society</i> , 67(4), 285-346	"It will be evident from these descriptions that the three Madeiran endemics, <i>G. rubescens</i> , <i>G. palmatum</i> and <i>G. maderense</i> , have diverged in their pollination arrangements; this divergence may at some time in their evolution have been a significant factor in causing genetic isolation or minimising unfruitful pollinations. Apart from being apparently suited to different types of insect, they deposit pollen on different parts of the insect's body; in the case of bee visitors, <i>G. rubescens</i> will deposit pollen on the face, <i>G. maderense</i> on the top of the head and thorax (or possibly the underside of the thorax of a large insect) and <i>G. palmatum</i> will deposit it on the underside of the abdomen. The place of deposition of the pollen is also likely to differ for Lepidoptera visiting all three types of flower."
	Kubitzki, K., Bayer, C. & Stevens, P.F. (2007). The Families and Genera of Vascular Plants: Volume IX. Flowering Plants. Eudicots. Springer-Verlag, Berlin, Heidelberg, New York	[Family traits] "All genera are protandrous. In <i>Erodium</i> and <i>Geranium</i> , most of the species are pollinated by insects but self-pollination is frequent."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Country Farm Perennials. (2022). <i>Geranium maderense</i> . https://www.countryfarmperennials.com.au/product/geranium-maderense-madeira-cranesbill/ . [Accessed 19 Sep 2022]	[No evidence] " <i>Geranium maderense</i> is endemic to Madeira with less than 50 remaining mature individuals. The population is stable but the habitat is declining due to urbanisation, infrastructure development, and the encroachment of invasive species. It is therefore classed as Critically Endangered and appropriate conservation measures are urgently needed."

607	Minimum generative time (years)	2
	Source(s)	Notes

Qsn #	Question	Answer
	Rickard, S. (2011). The New Ornamental Garden. CSIRO Publishing, Collingwood, Australia	"G. maderense (1.2 x 1.2 m) is a spectacular monocarpic plant from the island of Madeira. In its first year it forms a sculptural dome of large, dissected, glossy green leaves on brown stalks which buttress the plant (its root system is pretty feeble). In this state the plant is quite beautiful enough but in its second or third year the foliage is overtopped with an enormous, fuzzy brown inflorescence which looks like a wig sitting on top of the plant. From the wig emerges a succession of mallow pink, round flowers 3 cm across over many weeks - a magnificent sight. After flowering the plant dies but a few seedlings usually appear here and there and can be transplanted when 5-10 cm high."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Rickard, S. (2011). The New Ornamental Garden. CSIRO Publishing, Collingwood, Australia	"After flowering the plant dies but a few seedlings usually appear here and there and can be transplanted when 5-10 cm high." [Most seedling recruitment appears to occur around parent plants]
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	[No means of external attachment. Dispersed explosively] "Subgenus <i>Robertium</i> has a "carpel-projection type" of discharge: the whole mericarp, containing the seed, is dispersed by the propelling force of the explosive recurvature of the awn." ... "Fruit (26-)29-36(-39) mm; mericarps 3.8-4.731.3-2.3 mm, without strand of fibers, reticulate, with thin ridges scarcely anastomosing and forming 0 to 1 overlapping, collar-like keels at apex, glabrous; rostrum 17-29 mm, with narrowed apex (6.2-)7-7.8(-9.4) mm, with scattered, patent, eglandular hairs 0.1-0.2 mm and patent, glandular hairs 0.1-0.3 mm restricted to basal half of narrowed apex; stigmatic remnants 2.8-4.2mm, with 5 glabrous lobes. Seeds 2.8-4.1 3 1.4-2 mm."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Rickard, S. (2011). The New Ornamental Garden. CSIRO Publishing, Collingwood, Australia	[Cultivated and sold as an ornamental] "G. maderense (1.2 x 1.2 m) is a spectacular monocarpic plant from the island of Madeira."

