Taxon: Rosmarinus officinalis L. **Family:** Lamiaceae

Common Name(s): rosemary **Synonym(s):** Rosmarinus angustifolius Mill.
Rosmarinus laxiflorus Noë
Salvia rosmarinus Spenn.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 9 Dec 2021

WRA Score: 2.0 **Designation:** L **Rating:** Low Risk

Keywords: Temperate Shrub, Naturalized Elsewhere, Culinary Herb, Flammable, Prolific Seeder

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		
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
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)	n
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		
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		
408	Creates a fire hazard in natural ecosystems	y=1, n=0	y
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	n
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	y=1, n=-1	y
604	Self-compatible or apomictic		
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	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
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**
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	[Cultivated but not domesticated] "Among three species of the genus, R. officinalis is the most widely spread, present as native in Portugal, Spain, France, Italy, Greece, Albania, Bosnia and Herzegovina, Croatia, Montenegro, Morocco, Algeria, Libya, Tunisia, Egypt, Cyprus and Turkey and naturalized in Bulgaria, Crimea, Azores, Canary Islands, Cape Verde, Bermuda, Texas and Central Mexico. It can be found from sea level to 1600 m a.s.l., usually growing in arid, semi-arid and calcareous habitats (Morales 2010). High genetic variability and adaptability of Rosmarinus officinalis L. populations in the western part of the Mediterranean, as well as the coexistence of this species with the other two species of the genus in North Africa and Andalucia, suggest that the diversity centre of the species is located in this territory (Mateu-Andrés et al. 2013)."

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 8 Dec 2021]	"Native Africa MACARONESIA: Spain [Canarias], Portugal [Madeira Islands] NORTHERN AFRICA: Algeria (n.), Libya (n.), Morocco, Tunisia Asia-Temperate WESTERN ASIA: Cyprus, Turkey Europe SOUTHEASTERN EUROPE: Former Yugoslavia, Greece, Italy (incl. Sardinia, Sicily) SOUTHWESTERN EUROPE: Spain (incl. Baleares), France (incl. Corsica), Portugal"
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"R. officinalis is cultivated in tropical and temperate regions around the world. Outside of cultivation it grows primarily in dry, sandy or rocky soils in a temperate climate characterized by warm summers and mild, dry winters"

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

Qsn #	Question	Answer
	Source(s)	**Notes**
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	"Among three species of the genus, R. officinalis is the most widely spread, present as native in Portugal, Spain, France, Italy, Greece, Albania, Bosnia and Herzegovina, Croatia, Montenegro, Morocco, Algeria, Libya, Tunisia, Egypt, Cyprus and Turkey and naturalized in Bulgaria, Crimea, Azores, Canary Islands, Cape Verde, Bermuda, Texas and Central Mexico. It can be found from sea level to 1600 m a.s.l., usually growing in arid, semi-arid and calcareous habitats (Morales 2010)."
	Guzman, C. C. de & Siemonsma, J. S. (eds.). (1999). Plant resources of South-East Asia, No.13. Spices. Backhuys Publishers, Leiden, The Netherlands	"The ecological amplitude of rosemary is from the temperate humid zone (mean annual temperature of 6-12°C; mean annual rainfall of 1000-2000 mm) to the subtropical semi-arid to humid zones (18-24°C; 500-2000 mm)."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Preferred Climate/s: Mediterranean, Subtropical, Tropical"
	Guzman, C. C. de & Siemonsma, J. S. (eds.). (1999). Plant resources of South-East Asia, No.13. Spices. Backhuys Publishers, Leiden, The Netherlands	"The ecological amplitude of rosemary is from the temperate humid zone (mean annual temperature of 6-12°C; mean annual rainfall of 1000-2000 mm) to the subtropical semi-arid to humid zones (18-24°C; 500-2000 m"

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	**Notes**
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"In Hawai'i, rosemary is grown as a specimen plant, ground cover, bonsai, or container plant, both ornamentally and for culinary purposes. It is quite salt tolerant and thrives near the coast, and for these reasons it could be more widely used as an ornamental here."
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	"Rosemary is considered to be one of the most traded herbs in the international market (Ravikumar 2000). Even if cultivation is increasing steadily, wild collection is still the major supplier of trade (Zeineb 2012; ProGuiRosemary 2012). Leading regions of rosemary production are Europe, Northern Africa, Mexico and the United States. Svoboda and Deans (1992) reported Italy, Dalmatia, Spain, Greece, Turkey, Egypt, France, Portugal, Tunisia and Morocco as the main producers of rosemary."
	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 8 Dec 2021]	Cultivated (widely cult.)

