Taxon: Artemisia vulgaris L. **Family:** Asteraceae

Common Name(s): felonherb
green-ginger
mugwort

Synonym(s): Artemisia vulgaris var. coarctata
Artemisia vulgaris var. vulgaris

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 23 Nov 2020

WRA Score: 16.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Rhizomatous Herb, Weedy, Allergenic, Toxic Properties, Spreads Vegetatively

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	Intermediate
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	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	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	y
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	y
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle		

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	y
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)		
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	n
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	y
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	n
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**
	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	[Long used, but no evidence of domestication] "Part of a species complex, A. vulgaris is widespread from Europe across Russia to Siberia, Japan, and Korea. Plants at the eastern, Asian end of chis range look rather different from those in Europe and have been given species names such as A. princeps Pampanini, which is reported to be in Hawai'i. Because the taxonomy in this complex of species has not been worked out, for now we continue to use the name A. vulgaris for plants grown and naturalized here. Mugwort has a long history of human use throughout its range."
	Dempewolf, H., Rieseberg, L. H., & Cronk, Q. C. (2008). Crop domestication in the Compositae: a family-wide trait assessment. Genetic Resources and Crop Evolution, 55(8), 1141-1157	No mention of domestication in this publication

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	NA

201	**Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"**	**Intermediate**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to Eurasia; in Hawai'i cultivated as a potherb, used to flavor and color rice cakes for festivals, and occasionally sparingly naturalized in disturbed areas at least on Kaua'i, O'ahu, and Hawai'i. First collected on Hawai'i in 1916 (Kelly s.n., BISH)."

Qsn #	Question	Answer
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 18 Nov 2020]	"Native Africa NORTHERN AFRICA: Algeria, Tunisia Asia-Temperate WESTERN ASIA: Afghanistan, Iran, Turkey CAUCASUS: Russian Federation-Ciscaucasia [Ciscaucasia], Azerbaijan, Georgia SIBERIA: Russian Federation [Buryatia, Gorno-Altay, Tyva, Respublika, Yakutia-Sakha, Altay, Krasnoyarsk, Chita, Irkutsk, Kemerovskaja oblast', Kurganskaja oblast', Novosibirsk, Omsk, Tomsk, Tyumen] MIDDLE ASIA: Kazakhstan, Kyrgyzstan, Tajikistan MONGOLIA: Mongolia CHINA: China [Gansu Sheng, Shaanxi Sheng, Sichuan Sheng (w.), Qinghai Sheng, Xizang Zizhiqu] Europe NORTHERN EUROPE: Denmark, Finland, United Kingdom, Ireland, Norway, Sweden MIDDLE EUROPE: Austria, Belgium, Switzerland, Czech Republic, Germany, Hungary, Netherlands, Poland EASTERN EUROPE: Russian Federation-European part [European part], Belarus, Estonia, Lithuania, Latvia, Moldova, Ukraine (incl. Krym) SOUTHEASTERN EUROPE: Albania, Bulgaria, Bosnia and Herzegovina, Greece, Croatia, Italy (incl. Sardinia, Sicily), North Macedonia, Montenegro, Romania, Serbia, Slovenia SOUTHWESTERN EUROPE: Spain, France (incl. Corsica), Portugal"

202	Quality of climate match data	High
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"Globally, A. vulgaris is tolerant of a wide range of climatic conditions and is reported to occur from the high mountainous regions (3700 m) of the Northern Himalayas (Koul 1964) to the warm temperate regions of South America (Holm et al. 1997). The only two continents where A. vulgaris has not been documented are Africa and Antarctica. It has been reported that A. vulgaris is well adapted to a cool climate, as populations have rarely been found south of latitude 45° (Rousseau 1968)."
	Missouri Botanical Garden. (2020). Artemisia vulgaris . https://www.missouribotanicalgarden.org. [Accessed 20 Nov 2020]	"Zone: 3 to 8"

Qsn #	Question	Answer
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. Flora of China Volume 20-21 (Asteraceae). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	[Elevation range 2300 m] "Roadsides, slopes, canyons, forest margins, forest steppes, subalpine steppes; 1500–3800 m."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	"Native to Eurasia; in Hawai'i cultivated as a potherb, used to flavor and color rice cakes for festivals, and occasionally sparingly naturalized in disturbed areas at least on Kaua'i, O'ahu, and Hawai'i. First collected on Hawai'i in 1916 (Kelly s.n., BISH)."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	**Notes**
	Flora of North America. (2020). Artemisia vulgaris. http://www.efloras.org. [Accessed 18 Nov 2020]	"Flowering mid summer–late fall. Sandy or loamy soils, forested areas, coastal strands, roadsides; 0–500 m; introduced; Greenland; Alta., B.C., Man., N.B., Nfld. and Labr. (Nfld.), N.S., Ont., P.E.I., Que., Sask.; Ala., Alaska, Conn., Del., D.C., Fla., Ga., Idaho, Ill., Ind., Iowa, Kans., Ky., La., Maine, Md., Mass., Mich., Minn., Mo., Mont., N.H., N.J., N.Y., N.C., Ohio, Oreg., Pa., R.I., S.C., Tenn., Vt., Va., Wash., W.Va., Wis.; Eurasia. Grown as a medicinal plant, most commonly as a vermifuge, Artemisia vulgaris is widely established in eastern North America and is often weedy in disturbed sites."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	"Native to Eurasia; in Hawai'i cultivated as a potherb, used to flavor and color rice cakes for festivals, and occasionally sparingly naturalized in disturbed areas at least on Kaua'i, O'ahu, and Hawai'i. First collected on Hawai'i in 1916 (Kelly s.n., BISH)."