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	Yeo, P. F. (1973). The biology and systematics of <i>Geranium</i> sections <i>Anemonifolia</i> Knuth and <i>Ruberta</i> Dum. <i>Botanical Journal of the Linnean Society</i> , 67(4), 285-346	"As mentioned earlier, all the species of this group have carpellary dispersal. Each carpel, containing its seed, is forcibly discharged." [Possibly as a seed contaminant of potted plants if grown within discharge distance]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

704	Propagules adapted to wind dispersal	
	Source(s)	Notes

Qsn #	Question	Answer
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	[Wind may influence distance and direction of seed dispersal, but otherwise lacks mechanisms for wind dispersal. Dispersed explosively] "Subgenus <i>Robertium</i> has a "carpel-projection type" of discharge: the whole mericarp, containing the seed, is dispersed by the propelling force of the explosive recurvature of the awn." ... "Fruit (26-)29-36(-39) mm; mericarps 3.8-4.731.3-2.3 mm, without strand of fibers, reticulate, with thin ridges scarcely anastomosing and forming 0 to 1 overlapping, collar-like keels at apex, glabrous; rostrum 17-29 mm, with narrowed apex (6.2-)7-7.8(-9.4) mm, with scattered, patent, eglandular hairs 0.1-0.2 mm and patent, glandular hairs 0.1-0.3 mm restricted to basal half of narrowed apex; stigmatic remnants 2.8-4.2mm, with 5 glabrous lobes. Seeds 2.8-4.1 3 1.4-2 mm."

705	Propagules water dispersed	n
	Source(s)	Notes
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	[Water may secondarily move seeds, but not naturally occurring near aquatic or riparian habitats. Dispersed explosively] "Subgenus <i>Robertium</i> has a "carpel-projection type" of discharge: the whole mericarp, containing the seed, is dispersed by the propelling force of the explosive recurvature of the awn." ... "Fruit (26-)29-36(-39) mm; mericarps 3.8-4.731.3-2.3 mm, without strand of fibers, reticulate, with thin ridges scarcely anastomosing and forming 0 to 1 overlapping, collar-like keels at apex, glabrous; rostrum 17-29 mm, with narrowed apex (6.2-)7-7.8(-9.4) mm, with scattered, patent, eglandular hairs 0.1-0.2 mm and patent, glandular hairs 0.1-0.3 mm restricted to basal half of narrowed apex; stigmatic remnants 2.8-4.2mm, with 5 glabrous lobes. Seeds 2.8-4.1 3 1.4-2 mm."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Yeo, P. F. (1973). The biology and systematics of <i>Geranium</i> sections <i>Anemonifolia</i> Knuth and <i>Ruberta</i> Dum. <i>Botanical Journal of the Linnean Society</i> , 67(4), 285-346	"As mentioned earlier, all the species of this group have carpellary dispersal. Each carpel, containing its seed, is forcibly discharged. This discharge is usually accompanied by the breaking loose of a ribbon-like portion from the rostrum above the carpel."
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	[Not fleshy-fruited] "Fruit (26-)29-36(-39) mm; mericarps 3.8-4.731.3-2.3 mm, without strand of fibers, reticulate, with thin ridges scarcely anastomosing and forming 0 to 1 overlapping, collar-like keels at apex, glabrous; rostrum 17-29 mm, with narrowed apex (6.2-)7-7.8(-9.4) mm, with scattered, patent, eglandular hairs 0.1-0.2 mm and patent, glandular hairs 0.1-0.3 mm restricted to basal half of narrowed apex; stigmatic remnants 2.8-4.2mm, with 5 glabrous lobes. Seeds 2.8-4.1 3 1.4-2 mm."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes

