Taxon: Sinapis alba L. **Family:** Brassicaceae

Common Name(s): white mustard
yellow mustard

Synonym(s): Brassica alba (L.) Rabenhorst
Brassica hirta Moench

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 7 Jul 2022

WRA Score: 4.0 **Designation:** L **Rating:** Low Risk

Keywords: Annual Herb, Weedy Escape, Toxic Properties, Self-Incompatible, Human-Dispersed

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		
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	y
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	y
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans		
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	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	n
604	Self-compatible or apomictic	y=1, n=-1	n
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	1
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	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	y
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	n
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**
	Ravindran, P. N. (2017). The Encyclopedia of Herbs and Spices. CABI, Wallingford, UK	"White mustard (or yellow mustard) is a species that has probably originated in the Mediterranean region (the Iranio-Turanian, Euro-Siberian floral region or phytogeographical zone). The species has a cosmopolitan distribution, occurring in most of the temperate and subtropical regions of the world." [Long history of cultivation, but apparently not heavily domesticated]

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

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

201	**Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"**	**Intermediate**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 5 Jul 2022]	"Native Africa NORTHERN AFRICA: Algeria, Egypt, Libya, Morocco, Tunisia Asia-Temperate WESTERN ASIA: Cyprus, Iran, Iraq, Israel, Jordan, Lebanon, Syria, Turkey Asia-Tropical INDIAN SUBCONTINENT: Pakistan (n.) Europe NORTHERN EUROPE: Denmark, United Kingdom, Ireland, Norway, Sweden MIDDLE EUROPE: Austria, Belgium, Switzerland, Germany, Netherlands, Poland EASTERN EUROPE: Ukraine [Krym] SOUTHEASTERN EUROPE: Albania, Bulgaria, Greece (incl. Crete), Croatia, Italy (incl. Sardinia, Sicily), Romania SOUTHWESTERN EUROPE: Spain (incl. Baleares), France (incl. Corsica), Portugal (e.?)"
	Guzman, C. C. de & Siemonsma, J. S. (eds.). (1999). Plant resources of South-East Asia, No.13. Spices. Backhuys Publishers, Leiden, The Netherlands	"Sinapis alba originates from the eastern Mediterranean and the Middle East. It is grown for seed worldwide, production being important in Canada, Scandinavia and Hungary."

202	**Quality of climate match data**	**High**

Qsn #	Question	Answer
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 5 Jul 2022]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	**Notes**
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 6 Jul 2022]	"S. alba occurs over a large range in Canada, including in the YK, BC, AB, SK, MB, ON, QB, NB, NS, and PEFootnote 22,Footnote 23,Footnote 24. S. alba is predominantly found in areas it is cultivated, primarily in the brown and dark brown soil zones of the western Canadian Prairies and the northern Great Plains of the United StatesFootnote 8. S. alba is uncommon in the Maritime provincesFootnote 22,Footnote 23. The potential future range includes all Canadian provinces and territories."
	Guzman, C. C. de & Siemonsma, J. S. (eds.). (1999). Plant resources of South-East Asia, No.13. Spices. Backhuys Publishers, Leiden, The Netherlands	"Similar to the closely related Brassica crops, white mustard favours moderate temperatures for germination and early growth, and long days and high temperatures for flowering and seed-set. It requires high levels of N and grows best on sandy loamy soils. It does well in the conditions prevailing in the Canadian prairies where most of the commercial seed is produced. It occurs in areas where the annual precipitation ranges from 350-1800 mm, annual temperatures from 5-25°C, and soil pH from (4.5-)5.6-8.2. "
	Flora of North America Editorial Committee. (2010). Flora of North America: North of Mexico, Volume 7. Magnoliophyta: Salicaceae to Brassicaceae. Oxford University Press, Oxford, UK	[Broad elevation range and distribution] "Escape from cultivation, roadsides, waste places, disturbed areas, grain fields, cultivated areas, gardens, orchards; 0-1000 m; introduced; Greenland; Alta., B.C., Man., N.B., N.S., Ont., P.E.I., Que., Sask., Yukon; Ariz., Calif., Colo., Conn., Del., D.C., Ill., Ind., Iowa, Maine, Mass., Mich., Minn., Mo., Mont., Nebr., N.H., N.J., N.Mex., N.Y., N.C., N.Dak., Ohio, Okla., Oreg., Pa., R.I., S.C., S.Dak., Tenn., Tex., Utah, Vt., Wash., W.Va., Wis.; Eurasia; introduced also in Mexico, Central America, South America (Argentina), Europe, sw Asia, n Africa, Atlantic Islands"

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	**Notes**
	Ravindran, P. N. (2017). The Encyclopedia of Herbs and Spices. CABI, Wallingford, UK	"White mustard (or yellow mustard) is a species that has probably originated in the Mediterranean region (the lranio-Turanian, Euro-Siberian floral region or phytogeographical zone). The species has a cosmopolitan distribution, occurring in most of the temperate and subtropical regions of the world."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Ravindran, P. N. (2017). The Encyclopedia of Herbs and Spices. CABI, Wallingford, UK	"White mustard (or yellow mustard) is a species that has probably originated in the Mediterranean region (the lranio-Turanian, Euro-Siberian floral region or phytogeographical zone). The species has a cosmopolitan distribution, occurring in most of the temperate and subtropical regions of the world."