301	Naturalized beyond native range	y
	Source(s)	**Notes**
	Oppenheimer, H. 2008. New Hawaiian plant records for 2007. Bishop Museum Occasional Papers 100: 22-38	"Artemisia vulgaris L. New island record Mugwort is sparingly naturalized in disturbed areas on Kaua‘i, O‘ahu, East and West Maui, and Hawai‘i (Wagner et al. 1999a: 265; Wagner & Herbst 1995: 15; Oppenheimer 2004: 9). Now it is known from Läna‘i, where it also grows in disturbed areas. Material examined. LÄNA‘I: Läna‘i City, locally common in yards & waste areas, 495 m, 4 Sep 2007, Oppenheimer & Perlman H90701."
	Oppenheimer, H. L. 2004. New Hawaiian plant records for 2003. Bishop Museum Occasional Papers. 79: 8-20	"Artemisia vulgaris L. Range extension Previously reported from Kaua ‘i, O‘ahu, East Maui, and Hawai‘i (Wagner et al., 1999: 265; Wagner & Herbst, 1995: 15), the following collection represents a significant range extension to West Maui. It has also been observed as a garden weed in the Mahinahina area, Lahaina District. Material examined: MAUI: West Maui, Wailuku Distr,‘Iao Valley, 238 m, growing along weedy roadside near Kepaniwai Park, locally common, 30 Mar 2002, Oppenheimer, F. Duvall, & L. Nelson H30218."

Qsn #	Question	Answer
	Flora of North America. (2020). Artemisia vulgaris. http://www.efloras.org. [Accessed 18 Nov 2020]	"Flowering mid summer–late fall. Sandy or loamy soils, forested areas, coastal strands, roadsides; 0–500 m; introduced; Greenland; Alta., B.C., Man., N.B., Nfld. and Labr. (Nfld.), N.S., Ont., P.E.I., Que., Sask.; Ala., Alaska, Conn., Del., D.C., Fla., Ga., Idaho, Ill., Ind., Iowa, Kans., Ky., La., Maine, Md., Mass., Mich., Minn., Mo., Mont., N.H., N.J., N.Y., N.C., Ohio, Oreg., Pa., R.I., S.C., Tenn., Vt., Va., Wash., W.Va., Wis.; Eurasia. Grown as a medicinal plant, most commonly as a vermifuge, Artemisia vulgaris is widely established in eastern North America and is often weedy in disturbed sites."
	Weston, L. A., Barney, J. N., & DiTommaso, A. (2005). A review of the biology and ecology of three invasive perennials in New York State: Japanese knotweed (Polygonum cuspidatum), mugwort (Artemisia vulgaris) and pale swallow-wort (Vincetoxicum rossicum). Plant and Soil, 277(1-2), 53-69	"Mugwort is now widely distributed across the world, being naturalized in regions from the Himalayan mountains to the warm temperate regions of southern North America, exhibiting wide variation in morphology (Barney and DiTommaso, 2003; Holm et al., 1997)."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to Eurasia; in Hawai'i cultivated as a potherb, used to flavor and color rice cakes for festivals, and occasionally sparingly naturalized in disturbed areas at least on Kaua'i, O'ahu, and Hawai'i. First collected on Hawai'i in 1916 (Kelly s.n., BISH)."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed]	"Naturalized (widely natzd.)"

302	Garden/amenity/disturbance weed	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	"Mugwort spreads rapidly by underground rhizomes, eventually forming large clumps, and it can become invasive in the garden; for this reason it is best grown in a container or with boards or other retainers sunk below the soil to prevent the rhizomes from spreading out of bounds."
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	[Agricultural and disturbance weed] "A. vulgaris is considered a troublesome weed in nursery and urban landscapes in Canada and the Eastern United States (Henderson and Weller 1985), with the most serious infestations occurring in nursery stock, waste areas, and turfgrass. The US nursery industry considers A. vulgaris one of its 10 most serious weeds (Henderson and Weller 1985; Holm et al. 1997). A. vulgaris is found in most field-grown ornamental crops; i.e., trees, shrubs, herbaceous ornamentals, but is rarely found in containerized ornamentals in the Southeastern United States (J.C. Neal, personal communication). However, A. vulgaris is sold as a containerized ornamental at a garden centre in Victoria, BC (Feb. 2002) for $7 per plant"