301	Naturalized beyond native range	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	"Among three species of the genus, R. officinalis is the most widely spread, present as native in Portugal, Spain, France, Italy, Greece, Albania, Bosnia and Herzegovina, Croatia, Montenegro, Morocco, Algeria, Libya, Tunisia, Egypt, Cyprus and Turkey and naturalized in Bulgaria, Crimea, Azores, Canary Islands, Cape Verde, Bermuda, Texas and Central Mexico."
	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 8 Dec 2021]	"Naturalized Africa MACARONESIA: Portugal [Azores]"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"References: Puerto Rico-CW-261, United States of America-N-101, New Zealand-UW-280, Australia-N-945, United Kingdom-CN-314, Australia-E-380, United Kingdom-N-519, New Zealand-N-15, United Kingdom-C-812, New Zealand-N-823, Australia-W-853, Australia-N-855, Paraguay-N-876, New Zealand-U-919, Australia-N-354, Portugal-N-1006, China-I-1055, Europe-N-819, Gal pagos Islands-CN-1157, China-N-1215, Belgium-U-1220, Crete-A-1228, Peru-N-1293, Cape Verde-N-1414, Australia-N-1450, Bolivia-N-1630, Global-CD-1611, Azores-N-1721, China-I-1769, Ukraine-N-1813, Switzerland-U-1990, Ukraine-U-2014, New Zealand-U-2048, Australia-W-1977, Barbados-W-1977, Belgium-W-1977, Cabo Verde-W-1977, China-W-1977, Peru-W-1977, Rwanda-W-1977, Spain-W-1977, Switzerland-W-1977, United Kingdom-W-1977, Global--1324."
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

302	Garden/amenity/disturbance weed	
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[Potentially weedy] "Potential for R. officinalis to become a weed was previously determined to be 'negligible' (Kahn and Lima, 2001) but risk of introduction for this species is now higher as it has since been reported as a cultivation escape, garden thug, and weed (Randall, 2012) and is known to be invasive to Cuba (Oviedo Prieto et al., 2012). Little data is available on possible negative environmental and economic impacts of the spread of this species, but considering its long history of widespread cultivation, use and value as a culinary, medicinal and ornamental species in all regions of the world, restriction to the international trade and import of R. officinalis to non native and non-naturalized places is unlikely."

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

Qsn #	Question	Answer
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[No evidence] "Potential for R. officinalis to become a weed was previously determined to be 'negligible' (Kahn and Lima, 2001) but risk of introduction for this species is now higher as it has since been reported as a cultivation escape, garden thug, and weed (Randall, 2012) and is known to be invasive to Cuba (Oviedo Prieto et al., 2012). Little data is available on possible negative environmental and economic impacts of the spread of this species, but considering its long history of widespread cultivation, use and value as a culinary, medicinal and ornamental species in all regions of the world, restriction to the international trade and import of R. officinalis to non-native and non-naturalized places is unlikely."

304	Environmental weed	n
	Source(s)	**Notes**
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[No evidence] "Potential for R. officinalis to become a weed was previously determined to be 'negligible' (Kahn and Lima, 2001) but risk of introduction for this species is now higher as it has since been reported as a cultivation escape, garden thug, and weed (Randall, 2012) and is known to be invasive to Cuba (Oviedo Prieto et al., 2012). Little data is available on possible negative environmental and economic impacts of the spread of this species, but considering its long history of widespread cultivation, use and value as a culinary, medicinal and ornamental species in all regions of the world, restriction to the international trade and import of R. officinalis to non-native and non-naturalized places is unlikely."

305	Congeneric weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Wu, Z. Y. & P. H. Raven, (eds). (1994). Flora of China. Vol. 17 (Verbenaceae through Solanaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis.	[No evidence] "Plants to 2 m tall. Bark dark gray, irregularly fissured, exfoliating, young branches densely white stellatetomentulose. Leaves tufted on branches, sessile to short petiolate; leaf blade 1–2.5 cm□×□1–2 mm, leathery, adaxially somewhat shiny, subglabrous, abaxially densely white stellate-tomentose, base attenuate, margin entire, revolute, apex obtuse. Calyx ca. 4 mm, densely white stellate tomentose and glandular outside, upper lip subcircular, teeth of lower lip ovate-triangular. Corolla blue-purple, less than 1 cm, sparsely pubescent outside, tube slightly exserted, apex of upper lip 2-lobed, lobes ovate, middle lobe of lower lip constricted at base into claw, lateral lobes oblong."

402	Allelopathic	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Chen, F., Peng, S., Chen, B., Ni, G., & Liao, H. (2013). Allelopathic potential and volatile compounds of Rosmarinus officinalis L. against weeds. Allelopathy Journal, 32(1), 57-66	[Potentially Yes] "To test the Rosmarinus officinalis L. (Lamiaceae) allelopathic potential on seedling establishment of weeds, bioassay experiments were done with aqueous leachates from its fresh leaves, leaf volatiles and leaf litter leachates on seed germination and seedling growth of 3 weed species [(Eleusine indica (L.) Gaertn., Cynodon dactylon (L.) Pers. and Digitaria sanguinalis (L.) Scop.)]. The aqueous leachates from fresh leaves at 100 mg/mL, leaf litter leachates at 5 mg/mL and the volatiles at ≥10 mg/cm3 inhibited the seed germination and seedling growth of all 3- test weeds. In fresh leaves, stems, roots and litter of R. officinalis, 14, 10, 7 and 14 volatiles compounds were identified, respectively. To better understand the allelopathic effects from different parts or tissues of R. officinalis, we analyzed chemical composition of volatile compounds from fresh leaves, stem, root and litter of R. officinalis by GC-MS and GC. The major constituents of the volatiles were apinene (29.6, 25.7, 33.7 and 44.3%), 1,8-cineole (25.6, 13.2, 19.4 and 26.7%), piperitone (14.1, 20.5, 30.4 and 6.5%) from fresh leaves, stem, root and litter, respectively. The results indicated that R. officinalis had the potential as living plant and cover plant (or residues as mulch) for weed control. The study provided key information for the use of R. officinalis in sustainable management of weeds."