301	Naturalized beyond native range	y
	Source(s)	**Notes**
	Flora of North America Editorial Committee. (2010). Flora of North America: North of Mexico, Volume 7. Magnoliophyta: Salicaceae to Brassicaceae. Oxford University Press, Oxford, UK	"Escape from cultivation, roadsides, waste places, disturbed areas, grain fields, cultivated areas, gardens, orchards; 0-1000 m; introduced; Greenland; Alta., B.C., Man., N.B., N.S., Ont., P.E.I., Que., Sask., Yukon; Ariz., Calif., Colo., Conn., Del., D.C., Ill., Ind., Iowa, Maine, Mass., Mich., Minn., Mo., Mont., Nebr., N.H., N.J., N.Mex., N.Y., N.C., N.Dak., Ohio, Okla., Oreg., Pa., R.I., S.C., S.Dak., Tenn., Tex. Utah, Vt., Wash., W.Va., Wis.; Eurasia; introduced also in Mexico, Central America, South America (Argentina), Europe, sw Asia, n Africa, Atlantic Islands. Of the three subspecies of Sinapis alba recognized in European and North African floras, only subsp. alba is naturalized in the New World. This taxon is an important crop plant, and is occasionally reported as a weedy escape from cultivation. Its seeds are used for the manufacture of condiment mustard (see also 17. Brassica), pickling spice, and production of oils for soap and mayonnaise, lubrication, and cooking (I. A. Al-Shehbaz 1985)."
	Wu, Z.Y. & Raven, P.H. (eds.). (2001). Flora of China. Vol. 8 (Brassicaceae through Saxifragaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Roadsides, fields, pastures, disturbed sites. Anhui, Gansu, Hebei, Liaoning, Qinghai, Shandong, Shanxi, Sichuan, Xinjiang [India, Kashmir, Russia, Tajikistan, Turkmenistan, Vietnam; N Africa, SW Asia, Europe; naturalized elsewhere]. The seeds are used for the manufacture of table mustard and also for the extraction of oils, which are used for cooking and making soap and mayonnaise. The species is a cosmopolitan, naturalized weed."
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 6 Jul 2022]	"S. alba is introduced and widely naturalized in: Canada the continental United States the Caribbean TerritoriesFootnote 1,Footnote 5"
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	Sinapis arvensis is the only species recorded as questionably naturalized on Molokai

302	Garden/amenity/disturbance weed	y
	Source(s)	**Notes**
	Plants for a Future. (2022). Sinapis alba. https://pfaf.org. [Accessed 7 Jul 2022]	"A weed of arable and waste land, especially on calcareous soils"
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 7 Jul 2022]	"Following cultivation, volunteer S. alba can become weedy in subsequent crops. S. alba may also occur in prairies, roadsides, and disturbed areasFootnote 3,Footnote 11,Footnote 25,Footnote 45,Footnote 46. We found no record of substantial populations of S. alba in natural environments in Canada. S. alba is not listed in the Weed Seeds Order, 2016."

Qsn #	Question	Answer
	Flora of North America Editorial Committee. (2010). Flora of North America: North of Mexico, Volume 7. Magnoliophyta: Salicaceae to Brassicaceae. Oxford University Press, Oxford, UK	"This taxon is an important crop plant, and is occasionally reported as a weedy escape from cultivation."
	WRA Specialist. (2022). Personal Communication	Valued as an agricultural crop, but also considered a weed in some agricultural systems. For the purposes of Hawaii and other tropical Pacific islands, it is designated conservatively as a disturbance weed with the potential to negatively impact agriculture

303	Agricultural/forestry/horticultural weed	
	Source(s)	**Notes**
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 7 Jul 2022]	"Following cultivation, volunteer S. alba can become weedy in subsequent crops. S. alba may also occur in prairies, roadsides, and disturbed areasFootnote 3,Footnote 11,Footnote 25,Footnote 45,Footnote 46. We found no record of substantial populations of S. alba in natural environments in Canada. S. alba is not listed in the Weed Seeds Order, 2016."
	Duke, J. A. (1983). Sinapis alba. Handbook of Energy Crops. https://www.hort.purdue.edu. [Accessed 7 Jul 2022]	"It has become naturalized in many areas and is a weed of cultivated lands, especially flax-fields."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Canola, Cereals, Pastures"