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

Qsn #	Question	Answer
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"A. vulgaris is considered a troublesome weed in nursery and urban landscapes in Canada and the Eastern United States (Henderson and Weller 1985), with the most serious infestations occurring in nursery stock, waste areas, and turfgrass. The US nursery industry considers A. vulgaris one of its 10 most serious weeds (Henderson and Weller 1985; Holm et al. 1997). A. vulgaris is found in most field-grown ornamental crops; i.e., trees, shrubs, herbaceous ornamentals, but is rarely found in containerized ornamentals in the Southeastern United States (J.C. Neal, personal communication). However, A. vulgaris is sold as a containerized ornamental at a garden centre in Victoria, BC (Feb. 2002) for $7 per plant" … "Artemesia vulgaris also infests barley and wheat crops in Korea; cereals and horticultural crops in Italy; citrus and maize in the former Soviet Union; tea and vegetables in Indonesia and Soviet Georgia; hazelnuts in Turkey; rangelands and pastures in Japan, Norway, and Sweden; tobacco in the Philippines; vineyards in France; and lucerne in Japan (Soedarsan et al. 1976; Holm et al. 1997)."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Artemisia vulgaris - Weed of: Cereals, Cutflowers, Grapevines, Nursery Production, Orchards & Plantations, Pastures, Vegetables"
	Weston, L. A., Barney, J. N., & DiTommaso, A. (2005). A review of the biology and ecology of three invasive perennials in New York State: Japanese knotweed (Polygonum cuspidatum), mugwort (Artemisia vulgaris) and pale swallow-wort (Vincetoxicum rossicum). Plant and Soil, 277(1-2), 53-69	"With very few effective strategies for control, this aggressive weed has rapidly colonized new areas in the eastern US. Mugwort is most troublesome, often forming dense mono-specific stands along roadsides, in turfgrass and rights-of-way, and in nursery and landscape settings. Mugwort is also noted as one of the major weeds in the US nursery industry where it strongly interferes with ornamental growth."

304	Environmental weed	y
	Source(s)	**Notes**
	Weston, L. A., Barney, J. N., & DiTommaso, A. (2005). A review of the biology and ecology of three invasive perennials in New York State: Japanese knotweed (Polygonum cuspidatum), mugwort (Artemisia vulgaris) and pale swallow-wort (Vincetoxicum rossicum). Plant and Soil, 277(1-2), 53-69	"Following mugwort colonization, species diversity of native flora in many habitats has declined, especially early successional species (Barney and DiTommaso, 2003; Holm et al., 1997). With the displacement of native colonizers, succession in natural ecosystems can be altered following mugwort invasion. Habitats that generally support diverse stands of native ruderals or stress-tolerators are being displaced by monospecific stands of the weedy mugwort (Barney and DiTommaso, 2003). This active displacement is most prominent along heavily traveled urban corridors, especially in the New York City metropolitan area (Barney, data not presented)."

305	Congeneric weed	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Follak, S., Dullinger, S., Kleinbauer, I., Moser, D., & Essl, F. (2013). Invasion dynamics of three allergenic invasive Asteraceae (Ambrosia trifida, Artemisia annua, Iva xanthiifolia) in central and eastern Europe. Preslia, 85(1), 41-61	"Abstract : We analyzed the history of the invasion, spread dynamics and habitat affiliation of three allergenic wind-pollinated species (Ambrosia trifida, Artemisia annua, Iva xanthiifolia; tribe Heliantheae, Asteraceae) in central and eastern Europe (CEE) using distribution data from a wide range of sources. In addition, we used niche-based ensemble modelling techniques to assess current invasion risk of the region studied. We collated 1804 records of A. annua, 1063 of I. xanthiifolia and 324 of A. trifida. All species were first recorded in the 19th century, remained rare until the middle of the 20th century, but have spread rapidly in recent decades. Iva xanthiifolia spread the fastest followed by A. annua. The latter species is now abundant in northern Italy, along the Elbe river in Germany and the Danubian Lowland in Slovakia and Hungary, while I. xanthiifolia occurs most frequently in the warm and continental parts of CEE. Ambrosia trifida spread slowly and its current distribution consists of relatively few and mostly isolated localities in CEE. Ambrosia trifida and I. xanthiifolia occur primarily in ruderal habitats, whereas I. xanthiifolia has also increasingly invaded fields. Initially confined to ruderal habitats, A. annua has expanded its habitat niche during the invasion and has invaded riverine vegetation and (semi-)natural habitats. Ensemble species-distribution models show that the current distribution of A. trifida and A. annua in CEE is closely related to temperature and precipitation, whereas land use is only important for I. xanthiifolia. Under the current climate, substantial fractions of the study area provide suitable habitat for these species: A. trifida (16% of CEE), A. annua (28%) and I. xanthiifolia (26%). Because of their significant potential impact on public health, future spread of these species should be monitored and management strategies (e.g. raising awareness, early control) should urgently be implemented."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Artemisia absinthium - Weed of: Cereals, Grapevines, Nursery Production, Orchards & Plantations, Pastures, Vegetables"... "Artemisia annua - Weed of: Cereals, Vegetables"... "Artemisia arborescens - Weed of: Pastures"... "Artemisia biennis - Weed of: Cereals, Nursery Production"... "Artemisia campestris - Weed of: Pastures"... "Artemisia capillaris - Weed of: Pastures"... "Artemisia douglasiana - Weed of: Grapevines, Orchards & Plantations, Pastures, Pome Fruits"... "Artemisia filifolia - Weed of: Pastures"... "Artemisia frigida - Weed of: Vegetables"... "Artemisia gmelinii - Weed of: Cereals"... "Artemisia japonica - Weed of: Pastures"... "Artemisia ludoviciana - Weed of: Cereals, Vegetables"... "Artemisia maritima - Weed of: Cereals, Orchards & Plantations, Pome Fruits"... "Artemisia nilagirica - Weed of: Orchards & Plantations"... "Artemisia parviflora - Weed of: Orchards & Plantations"... "Artemisia princeps - Weed of: Pastures"... "Artemisia santonicum - Weed of: Pastures"... "Artemisia scoparia - Weed of: Orchards & Plantations, Pastures"... "Artemisia tournefortiana - Weed of: Orchards & Plantations"... "Artemisia tridentate - Weed of: Cereals, Lupins, Pastures"... "Artemisia verlotiorum - Weed of: Pastures"... "Artemisia vestita - Weed of: Orchards & Plantations"... "Artemisia vulgaris - Weed of: Cereals, Cutflowers, Grapevines, Nursery Production, Orchards & Plantations, Pastures, Vegetables"