Qsn #	Question	Answer
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	[No means of external attachment. Dispersed explosively] "Subgenus <i>Robertium</i> has a "carpel-projection type" of discharge: the whole mericarp, containing the seed, is dispersed by the propelling force of the explosive recurvature of the awn." ... "Fruit (26-)29-36(-39) mm; mericarps 3.8-4.731.3-2.3 mm, without strand of fibers, reticulate, with thin ridges scarcely anastomosing and forming 0 to 1 overlapping, collar-like keels at apex, glabrous; rostrum 17-29 mm, with narrowed apex (6.2-)7-7.8(-9.4) mm, with scattered, patent, eglandular hairs 0.1-0.2 mm and patent, glandular hairs 0.1-0.3 mm restricted to basal half of narrowed apex; stigmatic remnants 2.8-4.2mm, with 5 glabrous lobes. Seeds 2.8-4.1 3 1.4-2 mm."

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Aedo, C. (2017). Taxonomic Revision of <i>Geranium</i> Sect. <i>Ruberta</i> and <i>Unguiculata</i> (Geraniaceae). <i>Annals of the Missouri Botanical Garden</i> , 102(3), 409-465	[No adaptations for or evidence of consumption. Dispersed explosively] "Subgenus <i>Robertium</i> has a "carpel-projection type" of discharge: the whole mericarp, containing the seed, is dispersed by the propelling force of the explosive recurvature of the awn." ... "Fruit (26-)29-36(-39) mm; mericarps 3.8-4.731.3-2.3 mm, without strand of fibers, reticulate, with thin ridges scarcely anastomosing and forming 0 to 1 overlapping, collar-like keels at apex, glabrous; rostrum 17-29 mm, with narrowed apex (6.2-)7-7.8(-9.4) mm, with scattered, patent, eglandular hairs 0.1-0.2 mm and patent, glandular hairs 0.1-0.3 mm restricted to basal half of narrowed apex; stigmatic remnants 2.8-4.2mm, with 5 glabrous lobes. Seeds 2.8-4.1 3 1.4-2 mm."

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Webb, C. J., Sykes, W. R., & Garnock-Jones, P. J. (1988). <i>Flora of New Zealand Volume IV. Botany Division, DSIR, Christchurch, New Zealand</i>	" <i>G. maderense</i> has been widely cultivated in N.Z. in recent years. Seedlings are sometimes so numerous that they are a nuisance." [Seed densities unknown]

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2022) Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/ . [Accessed 20 Sep 2022]	"Storage Behaviour: No data available for species. Of 26 known taxa of genus <i>Geranium</i> , 92.31% Orthodox(p/?), 7.69% Uncertain"

803	Well controlled by herbicides	n
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	n

Qsn #	Question	Answer
	Source(s)	Notes
	PlantMaster. (2022). <i>Geranium maderense</i> Magenta-Eyed Geranium. https://plantmaster.com/plants/eplant.php?plantnum=210 . [Accessed 20 Sep 2022]	"This geranium is a show stopper when back lit! Prune when plant is toppling over from its weight, after bloom period." [Tolerates some pruning, but short-lived. Unknown if plants will regrow after complete removal of or damage to all foliage]

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 subtropical to Mediterranean climates
- Naturalized in the UK and New Zealand (but no evidence in the Hawaiian Islands to date)
- Seedling recruitment reported to be a nuisance in New Zealand
- Other Geranium species are invasive weeds
- Unpalatable to deer, rabbits, and possibly other animals
- Shade tolerant
- Tolerates many soil types
- Reproduces by seeds
- May hybridize with other Geranium species
- Self-fertile
- Reaches maturity in two to three years
- Seeds dispersed through explosive dehiscence, and through intentional cultivation

Low Risk Traits

- No significant negative impacts reported where naturalized
- Unarmed (no spines, thorns, or burrs)
- Non-toxic
- Not reported to spread vegetatively

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

(A) Reported as a weed of cultivated lands? Possibly. Described as a nuisance in cultivation

(B) Unpalatable to grazers or known to form dense stands? Unpalatable

Outcome = Evaluate further