304	Environmental weed	n
	Source(s)	**Notes**
	Victorian Government. (2009). Advisory list of environmental weeds of the Mallee bioregions of Victoria. Department of Sustainability and Environment, East Melbourne	"Using a sequential ordering process, each combination of scores produced a final ranking score that ranged from 1 to 243. Species with low final scores pose a higher risk to biodiversity than species with high final scores." [Sinapis alba - Ranking Score = 242 = Lower Risk Weeds]
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 7 Jul 2022]	"We found no record of substantial populations of S. alba in natural environments in Canada."
	White, M., Cheal, D., Carr, G. W., Adair, R., Blood, K. and Meagher, D. (2018). Advisory list of environmental weeds in Victoria. Arthur Rylah Institute for Environmental Research Technical Report Series No. 287. Department of Environment, Land, Water and Planning, Heidelberg, Victoria	Sinapis alba subp. alba - Impact on natural systems = Currently insignificant; Potential for invasion = Currently non-invasive

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

Qsn #	Question	Answer
	Warwick, S. I., Beckie, H. J., Thomas, A. G., & McDonald, T. (2000). The biology of Canadian weeds. 8. Sinapis arvensis. L.(updated). Canadian Journal of Plant Science, 80(4), 939-961	"An updated review of biological information is provided for Sinapis arvensis L. Native to the Old World, the species is widely introduced and naturalized in temperate regions around the world. The species occurs in all the provinces, the Northwest Territories, and the Yukon. It is an important weed of field crops in the Canadian prairies. A strongly persistent seedbank, competitive annual growth habit and high fecundity all contribute to its weedy nature and ensure that it will be a continuing problem. Several cases of herbicide resistance have been documented for natural populations of S. arvensis in Canada, including biotypes resistant to: i) Group 2 herbicides, which inhibit acetolactate synthase (ALS), from Manitoba in 1992 and Alberta in 1993; ii) Group 4 herbicides or synthetic auxins from Manitoba in 1991; and iii) Group 5 herbicides, which inhibit photosynthesis at photosystem II, from Ontario in 1983. The species is a close relative of Brassica nigra (L.) Koch, black mustard, and is capable of limited genetic exchange with the Brassica crop species under laboratory hybridization conditions either by conventional crossing or with the aid of ovary/embryo recovery techniques."
	DiTomaso, J. M., Kyser, G. B., Oneto, et al. (2013). Weed Control in Natural Areas in the Western United States. Weed Research and Information Center, University of California, Davis, CA	[Sinapis arvensis] "Impacts: Wild mustard can form dense patches that outcompete desirable plants. It is most common in croplands, roadsides and waste areas, as well as urban environments, but can also be a problem in some natural areas. Wild mustard seeds contain alkaloids that can be toxic to livestock if ingested in large quantities."

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Flora of North America Editorial Committee. (2010). Flora of North America: North of Mexico, Volume 7. Magnoliophyta: Salicaceae to Brassicaceae. Oxford University Press, Oxford, UK	[No evidence] "Plants usually hispid, rarely glabrous. Stems often branched distally, (0.15-)0.25-1(-2.2) dm. Basal leaves: petiole 1-3 (-6) cm; blade oblong, ovate, or lanceolate (in outline), (3.5-)5-14(-20) cm × 20-60(-80) mm, margins lyrate, pinnatifid, pinnatisect; lobes 1-3 each side, (oblong, ovate, or lanceolate, 1.5-2.5 cm), margins usually dentate or repand, rarely pinnatifid. Cauline leaves (distal) shortly petiolate; blade (ovate or oblong-ovate, 2-4.5 cm), margins coarsely dentate, rarely subentire. Fruiting pedicels divaricate, (3-)6-12(-17) mm. Flowers: sepals (3.8-)4-7(-8) × 1-1.8 mm; petals pale yellow, (7-)8-12(-14) × (3-)4-6(-7) mm; filaments (3-)4-7(-8) mm; anthers 1.2-1.5 mm. Fruits lanceolate, (1.5-)2-4.2(-5) cm × (2-)3-5.5(-6.5) mm; valvular segment terete or slightly flattened, (0.5-)0.7-1.7(-2) cm, 2-5-seeded per locule; terminal segment ensiform, flattened, (1-)1.5-2.5(-3) cm, equal to or longer than valves, seedless; valves hispid, trichomes of 2 types (subsetiform mixed with shorter, slender ones). Seeds pale yellow to pale brown, (1.7-)2-3(-3.5) mm diam. "