Qsn #	Question	Answer
401	**Produces spines, thorns or burrs**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence] "Aromatic, rhizomatous perennial herbs 3-10 dm tall; stems 1 to several, unbranched to the inflorescence, nearly glabrous below the inflorescence but sparsely pubescent between narrow striations. Leaves ovate to obovate in outline, 2.5-5 (-6) cm long, 2-3 cm wide, pinnatifid to bipinnatifid with unequal lobes that are rather broad and acute, upper surface dark green and nearly glabrous, lower surface densely white tomentose, narrowed at base, without a distinct petiole. Heads in racemose panicles, amply leafy, with erect branches, each head 2.5-3.8 mm high, 2-2.5 mm wide; involucral bracts ovate, densely pubescent, the margins narrowly scarious; receptacle conical, glabrous; florets 8-12 per head, the outer ones pistillate and inner ones perfect, all fertile, tubular, 1-1.3 mm long. Achenes dark brown to black, fusiform, 0.8-1 mm long, 0.1-0.3 mm wide, glabrous."

402	**Allelopathic**	**y**
	Source(s)	**Notes**
	Weston, L. A., Barney, J. N., & DiTommaso, A. (2005). A review of the biology and ecology of three invasive perennials in New York State: Japanese knotweed (Polygonum cuspidatum), mugwort (Artemisia vulgaris) and pale swallow-wort (Vincetoxicum rossicum). Plant and Soil, 277(1-2), 53-69	"A remarkable number of secondary compounds have been isolated from mugwort tissue, many of these being terpenes (Banthorpe and Brown, 1989; Milhau et al., 1997; Misra and Singh, 1986; Pino et al., 1999). It has been suggested that mugwort exhibits strong allelopathic properties, either by foliar-produced phytotoxins or those released by living rhizomes (Barney, 2003; Hale, 1982; Melkania et al., 1982). Other studies have indicated that decomposing mugwort foliage and rhizomes were potentially allelopathic to red clover (Trifolium pratense L.) seedling growth (Inderjit and Foy, 1999; Inderjit et al., 2001). It has been reported that mugwort rhizomes contain large quantities of 1,8-cineole, ascorbic acid, quercetin and vulgarin, a sesquiterpene lactone (Duke et al., 2002; http://dreampharm. com/garlic/mugwort.asp, 2004). In any case, the diversity of compounds produced may contribute to strong potential for allelopathy in this species."
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"The extensive rhizome system and ability to produce allelochemicals (Hale 1982; Inderjit and Foy 1999) make A. vulgaris an effective competitor in many plant production systems of Eastern North America, including, noncontainerized nursery stock, turfgrass and vineyards."

403	**Parasitic**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Aromatic, rhizomatous perennial herbs 3-10 dm tall" [Asteraceae (alt. Compositae). No evidence]

404	**Unpalatable to grazing animals**	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"Mammals — There is no information on mammalian herbivory of A. vulgaris populations. However, Schuman and Howard (1978) examined the possibility using A. vulgaris to reclaim disturbed lands, and found that A. vulgaris tissue contains nearly 31% protein, which would make it a nutritionally acceptable species for grazers."

405	Toxic to animals	
	Source(s)	**Notes**
	Linley, P. A. (2002). Artemisia vulgaris. In Artemisia (Pp. 139-148). Taylor & Francis, London	"In animals, Forsyth (1968) records one incidence of poisoning in cattle attributed to A. vulgaris."
	Missouri Botanical Garden. (2020). Artemisia vulgaris . https://www.missouribotanicalgarden.org. [Accessed 23 Nov 2020]	"Leaves are technically edible, but bitter and toxic when consumed in quantity." [Toxicity to animals unknown]
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	[Unknown] "There is no information on mammalian herbivory of A. vulgaris populations. However, Schuman and Howard (1978) examined the possibility using A. vulgaris to reclaim disturbed lands, and found that A. vulgaris tissue contains nearly 31% protein, which would make it a nutritionally acceptable species for grazers."

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"(d) Other non-vertebrates — A. vulgaris and other weedy Artemisia spp., are plant hosts for Meloidogyne nematode species (Bendixen 1988). Diseases (a) Fungi — Seventy-nine fungal species have been identified on A. vulgaris, ranging from Allophylaria soederholmii to Sphaerotheca fusca (Anonymous 2001). In British Columbia, Mycosphaerella tassiania (de Not) Johans and Pleospora penicillus (Schm.) Fckl. has been recorded from A. vulgaris (Conners 1967). No information exists on the damage caused by these fungi on A. vulgaris."
	Missouri Botanical Garden. (2020). Artemisia vulgaris . https://www.missouribotanicalgarden.org. [Accessed 23 Nov 2020]	"No serious insect or disease problems."