403	Parasitic	n
	Source(s)	**Notes**
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	"Rosmarinus officinalis L. is an evergreen perennial, occasionally shrub-like, up to 3 m high, usually erect, with no rooting, woody highly branched stems" [No evidence]

404	Unpalatable to grazing animals	
	Source(s)	**Notes**
	Missouri Botanical Garden. (2021). Salvia rosmarinus. http://www.missouribotanicalgarden.org. [Accessed 8 Dec 2021]	"Deer tend to avoid this plant."
	Aldezabal, A., & Garin, I. (2000). Browsing preference of feral goats (Capra hircus L.) in a Mediterranean mountain scrubland. Journal of Arid Environments, 44(1), 133-142	[Browsed at certain times of year, but not a preferred plant] "Domestic goats usually select against the evergreen R. officinalis (Barroso et al., 1995) and browse it only when the availability of preferred food decreases (Dumont et al., 1995). Wild goats consume R. officinalis especially in winter, although it is also appreciably foraged in spring and autumn (Martinez et al., 1985). Feral goats did not browse R. officinalis out of winter, probably because it acted as a substitute for species whose nutritive value falls in winter. Digestibility of R. officinalis is known to be very low during the growing season (Robles & Passera, 1995). Its significance in the diet of feral goats is probably low."

Qsn #	Question	Answer
	Mancilla-Leytón, J. M., & Vicente, A. M. (2014). Effect of agro-industrial by-products on browsing of Rosmarinus officinalis by goats. Journal of Arid Environments, 110: 8-11	[Limited browsing and palatability] "In this context, rosemary (Rosmarinus officinalis) is of particular interest given its capacity for both invasion and ignition. This aromatic shrub can be found in the Mediterranean basin, particularly in areas of Spain with a basic substrate. The species is typically consumed in low quantities by ruminants. Individual rosemary plants present a seasonal pattern of herbivory that is limited to the flowering period (December-March) (Mancilla-Leyton et al., 2012). The poor consumption of Lamiaceae or Labiateae species, such as rosemary, is attributed to the high oil content of these plants (Guillen et al., 1996) that decreases their palatability and confers high flammability (IF¼ 4) (Hernando, 2009)."

405	Toxic to animals	n
	Source(s)	**Notes**
	ASPCA. (2021). Toxic and Non-Toxic Plants - Rosemary. https://www.aspca.org/pet-care/animal-poison-control/toxic-and-non-toxic-plants/rosemary. [Accessed 9 Dec 2021]	"Toxicity: Non-Toxic to Dogs, Non-Toxic to Cats, Non-Toxic to Horses"
	Aldezabal, A., & Garin, I. (2000). Browsing preference of feral goats (Capra hircus L.) in a Mediterranean mountain scrubland. Journal of Arid Environments, 44(1), 133-142	[Chemicals in leaves may deter browsing, but are apparently not toxic to goats] "Domestic goats usually select against the evergreen R. officinalis (Barroso et al., 1995) and browse it only when the availability of preferred food decreases (Dumont et al., 1995). Wild goats consume R. officinalis especially in winter, although it is also appreciably foraged in spring and autumn (Martinez et al., 1985).

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	Guzman, C. C. de & Siemonsma, J. S. (eds.). (1999). Plant resources of South-East Asia, No.13. Spices. Backhuys Publishers, Leiden, The Netherlands	"Rosemary has been reported to be attacked by Phytocoris rosmarini and Orthotylus ribesi in Spain and by Sclerotinia sclerotiorum in India. It has also been found susceptible to the root-knot nematode Meloidogyne incognita."