402	Allelopathic	y
	Source(s)	**Notes**

Qsn #	Question	Answer
	Jabran, K. (2017). Brassicaceae allelopathy for weed control. In Manipulation of allelopathic crops for weed control (pp. 21-27). Springer, Cham	"Several members of Brassicaceae family possess an allelopathic activity. A number of members of this family (particularly the ones belonging to genus Brassica) are grown as vegetables, herbs, or oilseed crops. Another important characteristic of plant species in family Brassicaceae is their allelopathic activity. Glucosinolates and phenolic compounds are the most important allelochemicals synthesized by the plants in Brassicaceae family. The glucosinolates are converted into several isothiocyanates through enzymatic (myrosinase) activity and express an allelopathic activity. Allelopathic potential of Brassicaceae crops (particularly, Brassica spp., Sinapis alba L. and Raphanus sativus L.) can be used for weed control in agricultural fields. Allelopathic potential of crops from family Brassicaceae may be exploited for weed control by using these as cover crops, growing their cultivars with allelopathic activity, including allelopathic crops of this family in a crop rotation and employing the allelopathic mulch from Brassicaceae crops in agricultural fields."
	Kunz, C., Sturm, D. J., Varnholt, D., Walker, F., & Gerhards, R. (2016). Allelopathic effects and weed suppressive ability of cover crops. Plant, Soil and Environment, 62(2), 60-66	"The high efficacy of extracts from S. alba, R. sativus var. niger and M1 in germination tests could arise due to the high amounts of phytotoxic and allelopathic substances in Brassicaceae plants. In S. alba, glucotropaeolin (45 mg/kg), glucosinalbin (7.2 mg/kg) and glucobrassicin (< 0.1 mg/kg) were detected. R. sativus var. niger contained lower rates of glucotropaeolin (7.3 mg/kg) and sinigrin (1.7 mg/kg). Glucosinolate hydrolysis products, like isothiocyanates can inhibit and delay germination (Haramoto and Gallandt 2004). The inhibitory ability of M1 might be attributed to synergistic effects of Brassicaceae species with other plants, which possess allelopathic traits (Jabran et al. 2015)."

403	Parasitic	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	"Erect annual herb, 30-60(-120) cm tall, mostly sparsely hairy and with a thin taproot. Stem ribbed, bristly, with hairs pointing downward, usually only branching in upper part." [Brassicaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	**Notes**
	Smith, J.G. (1900). Fodder and Forage Plants: Exclusive of the Grasses. Government Printing Office, Washington, D.C.	"No. 261. Sinapis alba. White Mustard. An annual soiling crop similar to rape, grown in France. Seed at the rate of 11 to 13 pounds per acre is sown in August after wheat or other small grain, and the crop is ready to cut from September to November. (Vilmorin.). White mustard has about the same feeding value as rape."
	Stace, C. (2010). New Flora of the British Isles. Third Edition. Cambridge University Press, Cambridge, UK	[S. alba Ssp. alba] "grown as fodder or green manure or for mustard-seed or seedling salad-plant"

405	Toxic to animals	y

Qsn #	Question	Answer
	Source(s)	**Notes**
	Burrows, G. E., & Tyrl, R. J. (2013). Toxic Plants of North America. Second Edition. Wiley-Blackwell, Hoboken, NJ	"Sinapis alba is quite toxic, and animals eating its seeds or grazing plants in fruit may suffer severe distress and die in a few days (Hughes 1924; Eaton 1941; Gallie and Paterson 1945; Holmes 1965; Kernaleguen et al. 1989). They may give off a conspicuous mustard odor. Other clinical signs and the pathologic changes are typical of the disease caused by the glucosinolates."
	Duke, J. A. (1983). Sinapis alba. Handbook of Energy Crops. https://www.hort.purdue.edu. [Accessed 7 Jul 2022]	[Seeds or seeding plants are toxic if consumed by animals in large quantities] "Seeds have a cathartic acid due to liberation of H2S on contact with water. Large doses may produce sulfide poisoning, with cyanosis, etc. Troxler (1981) reports fatalities in 19 of 48 heifers fed white mustard. A sudden drop in temperature inhibited its growth in the: preflowering stage. The plant contained 6.2% nitrate in the DM, 10–20 times the toxic level. "

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	Duke, J. A. (1983). Sinapis alba. Handbook of Energy Crops. https://www.hort.purdue.edu. [Accessed 7 Jul 2022]	"Among diseases infesting white mustard are the white-rust Albugo candida, an Alternaria leaf spot, the powdery mildew Erysiphe polygoni, the downy mildew Peronospora parasitica, the clubroot Plasmodiophora brassicae, and the stemrot Sclerotinia sclerotiorum. Nematodes include Ditylenchus dipsaci, Heterodera cruciferae, H. schachtii, H. trifolii, Meloidogyne sp., Pratylenchus penetrans, and P. pratensis (Golden, p.c. 1984)."
	Guzman, C. C. de & Siemonsma, J. S. (eds.). (1999). Plant resources of South-East Asia, No.13. Spices. Backhuys Publishers, Leiden, The Netherlands	"The crop is not known to suffer from major diseases, but it attracts a variety of insect pests, including flea beetles (Phyllotreta spp.) and aphids (e.g. Brevicoryne brassicae). Effective insect pest control can be achieved by using resistant cultivars, appropriate agronomy, crop rotation disinfected seed. In some years the yeast Nematospora sinecauda is an important disease of stored grain. Severe infestation renders the seed unsuitable for human consumption. The yeast infection is initiated by the false cinch bug (Nysius niger), but spreads easily in stored grain. As few insects are involved in the initial infection, the only preventive action possible is to control the alternative host flixweed (Descurainia sophia (L.) Webb ex Prantl, synonym: Sisymbrium sophia L.). "