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

Qsn #	Question	Answer
	Wopfner, N., Gadermaier, G., Egger, M., Asero, R., Ebner, C., Jahn-Schmid, B., & Ferreira, F. (2005). The spectrum of allergens in ragweed and mugwort pollen. International archives of allergy and immunology, 138(4), 337-346	"Ragweed and mugwort are important allergenic weeds belonging to the Asteraceae or Compositae plant family. Pollen of mugwort is one of the main causes of allergic reactions in late summer and autumn in Europe and affects about 10–14% of the patients suffering from pollinosis. Ragweed pollen represents the major source of allergenic protein in the United States, with a prevalence of about 50% in atopic individuals. In Europe, ragweed allergy is now rapidly increasing particularly in certain areas in France, Italy, Austria, Hungary, Croatia, and Bulgaria. Amb a 1 and Art v 1, the major allergens of ragweed and mugwort, respectively, are unrelated proteins. Amb a 1 is an acidic 38-kDa nonglycosylated protein. The natural protein undergoes proteolysis during purification and is cleaved into a 26-kDa alpha chain, which associates noncovalently with the beta chain of 12 kDa. The two-chain form seems to be immunologically indistinguishable from the full-length molecule. Art v 1 is a basic glycoprotein comprising two domains: an N-terminal cysteine-rich, defensin-like domain and a C-terminal proline/hydroxyproline-rich module. The proline/hydroxyproline-rich domain was recently shown to contain two types of glycosylation: (1) a large hydroxyproline-linked arabinogalactan composed of a short β1,6-galactan core substituted by a variable number (5–28) of α-arabinofuranose residues forming branched side chains with 5-, 2,5-, 3,5-, and 2,3,5-substituted arabinoses, and (2) single and adjacent β-arabinofuranoses linked to hydroxyproline. As described for other pollen, ragweed and mugwort pollen also contain the pan-allergen profilin and calcium-binding proteins, which are responsible for extensive cross reactivity among pollen-sensitized patients."
	Dempewolf, H., Rieseberg, L. H., & Cronk, Q. C. (2008). Crop domestication in the Compositae: a family-wide trait assessment. Genetic Resources and Crop Evolution, 55(8), 1141-1157	"Secondary compounds also play a major role as allergens. Ragweed (Ambrosia artemisiifolia and Ambrosia trifida), and mugwort (Artemisia vulgaris) pollen grains are particularly well-known allergens (Wopfner et al. 2005)."
	Plants for a Future. (2020). Artemisia vulgaris. https://pfaf.org. [Accessed 23 Nov 2020]	"The plant might be poisonous in large doses[21]. Skin contact can cause dermatitis in some people[222]. Probably unsafe for pregnant women as it may stimulate the uterus to contract and induce abortion [301]."
	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	[Edible uses, despite reports of toxicity] "In Hawai'i, mugwort is likely to be found in Japanese kitchen gardens, where it is called yomogi and the young leaves are used to flavor traditional mochi and sometimes eaten in salads and soups or to brew a tea."

Qsn #	Question	Answer
408	**Creates a fire hazard in natural ecosystems**	**n**
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	[No evidence, and not listed among detrimental impacts] "A. vulgaris is considered a troublesome weed in nursery and urban landscapes in Canada and the Eastern United States (Henderson and Weller 1985), with the most serious infestations occurring in nursery stock, waste areas, and turfgrass. The US nursery industry considers A. vulgaris one of its 10 most serious weeds (Henderson and Weller 1985; Holm et al. 1997). A. vulgaris is found in most field-grown ornamental crops; i.e., trees, shrubs, herbaceous ornamentals, but is rarely found in containerized ornamentals in the Southeastern United States (J.C. Neal, personal communication)."

409	**Is a shade tolerant plant at some stage of its life cycle**	
	Source(s)	**Notes**
	Plants for a Future. (2020). Artemisia vulgaris. https://pfaf.org. [Accessed 23 Nov 2020]	"It can grow in semi-shade (light woodland) or no shade."
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"On the northeastern seaboard of the United States, A. vulgaris does not typically infest heavily shaded sites and is much more problematic in areas of infrequent cultivation (A. Ayeni, personal communication)."
	Missouri Botanical Garden. (2020). Artemisia vulgaris . https://www.missouribotanicalgarden.org. [Accessed 23 Nov 2020]	"Sun: Full sun" … "Best grown in poor to moderately fertile, dry to medium moisture, well-drained soils in full sun to part shade."

410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y**
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"Populations of A. vulgaris grow across a range of soil types and pH, from sandy loams, sandy clays of pH 5.5–6.8, in both Québec (A. DiTommaso, unpublished data) and New Jersey, USA (A. Ayeni, personal communication) to sandy, loamy and clay soils of the Southeastern United States (J.C. Neal, personal communication). Rousseau (1968) states that this species is most common on well-drained gravelly or sandy soils in Québec. The growth of A. vulgaris was found to be poor in the presence of low concentrations of lime or magnesium, whereas pH was not found to affect biomass production (Mathias and Winant 1983)."

411	**Climbing or smothering growth habit**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Aromatic, rhizomatous perennial herbs 3-10 dm tall"

412	**Forms dense thickets**	**y**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"Artemisia vulgaris is generally introduced into an area by rhizome fragments. Eventually, these plants give rise to dense monospecific stands that are difficult to manage."
	Weston, L. A., Barney, J. N., & DiTommaso, A. (2005). A review of the biology and ecology of three invasive perennials in New York State: Japanese knotweed (Polygonum cuspidatum), mugwort (Artemisia vulgaris) and pale swallow-wort (Vincetoxicum rossicum). Plant and Soil, 277(1-2), 53-69	"Mugwort is most troublesome, often forming dense mono-specific stands along roadsides, in turfgrass and rights-of-way, and in nursery and landscape settings."