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	"According to WHO Monograph, eugenol, which can be metabolized to a quinone methide, is considered to be toxic, but its content in rosemary leaves is low, so that there is no risk for human health. Johnson et al. (2001) reported that certain extraction methods, like methanol extraction of rosemary, contribute to a higher concentration of eugenol, thus increasing the risk of toxicity." "Rosemary is considered to be one of the most traded herbs in the international market (Ravikumar 2000). Even if cultivation is increasing steadily, wild collection is still the major supplier of trade (Zeineb 2012; ProGuiRosemary 2012). Leading regions of rosemary production are Europe, Northern Africa, Mexico and the United States. Svoboda and Deans (1992) reported Italy, Dalmatia, Spain, Greece, Turkey, Egypt, France, Portugal, Tunisia and Morocco as the main producers of rosemary. Rosemary is widely used for flavouring food in Mediterranean cuisine and as a highly appreciated medicinal plant in folk medicine as well as pharmacy, cosmetics and phytocosmetics."
	Plants for a Future. (2021). Rosmarinus officinalis. https://pfaf.org/user/plant.aspx?latinname=Rosmarinus+officinalis. [Accessed 8 Dec 2021]	"Known Hazards: Products containing rosemary oil may cause erythema (redness) of the skin. Caution needed if allergies. Reportedly used as an abortifacient in large quantities but can lead to deep coma, spasm and vomiting and even death [301]."
	Guzman, C. C. de & Siemonsma, J. S. (eds.). (1999). Plant resources of South-East Asia, No.13. Spices. Backhuys Publishers, Leiden, The Netherlands	"The fresh or dried leaves are excellent flavouring agents in vegetables, meat (particularly lamb, veal and roasted chicken), sauces, stews, herbal butters, cream soups, fruit salads, jams, biscuits and bread. Rosemary oil, distilled from the flowering tops and leaves, is used to season processed foods, but for the most part it is employed in perfumes, in scenting soaps, detergents, household sprays and other related technical products. It finds application in denaturing alcohol and is popular in aromatherapy. In the United States the regulatory status 'generally recognized as safe' has been accorded to rosemary (GRAS 2991), rosemary oil (GRAS 2992) and rosemary oleoresin (GRAS 3001). The maximum permitted level of rosemary oil in food products is about 0.003%. Rosemary oleoresin is used in the food industry as a natural antioxidant, for instance in cooked meat products. In traditional medicine rosemary is thought to fortify the brain and refresh the memory. Flowering tops and leaves are considered carminative, diaphoretic, diuretic, aperient, emmenagogue, stimulant, stomachic and astringent. Rosemary also serves as a household remedy for headaches, bruises, colds, nervous tension, asthma, baldness and sore throat. In the Philippines, an infusion of the leaves is used as an eyewash for slight catarrhal conjunctivitis, as vapour baths for rheumatism, paralysis and incipient catarrhs, and to bathe women in puerperal state. Rosemary leaves are therapeutically allowed internally for dyspeptic complaints, and externally for rheumatic diseases and circulatory problems. Rosemary is very popular as an ornamental plant used as a ground cover, hedge or shrub and is even transformed by hobbyists into bonsai or planted in hanging baskets. The leaves and flowers can be carefully dried and sold in elegant sachets and potpourris. "
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Whole plant infusion sedative, carminative, sudorific, cardiac stimulant, antiinflammatory, antirheumatic, diuretic, digestive, antiseptic, antispasmodic."

Qsn #	Question	Answer
408	**Creates a fire hazard in natural ecosystems**	**y**
	Source(s)	**Notes**
	Pausas, J. G., Alessio, G. A., Moreira, B., & Segarra-Moragues, J. G. (2016). Secondary compounds enhance flammability in a Mediterranean plant. Oecologia, 180(1), 103-110	"all major terpenes found in R. officinalis are highly flammable in such a way that, in the presence of an ignition source, they ignite at relatively low temperatures and at low concentrations"
	Mancilla-Leytón, J. M., & Vicente, A. M. (2014). Effect of agro-industrial by-products on browsing of Rosmarinus officinalis by goats. Journal of Arid Environments, 110: 8-11	"In this context, rosemary (Rosmarinus officinalis) is of particular interest given its capacity for both invasion and ignition. This aromatic shrub can be found in the Mediterranean basin, particularly in areas of Spain with a basic substrate. The species is typically consumed in low quantities by ruminants. Individual rosemary plants present a seasonal pattern of herbivory that is limited to the flowering period (December-March) (Mancilla-Leyton et al., 2012). The poor consumption of Lamiaceae or Labiateae species, such as rosemary, is attributed to the high oil content of these plants (Guillen et al., 1996) that decreases their palatability and confers high flammability (IF¼ 4) (Hernando, 2009)."
	Corbett, L. (2021). Safer Gardens: Plant Flammability & Planning for Fire. Australian Scholarly Publishing, Melbourne	"Rosmarin us officinalis - Rosemary Shrub. One test indicated it was flammable over part of the summer and autumn months. Californian range scientists Nord and Green (1977} said rosemary bums readily."
	Fire Safe Marin. (2021). Rosmarinus officinalis. https://firesafemarin.org. [Accessed 9 Dec 2021]	"When irrigated and maintained free of dead, twiggy material, rosemary is relatively fire resistant. Because of its volatile oil content, and tendency to collect dead material when in bush form, rosemary should be removed within 30’ of structures."
409	**Is a shade tolerant plant at some stage of its life cycle**	**n**
	Source(s)	**Notes**
	Plants for a Future. (2021). Rosmarinus officinalis. https://pfaf.org/user/plant.aspx?latinname=Rosmarinus+officinalis. [Accessed 9 Dec 2021]	"It cannot grow in the shade." ... "Prefers a hot sunny position and a slightly alkaline light dry soil"
	Missouri Botanical Garden. (2021). Salvia rosmarinus. http://www.missouribotanicalgarden.org. [Accessed 9 Dec 2021]	"Winter hardy to USDA Zone 8-10 where it may be grown in light, slightly acidic, dry to medium, well-drained soils in full sun. Tolerates light shade, but best performance is in full sun."
410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**n**
	Source(s)	**Notes**
	Missouri Botanical Garden. (2021). Salvia rosmarinus. http://www.missouribotanicalgarden.org. [Accessed 9 Dec 2021]	"Performs poorly in heavy clay soils. Wet, poorly-drained soils in winter are usually fatal."
	Plants for a Future. (2021). Rosmarinus officinalis. https://pfaf.org/user/plant.aspx?latinname=Rosmarinus+officinalis. [Accessed 9 Dec 2021]	"Prefers a hot sunny position and a slightly alkaline light dry soil [11, 14, 27, 37]. Dislikes very heavy soils [11]. Intolerant of excessive winter wet [200]. Likes a stony calcareous soil [200]. Plants are smaller when grown on chalky soils, but are more fragrant [4]. "
411	**Climbing or smothering growth habit**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Guzman, C. C. de & Siemonsma, J. S. (eds.). (1999). Plant resources of South-East Asia, No.13. Spices. Backhuys Publishers, Leiden, The Netherlands	"An evergreen, usually erect, bushy shrub up to 2 m tall and wide."