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

Qsn #	Question	Answer
	Anguita, J. L. et al. (2007). An occupational respiratory allergy caused by Sinapis alba pollen in olive farmers. Allergy, 62(4), 447-450	"Background: Sinapis alba (white mustard) is a entomophilic species included in the Brassicaceae family. To date it has not been related to allergic sensitization or clinical respiratory disease. Methods: Twelve olive orchard workers had a history of rhinitis and/or bronchial asthma that occurred during control weed management and/or harvest, from January to March. They underwent skin prick tests (SPT) with S. alba pollen extract and a standard battery of aeroallergens. Sinapis alba pollen extract was prepared for performing quantitative skin tests, enzyme allergosorbent test and nasal challenge test (NCT). A portable monitoring station and an urban volumetric Hirst-type spore trap were used for the aerobiological study. Results: Eleven patients suffered from rhinitis and bronchial asthma and one had only from rhinitis. All patients were sensitized to S. alba pollen extract, and they showed a positive NCT response. In the urban aerobiologic monitoring station the amount of S. alba pollen only exceptionally reached peaks of 21 grains/m3, whereas in the work environment peaks of 1801 grains/m3 were detected between 15 February and 7 April. Conclusions: We demonstrate the existence of a new occupational allergen for olive farmers: S. alba pollen. We point out the importance of perform aerobiological sampling within the occupational environment for the detection and quantification of the allergenic source."
	Plants for a Future. (2022). Sinapis alba. https://pfaf.org. [Accessed 7 Jul 2022]	"The seed contains substances that irritate the skin and mucous membranes [238]. The plant is possibly poisonous once the seedpods have formed [76]. Mustard allergy possibly especially in children and adolescents. Retention of seeds possibly in intestines if taken internally"
	WRA Specialist. (2022). Personal Communication	Possibly toxic if seeds are consumed, and potentially allergenic to susceptible individuals

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	**Notes**
	Duke, J. A. (1983). Sinapis alba. Handbook of Energy Crops. https://www.hort.purdue.edu. [Accessed 7 Jul 2022]	"A quick-growing long-day annual which prefers temperate climates with some humidity. Can withstand high temperatures, but very hot days during flowering and ripening may reduce seed setting and lower quality of seed. Requires high nutrient soils with high level of nitrogen, but may be grown on a wide range of soils from light to heavy, growing best on relatively heavy sandy loamy soils. Not suited to very wet soils. Ranging from Boreal Moist to Wet through Tropical Dry Forest Life Zones, white mustard occurs where annual precipitation varies from 3.5 to 17.9 dm (mean of 43 cases = 7.7), annual temperature from 5.6 to 24.9°C (mean of 43 cases = 10.5), and pH of 4.5 to 8.2 (mean of 36 cases = 6.6). " [No evidence. A cultivated annual that does not typically grow in fire prone ecosystems]
	Benson, D., & McDougall, L. (1994). Ecology of Sydney plant species part 2: dicotyledon families Asteraceae to Buddlejaceae. Cunninghamia, 3(4), 789-1004	No evidence

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

Qsn #	Question	Answer
	Source(s)	**Notes**
	Outsidepride.com. (2022). Mustard Seeds - Yellow. https://www.outsidepride.com/seed/herb-seed/Mustard/mustard-yellow.html. [Accessed 7 Jul 2022]	"Environment: Full sun to partial shade"
	Plants for a Future. (2022). Sinapis alba. https://pfaf.org. [Accessed 7 Jul 2022]	"t can grow in semi-shade (light woodland) or no shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	Duke, J. A. (1983). Sinapis alba. Handbook of Energy Crops. https://www.hort.purdue.edu. [Accessed 7 Jul 2022]	"Requires high nutrient soils with high level of nitrogen, but may be grown on a wide range of soils from light to heavy, growing best on relatively heavy sandy loamy soils. Not suited to very wet soils."
	Plants for a Future. (2022). Sinapis alba. https://pfaf.org. [Accessed 7 Jul 2022]	"Succeeds on most soils when growing in a sunny position"

411	Climbing or smothering growth habit	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	"Erect annual herb, 30-60(-120) cm tall, mostly sparsely hairy and with a thin taproot."

412	Forms dense thickets	n
	Source(s)	**Notes**
	Flora of North America Editorial Committee. (2010). Flora of North America: North of Mexico, Volume 7. Magnoliophyta: Salicaceae to Brassicaceae. Oxford University Press, Oxford, UK	"Escape from cultivation, roadsides, waste places, disturbed areas, grain fields, cultivated areas, gardens, orchards; 0-1000 m"
	Duke, J. A. (1983). Sinapis alba. Handbook of Energy Crops. https://www.hort.purdue.edu. [Accessed 7 Jul 2022]	"It has become naturalized in many areas and is a weed of cultivated lands, especially flax-fields."
	Wu, Z.Y. & Raven, P.H. (eds.). (2001). Flora of China. Vol. 8 (Brassicaceae through Saxifragaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Roadsides, fields, pastures, disturbed sites."
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 7 Jul 2022]	[No evidence] "Following cultivation, volunteer S. alba can become weedy in subsequent crops. S. alba may also occur in prairies, roadsides, and disturbed areas ... We found no record of substantial populations of S. alba in natural environments in Canada. S. alba is not listed in the Weed Seeds Order, 2016."