501	Aquatic	n
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Terrestrial] "occasionally sparingly naturalized in disturbed areas at least on Kaua'i, O'ahu, and Hawai'i. First collected on Hawai'i in 1916"

502	Grass	n
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 23 Nov 2020]	Family: Asteraceae Subfamily: Asteroideae Tribe: Anthemideae Subtribe: Artemisiinae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 23 Nov 2020]	Family: Asteraceae Subfamily: Asteroideae Tribe: Anthemideae Subtribe: Artemisiinae

Qsn #	Question	Answer
504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Aromatic, rhizomatous perennial herbs 3-10 dm tall"
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	[May behave as a functional geophyte] "Artemisia vulgaris overwinters as a dense underground rhizome network, and possibly as seeds, which in spring gives rise to numerous leafy shoots. It is possible that seeds can survive the winter and germinate the following spring [Section 8(c)]. The density and vigour of shoots produced depends largely on the density and vigor of the underground rhizome system (Greenock-Jones 1986)."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	[Biotypes with limited seed production are able to reproduce vegetatively] "There is little published data available on A. vulgaris seed production and dispersal as most research has focused on vegetative reproduction. However, A. vulgaris has been reported to produce up to 200 000 seeds per plant depending on the growing environment (Pawlowski et al. 1967). Plants within several European A. vulgaris populations produced as many as 10 000 capitula per stem, and 450 000 capitula in total (Garnock-Jones 1986). In contrast, some biotypes have been found to produce no viable seeds (Holm et al. 1997)."

602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Achenes dark brown to black, fusiform, 0.8-1 mm long, 0.1-0.3 mm wide, glabrous."
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. Flora of China Volume 20-21 (Asteraceae). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	"Achenes obovoid or ovoid."
	Weston, L. A., Barney, J. N., & DiTommaso, A. (2005). A review of the biology and ecology of three invasive perennials in New York State: Japanese knotweed (Polygonum cuspidatum), mugwort (Artemisia vulgaris) and pale swallow-wort (Vincetoxicum rossicum). Plant and Soil, 277(1-2), 53-69	"Seed production and recruitment has been documented in its native range of Europe and Asia, but few, if any, seedlings have been observed in North America (Barney and DiTommaso, 2003; Holm et al., 1997). However, seed harvested from naturalized mugwort stands across New York State shows varying degrees of viability (Barney, data not presented)."
	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	[Seed production in Hawaiian Islands may be limited, or absent, as it is in North America. See Weston et al. (2005)] "It is nearly always propagated by division of mature clumps or removal of small planes that spring up around them."

603	**Hybridizes naturally**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"No reports exist of hybrids between A. vulgaris and other species."

604	Self-compatible or apomictic	
	Source(s)	**Notes**
	Garnock-Jones, P. J. (1986). Floret specialization, seed production and gender in Artemisia vulgaris L.(Asteraceae, Anthemideae). Botanical journal of the Linnean Society, 92(4), 285-302	[Possibly no] "Of the two inflorescence branches enclosed in gelatin capsules (Table I) one was later occupied by a caterpillar which ate corollas and stigmas after flowering was over; of the 89 florets on five capitula in this capsule no fruits matured whereas on an open-pollinated branch nearby 97 florets on five capitula matured a total of 32 fruits. On the undamaged plant the result was similar: the enclosed branch bore 12 capitula, 228 florets, two fruits; the open-pollinated branch bore nine capitula, 167 florets, 65 fruits. Stigmas on the enclosed florets·were liberally coated with self-pollen, but were still apparently in a receptive state long after open-pollinated florets had withered. These results arc suggestive of self-incompatibility, at least in the plants studied, and also that stigma withering is triggered either by fertilization or by growth of compatible pollen through the style. However, the absence of an enclosed but crosspollinated branch as a control in this experiment means that the possibility that physical effects of enclosure in the gelatin capsule reduced fruit set or maturation cannot be ruled out. Detailed investigations of compatibility relationships within A. vulgaris are warranted. Persson (1974) reported that isolation of inflorescences of A. maritima L. showed plants to be completely self-sterile."

605	Requires specialist pollinators	n
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"Garnock-Jones (1986) reports that A. vulgaris, which is gynomonoecious, is wind-pollinated. However, Garnock-Jones (1986) also reports A. vulgaris flowers being visited by syrphid flies and beetles, suggesting entomophilous pollination. Similarly, the closely related species A. dracunculus L., a primarily wind pollinated herb, was reported visited by the syrphid fly, Melanostoma mellina (Syrphidae) (Müller 1883)."

606	Reproduction by vegetative fragmentation	y
	Source(s)	**Notes**
	Weston, L. A., Barney, J. N., & DiTommaso, A. (2005). A review of the biology and ecology of three invasive perennials in New York State: Japanese knotweed (Polygonum cuspidatum), mugwort (Artemisia vulgaris) and pale swallow-wort (Vincetoxicum rossicum). Plant and Soil, 277(1-2), 53-69	"Mugwort is a broadleaf perennial that spreads quickly upon introduction via an extensive rhizome system, and is difficult at best, to control chemically or culturally (Barney and DiTommaso, 2003; Bing, 1983; Foy, 2001; Henderson and Weller, 1985; Neal and Adkins, 2001)."