412	Forms dense thickets	n
	Source(s)	**Notes**
	Loidi, J. (ed.). (2017). The Vegetation of the Iberian Peninsula, Volume 2. Springer, Cham, Switzerland	[Dominant, but no evidence of dense thickets] "Calcicole Scrub (Sideritido-Salvion lavandulifoliae) The matorrals growing on limestones and calcareous marls have a varied set of dominant species like Rosmarinus officinalis, Salvia lavandulifolia, Lavandula latifolia, and several woody legumes (Genista, Astragalus, Ononis, Erinacea anthyllis)."
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	[No evidence] "It can be found from sea level to 1600 m a.s.l., usually growing in arid, semi-arid and calcareous habitats (Morales 2010)."
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	[No evidence] "R. officinalis originated in the Mediterranean region with coastal climate, and can tolerate heat, drought, and poor, dry, sandy, and rocky soil types (Floridata, 2014). The species is cultivated around the world in both urban and rural gardens and agricultural settings. It also occurs in disturbed areas in Peru (Peru Checklist, 2014) while in Colombia, it occurs in premontane and lower montane humid forest habitats (Vascular Plants of Antioquia, 2014), and in Bolivia it occurs in dry valleys (Bolivia Checklist, 2014). In Bermuda it was reported by Britton (1918) to grow on rocky hillsides."

501	Aquatic	n
	Source(s)	**Notes**
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	[Terrestrial] "It can be found from sea level to 1600 m a.s.l., usually growing in arid, semi-arid and calcareous habitats"

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 8 Dec 2021]	Family: Lamiaceae (alt. Labiatae) Subfamily: Nepetoideae Tribe: Mentheae Subtribe: Salviinae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**

Qsn #	Question	Answer
	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 8 Dec 2021]	Family: Lamiaceae (alt. Labiatae) Subfamily: Nepetoideae Tribe: Mentheae Subtribe: Salviinae

504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	Guzman, C. C. de & Siemonsma, J. S. (eds.). (1999). Plant resources of South-East Asia, No.13. Spices. Backhuys Publishers, Leiden, The Netherlands	"An evergreen, usually erect, bushy shrub up to 2 m tall and wide." ... "Once established rosemary roots deeply and is drought-resistant."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	[No evidence] "Among three species of the genus, R. officinalis is the most widely spread, present as native in Portugal, Spain, France, Italy, Greece, Albania, Bosnia and Herzegovina, Croatia, Montenegro, Morocco, Algeria, Libya, Tunisia, Egypt, Cyprus and Turkey and naturalized in Bulgaria, Crimea, Azores, Canary Islands, Cape Verde, Bermuda, Texas and Central Mexico. It can be found from sea level tc 1600 m a.s.l., usually growing in arid, semi-arid and calcareous habitats (Morales 2010). High genetic variability and adaptability of Rosmarinus officinalis L. populations in the western part of the Mediterranean, as well as the coexistence of this species with the other two species of the genus in North Africa and Andalucia, suggest that the diversity centre of the species is located in this territory (Mateu-Andrés et al. 2013)."

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Only light pruning is needed to shape plants and encourage new growth, and plants are easily propagated from 2-3" long half-woody tip cuttings or from seed."
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	"Rosemary is propagated generatively by seeds or vegetatively by cuttings, layering or division of roots."

603	**Hybridizes naturally**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	"Rosúa (1981, 1986) and Morales (2010) have described two interspecific hybrids, including R. officinalis, R. eriocalyx and R. tomentosus: Rosmarinus x noeanus Maire ex Rosúa = R. eriocalyx Jordán & Fourr x R. officinalis L. = R. tournefortii x R. officinalis (Maire 1932), a semi-prostrate shrub, with narrow leaves and mid blue flowers. The existence of such hybrids with introgression character is explainable for species growing in the same geographical region like the three species of rosemary (Rosúa 1981, 1986), but the hybrid between R. eriocalyx and R. officinalis has been also found in North Africa (Libya, Algeria, Tunisia), which is not the distributional area of R. eriocalyx (Greuter et al. 1986). Rosmarinus x mendizabalii Sagredo ex Rosúa = R. tomentosus Huber -Morath & Maire x R. officinalis L. Populations of the hybrid, R. x mendizabalii Sagredo ex Rosúa (Rosúa 1981, 1986), have been found in the Guadalfeo valley and very rarely at the eastern and western coast of Granada, where R. tomentosus is widely distributed."