Qsn #	Question	Answer
501	**Aquatic**	**n**
	Source(s)	**Notes**
	Flora of North America Editorial Committee. (2010). Flora of North America: North of Mexico, Volume 7. Magnoliophyta: Salicaceae to Brassicaceae. Oxford University Press, Oxford, UK	[Terrestrial] "Escape from cultivation, roadsides, waste places, disturbed areas, grain fields, cultivated areas, gardens, orchards; 0-1000 m"

502	**Grass**	**n**
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 6 Jul 2022]	"Family: Brassicaceae (alt. Cruciferae) Tribe: Brassiceae"

503	**Nitrogen fixing woody plant**	**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	"Erect annual herb, 30-60(-120) cm tall, mostly sparsely hairy and with a thin taproot." [Brassicaceae]

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	"Erect annual herb, 30-60(-120) cm tall, mostly sparsely hairy and with a thin taproot."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Ravindran, P. N. (2017). The Encyclopedia of Herbs and Spices. CABI, Wallingford, UK	"White mustard (or yellow mustard) is a species that has probably originated in the Mediterranean region (the Iranio-Turanian, Euro-Siberian floral region or phytogeographical zone). The species has a cosmopolitan distribution, occurring in most of the temperate and subtropical regions of the world."

602	**Produces viable seed**	**y**
	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	"S. alba is propagated by seed. The robust seed will even grow in a poorly prepared seedbed. Seeds may be sown about 1 cm deep in rows 30 cm apart, or broadcast at a rate of about 12 kg/ha."

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

Qsn #	Question	Answer
	Source(s)	**Notes**
	Nothnagel, T., Budahn, H., Straka, P., & Schrader, O. (1997). Successful backcrosses of somatic hybrids between Sinapis alba and Brassica oleracea with the Brassica oleracea parent. Plant Breeding, 116(1), 89-97	"Natural hybrids between S. alba and other Brassica species are not known. Two strategies for artificial hybridization have been followed in recent years — first, sexual crosses combined with in vitro techniques, e.g. ovary culture and embryo rescue and, second, somatic hybridization by protoplast fusion (Ripley and Arinson 1990, Zenkteler 1990, Mathias 1991, Inomata 1992, Chevre et al. 1994, Jandurova and Dolezel 1995)."

604	Self-compatible or apomictic	n
	Source(s)	**Notes**
	Śnieżko, R., & Winiarczyk, K. (1996). Pollen tube incompatibility reaction on the stigma in self-pollinated Sinapis alba L. Acta Societatis Botanicorum Poloniae, 65(1-2), 101-105	"After self-pollination of Sinapis alba L. pollen tubes growth is inhibited on the stigma. The pollen grains germinate 3-4 hours after pollination. The pollen give rise to one or more pollen tubes. They grow along the papillae. In the place of contact between the papilla and pollen tube the pellicula is digested. Then the direction of pollen tube growth changes completely. Pollen tubes grow back on the exine of their own pollen grain, or turn into the air. The pollen tubes growth was inhibited in 6-8 hours after self-pollination. After crosspollination usually there is no incompatibility reaction."
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 6 Jul 2022]	"S. alba is an obligate outcrossing speciesFootnote 32. Olsson (1960) measured the degree of outcrossing between individual plants of S. alba in experimental field plots to be up to 99.6%Footnote 27. The self-incompatibility mechanism is discussed in Śnieżko and Winiarczyk (1996)Footnote 32. When flowers are pollinated with pollen from the same plant, pollen grains can germinate on the stigma, but they do not grow in the pistil tissue."

Qsn #	Question	Answer
605	**Requires specialist pollinators**	**n**
	Source(s)	**Notes**
	Roubik, D.W. (1995). Pollination of cultivated plants in the tropics. FAO Services Bulletin 118. FAO, Rome, Italy	"Appendix I" [Sinapis alba - Pollinators = bee, Apis]
	Naumkin, V. P., & Velkova, N. I. (2013). Species diversity of insects-pollinators on crops of white mustard. Вестник аграрной науки, 43(4), 28-32	"The paper presents the results of years of research on the insect fauna on crops of white mustard (Sinapis alba L.). The species composition of insect pollinators, their numerical ratio and the daily dynamics of summer were investigated. Distribution of insect pollinators on different varieties of white mustard was established. It is shown that in the Orel region in the years of research 83 species of insect pollinators were registered on crops. They represent 10 different taxonomic groups. 57% of the total number of collected insects are hymenoptera. Taxonomic groups of insects in plant stand of mustard differ in species composition and number. Insects of different groups throughout the day are distributed extremely uneven. This regularity in the temporal distribution of various groups of insects apparently takes place due to their avoidance of competitive relations in the flowers of white mustard. Varieties that have the greatest appeal to honey bees were marked."
	Duke, J. A. (1983). Sinapis alba. Handbook of Energy Crops. https://www.hort.purdue.edu. [Accessed 7 Jul 2022]	"White mustard is 100% pollinated by wind and insects, mainly honey-bees."