Qsn #	Question	Answer
	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	"Mugwort spreads rapidly by underground rhizomes, eventually forming large clumps, and it can become invasive in the garden; for this reason it is best grown in a container or with boards or other retainers sunk below the soil to prevent the rhizomes from spreading out of bounds." … "It is nearly always propagated by division of mature clumps or removal of small planes that spring up around them."

607	Minimum generative time (years)	2
	Source(s)	**Notes**
	Bender, M., Baskin, J., & Baskin, C. (2000). Age of Maturity and Life Span in Herbaceous, Polycarpic Perennials. Botanical Review, 66(3), 311-349	"Table IX Herbaceous, polycarpic perennials with earliest maturity under cultivation being the second year or later" [Artemisia vulgaris L. - Year of maturity = 2]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"Rhizomes are often fragmented by cultivation equipment, and are then wrapped alongside balled and burlapped ornamentals."

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, mugwort is likely to be found in Japanese kitchen gardens, where it is called yomogi and the young leaves are used to flavor traditional mochi and sometimes eaten in salads and soups or to brew a tea."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to Eurasia; in Hawai'i cultivated as a potherb, used to flavor and color rice cakes for festivals, and occasionally sparingly naturalized in disturbed areas at least on Kaua'i, O'ahu, and Hawai'i. First collected on Hawai'i in 1916 (Kelly s.n., BISH)."

703	Propagules likely to disperse as a produce contaminant	y
	Source(s)	**Notes**
	Weston, L. A., Barney, J. N., & DiTommaso, A. (2005). A review of the biology and ecology of three invasive perennials in New York State: Japanese knotweed (Polygonum cuspidatum), mugwort (Artemisia vulgaris) and pale swallow-wort (Vincetoxicum rossicum). Plant and Soil, 277(1-2), 53-69	"Its rhizome pieces can be transported by the replanting of nursery stock (Holm et al., 1997). USDA and NY State inspection of nursery stock is now conducted to prevent transport of infested rootstock from New York State, a major site of mugwort infestation in the Northeast (NY State Department of Agriculture and Markets, personal communication)."

704	Propagules adapted to wind dispersal	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"Researchers in Eastern Canada and the United States have observed that seed production in A. vulgaris populations does not appear to be a major factor in the spread of this species (J.N. Barney, A. DiTommaso, J.C. Neal, L.A. Weston, personal observations). Seed dispersal in A. vulgaris is largely by wind because of its relatively small (~1 mm diameter) light seeds (Garnock-Jones 1986)."

705	Propagules water dispersed	y
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"Artemisia vulgaris is commonly dispersed by floodwaters in North Carolina, USA, because a large part of nursery stock is based in flood plains that receive relatively frequent flooding (J.C. Neal, personal communication)." … "In the Southern United States, A. vulgaris is commonly spread by flood waters since most field-grown ornamental trees, where A. vulgaris is a dominant weed, are established on flood plains (J.C. Neal, personal communication). Cultivation of A. vulgaris infested fields where ornamentals are grown is also a major source of dispersal for this perennial herb."

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"Researchers in Eastern Canada and the United States have observed that seed production in A. vulgaris populations does not appear to be a major factor in the spread of this species (J.N. Barney, A. DiTommaso, J.C. Neal, L.A. Weston, personal observations). Seed dispersal in A. vulgaris is largely by wind because of its relatively small (~1 mm diameter) light seeds (Garnock-Jones 1986)."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	[No evidence, and limited seed production in Hawaii may minimize chances of any accidental spread] "Researchers in Eastern Canada and the United States have observed that seed production in A. vulgaris populations does not appear to be a major factor in the spread of this species (J.N. Barney, A. DiTommaso, J.C. Neal, L.A. Weston, personal observations). Seed dispersal in A. vulgaris is largely by wind because of its relatively small (~1 mm diameter) light seeds (Garnock-Jones 1986)."

Qsn #	Question	Answer
708	**Propagules survive passage through the gut**	**n**
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	[No evidence] "Researchers in Eastern Canada and the United States have observed that seed production in A. vulgaris populations does not appear to be a major factor in the spread of this species (J.N. Barney, A. DiTommaso, J.C. Neal, L.A. Weston, personal observations). Seed dispersal in A. vulgaris is largely by wind because of its relatively small (~1 mm diameter) light seeds (Garnock-Jones 1986)."

801	**Prolific seed production (>1000/m2)**	**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	"It is nearly always propagated by division of mature clumps or removal of small planes that spring up around them."
	Weston, L. A., Barney, J. N., & DiTommaso, A. (2005). A review of the biology and ecology of three invasive perennials in New York State: Japanese knotweed (Polygonum cuspidatum), mugwort (Artemisia vulgaris) and pale swallow-wort (Vincetoxicum rossicum). Plant and Soil, 277(1-2), 53-69	"Seed production and recruitment has been documented in its native range of Europe and Asia, but few, if any, seedlings have been observed in North America (Barney and DiTommaso, 2003; Holm et al., 1997). However, seed harvested from naturalized mugwort stands across New York State shows varying degrees of viability (Barney, data not presented)."
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	[Plants in Hawaii appear to produce few or no seeds] "The number of seeds produced per plant in A. vulgaris varies greatly over its habitat range (Holm et al. 1997). There is little published data available on A. vulgaris seed production and dispersal as most research has focused on vegetative reproduction. However, A. vulgaris has been reported to produce up to 200 000 seeds per plant depending on the growing environment (Pawlowski et al. 1967). Plants within several European A. vulgaris populations produced as many as 10 000 capitula per stem, and 450 000 capitula in total (Garnock-Jones 1986). In contrast, some biotypes have been found to produce no viable seeds (Holm et al. 1997)."