604	Self-compatible or apomictic	
	Source(s)	**Notes**
	Garcia-Fayos, P., Castellanos, M. C., & Segarra-Moragues, J. G. (2018). Seed germination and seedling allogamy in Rosmarinus officinalis: the costs of inbreeding. Plant Biology, 20(3), 627-635	[Possibly, although most self-pollinated seeds are aborted] "We found that most seeds obtained experimentally from self-pollination were apparently healthy but empty, and that the proportion of filled seeds drove the differences in germination rate between self- and cross-pollination experiments. Plants from wild populations consistently had low germination rate and high rate of allogamy, as determined with microsatellites. Germination rate related positively to the length of the flowering season, flowering synchrony and the ratio of male-sterile flowers, whereas the rate of allogamous seedlings was positively related only to the ratio of male-sterile flowers. • Rosemary plants purge most of the inbreeding caused by its pollination system by aborting the seeds. This study showed that the rates of seed germination and allogamy of the seedlings depend on a complex combination of factors that vary in space and time. Male sterility of flowers, length of the flowering season and flowering synchrony of individuals within populations all favour high rates of cross-pollination, therefore increasing germination and allogamy rates. Flowering traits appear to be highly plastic and respond to local and seasonal conditions."
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	[Self-compatible, but generally not self-pollinated] "Rosemary plants are self-compatible, but their protandry, typical for Lamiaceae in combination with nonsimultaneous maturation of anthers and stigma, prevents self-pollination, making necessary an intermediator for pollination, thus promoting cross-pollination."

605	Requires specialist pollinators	n
	Source(s)	**Notes**

Qsn #	Question	Answer
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	"Nectar and scent produced by a huge number of rosemary flowers attract various insects, among them honeybees (Herrera 2005; Segarra-Moragués et al. 2016). A variation of pollen size and fertility has been observed on different rosemary populations, supposing genetic factors (Herrera 1986, 1987; Torres 2000; Lamborn et al. 2005; Beaulieu et al. 2008; Knight et al. 2010)."
	Pausas, J. G., Alessio, G. A., Moreira, B., & Segarra-Moragues, J. G. (2016). Secondary compounds enhance flammability in a Mediterranean plant. Oecologia, 180(1), 103-110	"Rosmarinus officinalis (rosemary; Lamiaceae) is an aromatic evergreen shrub up to 1.5 m tall that is native and widespread in the west and central parts of the Mediterranean Basin. Its flowers are insect pollinated and its seeds very small, lacking any specialized dispersal mechanism."

606	Reproduction by vegetative fragmentation	n
	Source(s)	**Notes**
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Only light pruning is needed to shape plants and encourage new growth, and plants are easily propagated from 2-3" long half-woody tip cuttings or from seed."
	Guzman, C. C. de & Siemonsma, J. S. (eds.). (1999). Plant resources of South-East Asia, No.13. Spices. Backhuys Publishers, Leiden, The Netherlands	"Rosemary is commonly propagated by cuttings, division or by air layering. Seeds are sometimes used, but they are produced only under very favourable growing conditions and often only 10-20% of the seeds germinate. Transplanting to the field is done at a spacing of 45 cm between plants in rows 1.2 m apart. It is also common to produce rosemary in containers in greenhouses."

607	Minimum generative time (years)	2
	Source(s)	**Notes**
	Guzman, C. C. de & Siemonsma, J. S. (eds.). (1999). Plant resources of South-East Asia, No.13. Spices. Backhuys Publishers, Leiden, The Netherlands	"Flowering is initiated when plants are 2 or more years old. Under favourable growing conditions and optimal cultural management, rosemary can remain productive for up to 30 years."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	**Notes**
	Garcia-Fayos, P., Castellanos, M. C., & Segarra-Moragues, J. G. (2018). Seed germination and seedling allogamy in Rosmarinus officinalis: the costs of inbreeding. Plant Biology, 20(3), 627-635	"Neighbouring rosemary shrubs are likely close relatives, because this species lacks mechanisms for long-distance seed dispersal and the single-seeded dry indehiscent fruits (schizocarps) or entire calyces containing fruits are gravity-dispersed, below or close to maternal plants (Bouman & Meeuse 1992). Furthermore, when moistened or wetted, the pericarp mucilage hydrates, glueing the fruits to the soil surface and preventing or reducing both secondary dispersal and predation by ants (Engelbrecht & Garc□ıa-Fayos 2012)."
	CABI. (2021). Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc	"The species can also be spread by vehicles used in agricultural settings where the species is commercially grown."

Qsn #	Question	Answer
	Clemente, A. S., Rego, F. C., & Correia, O. A. (2007). Seed Bank Dynamics of Two Obligate Seeders, Cistus monspeliensis and Rosmarinus officinalis, in Relation to Time since Fire. Plant Ecology, 190(2), 175–188	[Unspecialised seed dispersal] "Rosmarinus officinalis flowers from November to June, but two flowering peaks can be observed: November-February and April-June. Seed maturation in this species occurs within a few weeks after anthesis, overlapping the flowering period. Each flower produces four seeds, which become loose within the calyx and fall to the soil surface when ripen. Mean seed length and width is 2.23 mm and 1.16 mm, respectively, and mean seed mass 0.32 mg. Both species have unspecialised seed dispersal."