606	**Reproduction by vegetative fragmentation**	**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	"S. alba is propagated by seed. The robust seed will even grow in a poorly prepared seedbed." [No evidence. Annual]
	Benson, D., & McDougall, L. (1994). Ecology of Sydney plant species part 2: dicotyledon families Asteraceae to Buddlejaceae. Cunninghamia, 3(4), 789-1004	"Vegetative spread: No"

607	**Minimum generative time (years)**	**1**
	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	"White mustard seed germinates immediately upon sowing, and then grows rapidly. Four stages can be recognized in the development of mustard crops. The seedling stage, lasting 7-10 days in which the aboveground plant consists of a hypocotyl and 2 green cotyledons, is followed by the vegetative stage of 3-4 weeks in which the plant develops a basal rosette of leaves. During the flowering stage the plant bolts, rapidly producing an indeterminate raceme with branch racemes opening 4-5 flowers per day for 3-4 weeks. The final seed-filling stage lasts 4-8 weeks and is terminated by senescence of the pods and plant. "

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	**y**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Animals, Livestock, Sheep, Vehicles, Escapee"
	Heijting, S., Van der Werf, W., & Kropff, M. J. (2009). Seed dispersal by forage harvester and rigid-tine cultivator in maize. Weed Research, 49(2), 153-163	"Harvest and tillage operations are a major factor in seed dispersal in agricultural crops. We studied the effect of harvesting and cultivation on seed dispersal in continuous maize. A suite of cultivated plant species were used as model weed species to avoid potential sampling problems. Dispersal on the entire field was assessed by counting emerged seedlings in contiguous quadrats. Species that had the seeds on the plant at the time of harvest (Sinapis alba and Phacelia tanacetifolia) were spread further in the traffic direction by harvest + cultivation combined, as judged by the 50, 90 and 95 percentile of the cumulative dispersal distribution, than species whose seeds had been placed on the soil surface. Harvesting alone did not have this effect. The use of cultivator after harvesting significantly increased the distance travelled in the driving direction for three species with ripe seeds at harvest time (Eschscholzia californica, Linaria maroccana, Linum usitatissimum). Kernels resulting from cultivator operations were long tailed, extending over the whole of the sampled area, and they were quite variable. The headlands accumulated plant debris that had been collected and dragged over the field by the cultivator. Implications for the ecology, patterns and management of weeds are discussed."

702	**Propagules dispersed intentionally by people**	**y**
	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	"Sinapis alba originates from the eastern Mediterranean and the Middle East. It is grown for seed worldwide, production being important in Canada, Scandinavia and Hungary. "

703	**Propagules likely to disperse as a produce contaminant**	**y**
	Source(s)	**Notes**
	Canadian Food Inspection Agency. (2009). Weed Seeds Order Review Proposal For Change. Seed Section, Field Crops Division, Plant Health and Biosecurity Directorate. Ottawa, CA	"7.0 Weed Seeds in Domestic Seed 2001-2008. Impurities Retrieved from Pedigreed and Common Seed Samples (Domestic) The following table lists the impurities retrieved from domestic pedigreed and common seed samples and the sum amount found between 2001 and 2008." [Includes seeds of Mustard, White (Sinapis alba)]
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Crop, Herbal, Ornamental"
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 7 Jul 2022]	"S. alba seed may disperse through pod shatter, seed spillage during human use (for example, during transportation), and as a contaminate of other crop seeds."

704	**Propagules adapted to wind dispersal**	**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	"Fruit a silique, 2-4.5 cm × 3-7 mm, each valve with 3 prominent ribs, lower part setose and seed-bearing with constrictions between the seeds, equalled or exceeded by the flat, mostly slightly curved beak, spreading and not shattering at maturity, containing 4-6 seeds. Seed subglobose, about 2 mm in diameter, pale yellow, minutely pitted" ... "Because of the non-shattering nature of the fruit, the chance of white mustard developing into a weed is small."

705	Propagules water dispersed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Animals, Livestock, Sheep, Vehicles, Escapee"

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Animals, Livestock, Sheep, Vehicles, Escapee"

707	Propagules dispersed by other animals (externally)	y
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Animals, Livestock, Sheep, Vehicles, Escapee"
	Western, T. L. (2012). The sticky tale of seed coat mucilages: production, genetics, and role in seed germination and dispersal. Seed Science Research, 22(1), 1-25	"Sinapis alba has a thick layer of mucilage containing cellulosic fibres." [Presumably aids in external dispersal]

708	Propagules survive passage through the gut	
	Source(s)	**Notes**
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 7 Jul 2022]	"S. alba seeds might be dispersed by organisms that consume the seeds."
	Burrows, G. E., & Tyrl, R. J. (2013). Toxic Plants of North America. Second Edition. Wiley-Blackwell, Hoboken, NJ	[Seeds may be accidentally ingested. Unknown if this results in dispersal of viable seeds] "Sinapis alba is quite toxic, and animals eating its seeds or grazing plants in fruit may suffer severe distress and die in a few days (Hughes 1924; Eaton 1941; Gallie and Paterson 1945; Holmes 1965; Kernaleguen et al. 1989). They may give off a conspicuous mustard odor. Other clinical signs and the pathologic changes are typical of the disease caused by the glucosinolates."