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	
	Source(s)	**Notes**
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"Seeds of A. vulgaris recovered from 200-yr-old undisturbed soils were viable and able to germinate (Odum 1965). There is currently no specific information on the presence of transient or persistent seed banks in A. vulgaris. However, the findings of Odum (1965) suggest that A. vulgaris populations have the potential to develop persistent seed banks."

803	**Well controlled by herbicides**	**n**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	"This species is also tolerant to most herbicides, while cultivation and mowing are not effective means of control (Bing 1983)." … "Few herbicides provide effective control of A. vulgaris, with plants often capable of re-growth. Henderson and Weller (1985) found that efficacy of control using herbicides varied by location, time of application, and plant vigour. Postemergent applications of glyphosate (2.24 kg a.i. ha–1) provided significantly better control than 2,4-D (1.12 kg a.i. ha–1) in the Midwestern US, while pre-emergent applications of DPX-F 6025 (46.7 g a.i. ha–1) provided better control than dichlobenil (6.72 kg a.i. ha–1) and diuron (3.58 kg a.i. ha–1) (Henderson and Weller 1985). However, regrowth of A. vulgaris plants was observed in all treatment plots later in the season. Repeated applications of 2,4-D + 2,4-DP and three-way combination mixtures of 2,4-D, MCPP, and dicamba resulted in substantial growth reductions (Bing 1983). Repeated spot-treatments with glyphosate provided effective short-term control of A. vulgaris in nursery stock (Bing 1983). Foy (2001) found that picloram (0.14 kg ha–1) and clopyralid (0.14 kg ha–1) provided complete control of A. vulgaris 7 wk after treatment, with no re-growth at 21 wk after treatment. Foy (2001) also showed that dicamba (1.12 kg ha–1), glyphosate (1.12 kg ha–1) and triclopyr (4.48 kg ha–1) were moderately effective in controlling A. vulgaris under greenhouse conditions, but re-growth occurred after all herbicide treatments and was determined to be rate-dependent. There is no evidence to suggest that herbicide application stimulates rhizome growth."

Qsn #	Question	Answer
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	
	Source(s)	**Notes**
	Jordan, M. J., Lund, B., & Jacobs, W. A. (2002). Effects of mowing, herbicide and fire on Artemisia vulgaris, Lespedeza cuneata, and Euphorbia cyparissias at the Hempstead Plains grassland, Long Island, New York. The Nature Conservancy, Long Island Chapter, Cold Springs Harbor, NY	"Mugwort, a clump-forming rhizomatous perennial, was nearly eliminated by either repeated mowing or herbicide application for 2-3 years, with little regrowth. Mugwort was not affected by dormant-season burning."
	Barney, J. N., & DiTommaso, A. (2003). The biology of Canadian weeds. 118. Artemisia vulgaris L. Canadian Journal of Plant Science, 83(1), 205-215	[Possibly] "Bing (1983) found that repeated mowing did not control A. vulgaris, although the removal of aboveground plant tissue by animals, machinery or hoeing was reported to stimulate rhizome production (Holm et al. 1997). Holm et al. (1997) indicated that A. vulgaris might be effectively managed in fields under continuous cultivation. In 2001, a 3-yr field study was initiated in Central New York, examining the growth habit and reproductive ability of two local A. vulgaris populations in a turfgrass and cultivated field setting. Each of the populations was subjected to either a monthly mowing or was not mowed. Mowing had a significant effect on the number of shoots produced in both the cultivated and the turfgrass plots, while population source had a significant effect on the number of shoots produced in the cultivated plots only (Barney et al. 2002). Mowing increased shoot number from 60 to 100% in the cultivated field, and 20–30% in the turfgrass habitat. In the cultivated field, the number of shoots produced differed by about 30% between the two A. vulgaris populations."

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	[Unknown] "Native to Eurasia; in Hawai'i cultivated as a potherb, used to flavor and color rice cakes for festivals, and occasionally sparingly naturalized in disturbed areas at least on Kaua'i, O'ahu, and Hawai'i. First collected on Hawai'i in 1916 (Kelly s.n., BISH)."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Broad climate suitability
• Naturalized, and able to spread in regions with tropical climates
• Naturalized on Kauai, Oahu, Maui, Lanai, and Hawaii (Hawaiian Islands), and widely naturalized elsewhere
• A weed of gardens, nursery stock, waste areas, and turfgrass, as well as several crops
• An environmental weed in some locations
• Other species are invasive
• Allelopathic
• Possibly toxic to animals and people if consumed in large amounts
• Pollen is allergenic
• Tolerates many soil types
• Able to form dense, monospecific stands
• Able to reproduce by seeds (in some locations) and vegetatively by rhizomes
• Reaches maturity in 2 years
• Seeds dispersed by wind, water and people
• Rhizome fragments dispersed accidentally by machinery and as a contaminant of nursery stock
• Tolerant of, and difficult to control with many herbicides

Low Risk Traits
• Valued as a garden herb by some, in spite of reports of weediness and possibly toxicity
• Unarmed (no spines, thorns, or burrs)
• Propagated vegetatively in Hawaii, suggesting seed production may be low
• Limited seed production may limit ability for long distance dispersal