702	Propagules dispersed intentionally by people	y
	Source(s)	**Notes**
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"In Hawai'i, rosemary is grown as a specimen plant, ground cover, bonsai, or container plant, both ornamentally and for culinary purposes. It is quite salt tolerant and thrives near the coast, and for these reasons it could be more widely used as an ornamental here."
	Hammer, M. & Junghanns, W. (2020) Rosmarinus officinalis L.: Rosemary. In: Novak J., Blüthner WD. (eds) Medicinal, Aromatic and Stimulant Plants. Handbook of Plant Breeding, vol 12. Springer, Cham	"Rosemary is considered to be one of the most traded herbs in the international market (Ravikumar 2000). Even if cultivation is increasing steadily, wild collection is still the major supplier of trade (Zeineb 2012; ProGuiRosemary 2012). Leading regions of rosemary production are Europe, Northern Africa, Mexico and the United States. Svoboda and Deans (1992) reported Italy, Dalmatia, Spain, Greece, Turkey, Egypt, France, Portugal, Tunisia and Morocco as the main producers of rosemary."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	**Notes**
	Zona, S. (2017). Fruit and seed dispersal of Salvia L. (Lamiaceae): a review of the evidence. The Botanical Review, 83(2), 195-212	"Fayos (2012) found that mericarps of S. rosmarinus (as Rosmarinus officinalis) adhering to bare soil escaped removal by ants 50% of the time, whereas only 0–20% of loose mericarps escaped predation. In both cases, mucilage functioned not as a means of epizoochory but rather as a means of avoiding predation by granivores."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Crop, Herbal, Ornamental Dispersed by: Humans, Animals, Escapee"
	WRA Specialist. (2021). Personal Communication	Unlikely given widespread cultivation and lack of evidence as a produce contaminant

704	Propagules adapted to wind dispersal	n
	Source(s)	**Notes**
	Garcia-Fayos, P., Castellanos, M. C., & Segarra-Moragues, J. G. (2018). Seed germination and seedling allogamy in Rosmarinus officinalis: the costs of inbreeding. Plant Biology, 20(3), 627-635	[No evidence] "Neighbouring rosemary shrubs are likely close relatives, because this species lacks mechanisms for long-distance seed dispersal and the single-seeded dry indehiscent fruits (schizocarps) or entire calyces containing fruits are gravity-dispersed, below or close to maternal plants (Bouman & Meeuse 1992). Furthermore, when moistened or wetted, the pericarp mucilage hydrates, glueing the fruits to the soil surface and preventing or reducing both secondary dispersal and predation by ants (Engelbrecht & Garcıa-Fayos 2012)."

Qsn #	Question	Answer
705	**Propagules water dispersed**	**n**
	Source(s)	**Notes**
	Garcia-Fayos, P., Castellanos, M. C., & Segarra-Moragues, J. G. (2018). Seed germination and seedling allogamy in Rosmarinus officinalis: the costs of inbreeding. Plant Biology, 20(3), 627-635	[No evidence] "Neighbouring rosemary shrubs are likely close relatives, because this species lacks mechanisms for long-distance seed dispersal and the single-seeded dry indehiscent fruits (schizocarps) or entire calyces containing fruits are gravity-dispersed, below or close to maternal plants (Bouman & Meeuse 1992). Furthermore, when moistened or wetted, the pericarp mucilage hydrates, glueing the fruits to the soil surface and preventing or reducing both secondary dispersal and predation by ants (Engelbrecht & Garcıa-Fayos 2012)."

Qsn #	Question	Answer
706	**Propagules bird dispersed**	**n**
	Source(s)	**Notes**
	Clemente, A. S., Rego, F. C., & Correia, O. A. (2007). Seed Bank Dynamics of Two Obligate Seeders, Cistus monspeliensis and Rosmarinus officinalis, in Relation to Time since Fire. Plant Ecology, 190(2), 175–188	[Unspecialised seed dispersal] "Rosmarinus officinalis flowers from November to June, but two flowering peaks can be observed: November-February and April-June. Seed maturation in this species occurs within a few weeks after anthesis, overlapping the flowering period. Each flower produces four seeds, which become loose within the calyx and fall to the soil surface when ripen. Mean seed length and width is 2.23 mm and 1.16 mm, respectively, and mean seed mass 0.32 mg. Both species have unspecialised seed dispersal."

Qsn #	Question	Answer
707	**Propagules dispersed by other animals (externally)**	**n**
	Source(s)	**Notes**
	Garcia-Fayos, P., Castellanos, M. C., & Segarra-Moragues, J. G. (2018). Seed germination and seedling allogamy in Rosmarinus officinalis: the costs of inbreeding. Plant Biology, 20(3), 627-635	"Neighbouring rosemary shrubs are likely close relatives, because this species lacks mechanisms for long-distance seed dispersal and the single-seeded dry indehiscent fruits (schizocarps) or entire calyces containing fruits are gravity-dispersed, below or close to maternal plants (Bouman & Meeuse 1992). Furthermore, when moistened or wetted, the pericarp mucilage hydrates, glueing the fruits to the soil surface and preventing or reducing both secondary dispersal and predation by ants (Engelbrecht & Garcıa-Fayos 2012)."