801	Prolific seed production (>1000/m2)	

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	"Annual seed yield of S. alba is about 500-1500 kg/ha, but may reach 2400 kg/ha." [Seed densities in non-cultivated settings unknown]

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	**Notes**
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 7 Jul 2022]	"No studies were found that evaluated the length of time S. alba could remain in the seedbank in the Canadian environment. Cultivated S. alba does not exhibit notable levels of seed dormancy; seeds are often referred to as 'non-dormant'Footnote 49. Under suitable conditions, including adequate moisture and temperatures of at least 5 degrees celsius, seeds will germinate within 4 to 5 daysFootnote 49. Seeds can germinate within 24 hours when temperatures are approximately 20 degrees celsiusFootnote 49."

803	Well controlled by herbicides	y
	Source(s)	**Notes**
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 7 Jul 2022]	"4.5.2 Chemical control Volunteer S. alba can be controlled using herbicides including: Bromoxynil/MCPA Dicamba + MCPA Dicamba/mecoprop/MCPA Fluroxypyr + MCPA Imazamox Imazamox/Imazethapyr Clopyralid/MCPA + Fluroxypyr"
	Heap, I. (2022). The International Survey of Herbicide Resistant Weeds. www.weedscience.org	"White Mustard (Sinapis alba) is a dicot weed in the Brassicaceae family. In Spain this weed first evolved resistance to Group 2 (Legacy B) herbicides in 2007 and infests Winter wheat. Group 2 (Legacy B) herbicides are known as Inhibition of Acetolactate Synthase (Inhibition of Acetolactate Synthase). Research has shown that these particular biotypes are resistant to iodosulfuron-methyl-Na, and tribenuron-methyl and they may be cross-resistant to other Group 2 (Legacy B) herbicides."
	Warwick, S. I., Beckie, H. J., Thomas, A. G., & McDonald, T. (2000). The biology of Canadian weeds. 8. Sinapis arvensis. L.(updated). Canadian Journal of Plant Science, 80(4), 939-961	[Herbicides for the related S, arvensis may be effective] "Between 1984 and 1990, control of S. arvensis in canola in Canada was possible only by using cyanazine and metribuzin in triazine-resistant varieties. The latter varieties naturally yield 20 to 30% less than triazine-susceptible varieties in the absence of herbicides (Beversdorf and Hume 1984; Forcella 1987; Beversdorf et al. 1988). In 1990, ethametsulfuron, a sulfonylurea herbicide, was registered for selective control of S. arvensis and other weed species in canola and cultivated mustard (Anonymous 1999). Although mustard cultivars are not injured by recommended rates of this latter herbicide, S. alba is the least tolerant (Blackshaw and Derksen 1992)."

Qsn #	Question	Answer
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**n**
	Source(s)	**Notes**
	Plant and Biotechnology Risk Assessment Unit. (2022). The biology of Sinapis alba L. (mustard). Biology Document BIO2022-01. Plant Health Science Division, Canadian Food Inspection Agency. Ottawa, Ontario. https://inspection.canada.ca. [Accessed 7 Jul 2022]	"Reducing harvest losses will minimize the number of potential S. alba volunteers. Losses can be reduced by properly setting combines and sealing any leaks. Control of S. alba volunteers in other crops or in fallow ground can readily be achieved by mechanical means."

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

Summary of Risk Traits:

High Risk / Undesirable Traits
• Broad climate suitability
• Widely naturalized (but no records in the Hawaiian Islands to date)
• A cultivated crop that often escapes and may become a weed in other crops (but impacts are generally not explicitly documented)
• Other Sinapis species are invasive weeds
• Allelopathic
• Quite toxic - animals eating seeds or grazing plants in fruit may suffer severe distress and die in a few days
• Plants may also be toxic or allergenic to humans
• Tolerates many soil types
• Reproduces by seeds
• An annual, reaching maturity rapidly
• Seeds dispersed intentionally and accidentally by humans, and externally by animals
• Seeds may also be spread as a contaminant in other crops

Low Risk Traits
• Valued as a palatable crop, with negative impacts generally not specified in agricultural settings
• Unarmed (no spines, thorns, or burrs)
• Palatable fodder plant (when not in fruit)
• Grows best in high light environments (dense shade may inhibit spread)
• Self-incompatible
• Seeds reported to lack dormancy in natural settings (although may be stored for long periods)
• Herbicides may provide effective control
• Mechanical means effective at controlling volunteers in crops or fallow ground

Second Screening Results for Herbs or Low Stature Shrubby Life Forms

(A) Reported as a weed of cultivated lands? Yes. A minor weed or potential crop weed
(B) Unpalatable to grazers or known to form dense stands? No.
Outcome = Accept (Low Risk)