Qsn #	Question	Answer
708	**Propagules survive passage through the gut**	**n**
	Source(s)	**Notes**
	Garcia-Fayos, P., Castellanos, M. C., & Segarra-Moragues, J. G. (2018). Seed germination and seedling allogamy in Rosmarinus officinalis: the costs of inbreeding. Plant Biology, 20(3), 627-635	[No evidence] "Neighbouring rosemary shrubs are likely close relatives, because this species lacks mechanisms for long-distance seed dispersal and the single-seeded dry indehiscent fruits (schizocarps) or entire calyces containing fruits are gravity-dispersed, below or close to maternal plants (Bouman & Meeuse 1992). Furthermore, when moistened or wetted, the pericarp mucilage hydrates, glueing the fruits to the soil surface and preventing or reducing both secondary dispersal and predation by ants (Engelbrecht & Garcıa-Fayos 2012)."

Qsn #	Question	Answer
801	**Prolific seed production (>1000/m2)**	**y**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Clemente, A. S., Rego, F. C., & Correia, O. A. (2007). Seed Bank Dynamics of Two Obligate Seeders, Cistus monspeliensis and Rosmarinus officinalis, in Relation to Time since Fire. Plant Ecology, 190(2), 175–188	[Yes, in older stands] "Soil seed density after dispersal ranged from 640 seeds/m2 to 4388 seeds/m2 in C. monspeliensis and from 102 seeds/m2 to 3061 seeds/m2 for R. officinalis" ... "Rosmarinus officinalis showed a different pattern of variation of seed density with stand age, with substantially lower seed numbers at early stages after fire than at 35-year-old stands." ... "Thus, at 35- year-old stands, the highest soil seed density of R. officinalis seems to result from an increase in seed production, due to increases in individual shrub sizes, whereas a decline in shrub density and cover would account for the reduction in the seed bank of C. monspeliensis."

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**n**
	Source(s)	**Notes**
	Clemente, A. S., Rego, F. C., & Correia, O. A. (2007). Seed Bank Dynamics of Two Obligate Seeders, Cistus monspeliensis and Rosmarinus officinalis, in Relation to Time since Fire. Plant Ecology, 190(2), 175–188	[Effectively No] "Ten to 39% of buried seeds were not recovered after 1 year, and viability of seeds recovered was 97–100% for C. monspeliensis and only 0–3% for R. officinalis." ... "Viability of seeds persisting after 1 year differed greatly between the two species: 97–100% for C. monspeliensis and only 0–3% for R. officinalis (Table 5). Nonviable seeds of R. officinalis were mostly seeds with an aborted embryo. Thus, the unbalanced proportion of viable and nonviable seeds of R. officinalis in the burial experiment seems to result from a net disappearance of filled seeds." ... "In contrast, only 0–3% seeds were still viable 1 year after burial in R. officinalis, providing evidence of lower seed persistence than in C. monspeliensis. To our knowledge, this is the first report of very low seed persistence in an obligate seeder from the Mediterranean basin, although this syndrome is common among South-African and Australian species (Musil 1991; Pierce and Cowling 1991; Meney et al. 1994; Holmes and Newton 2004)."

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**
	NC State Extension. (2021). Salvia rosmarinus. https://plants.ces.ncsu.edu/plants/salvia-rosmarinus/. [Accessed 9 Dec 2021]	"It tolerates drought, shade, salt, heavy pruning, and most soil types."
	Pausas, J. G., Alessio, G. A., Moreira, B., & Segarra-Moragues, J. G. (2016). Secondary compounds enhance flammability in a Mediterranean plant. Oecologia, 180(1), 103-110	"R. officinalis individuals do not resprout after severe disturbances such as fire (Paula et al. 2009)."

Qsn #	Question	Answer
805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	Staples, G.W. & Herbst, D.R. (2005). A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Unknown] "In Hawai'i, rosemary is grown as a specimen plant, ground cover, bonsai, or container plant, both ornamentally and for culinary purposes. It is quite salt tolerant and thrives near the coast, and for these reasons it could be more widely used as an ornamental here. Rosemary requires excellent drainage, and care must be taken not to overwater or overfertilize it. Application of a complete garden fertilizer four times a year assures vigorous growth."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Broad climate suitability (grown in temperate, Mediterranean, and tropical climates)
• Naturalized in Bulgaria, Crimea, Azores, Canary Islands, Cape Verde, Bermuda, Texas, and Central Mexico (but no evidence in the Hawaiian Islands)
• May be allelopathic
• Rarely eaten by browsing and grazing animals (generally unpalatable for much of the growing season)
• Generally non-toxic, but may cause contact dermatitis to some people
• Contains highly flammable oils and may increase fire risk in arid, and fire prone habitats
• Reproduces by prolific seed production
• Can hybridize with other Rosmarinus species
• Potentially self-compatible
• Reaches maturity in 2 years
• May be spread by vehicles in agricultural settings where the species is commercially grown
• Older plants seed prolifically
• Tolerates heavy pruning

Low Risk Traits
• No reports of negative impacts where cultivated
• Unarmed (no spines, thorns, or burrs)
• Non-toxic to animals
• Thrives in high light environments (dense shade may inhibit ability to spread)
• Not reported to spread vegetatively
• Lacks mechanisms for long-distance seed dispersal

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

(A) Reported as a weed of cultivated lands? No. Generally non-invasive, and not reported as a weed of any type in the Hawaiian Islands.
Outcome = Accept (Low Risk)