

Family: *Brassicaceae*

Taxon: *Brassica juncea*

Synonym: *Brassica bessoriana* Andrz.

Common Name: big-stem mustard
brown mustard
canola
Indian mustard
oilseed mustard

Questionnaire : current 20090513
Status: Assessor Approved

Assessor: Patti Clifford
Data Entry Person: Patti Clifford

Designation: H(HPWRA)

WRA Score 15

101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?	y=1, n=-1	
103	Does the species have weedy races?	y=1, n=-1	
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	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)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	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	
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	
406	Host for recognized pests and pathogens	y=1, n=0	
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	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	y
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	y
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	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	
706	Propagules bird dispersed	y=1, n=-1	
707	Propagules dispersed by other animals (externally)	y=1, n=-1	
708	Propagules survive passage through the gut	y=1, n=-1	
801	Prolific seed production (>1000/m2)	y=1, n=-1	
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	
803	Well controlled by herbicides	y=-1, n=1	
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)	y=-1, n=1	

Designation: H(HPWRA)

WRA Score 15

Supporting Data:

101	1983. Duke, J.A.. Brassica juncea (L.) Czern - Handbook of Energy Crops. http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_juncea.html	[Is the species highly domesticated?] "Growing period is from 40–60 days, depending on variety and weather conditions. Plants generally harvested before fruits are fully ripe to reduce shattering, harvesting usually in early morning. Entire plants are either pulled out by hand or cut a few cm above ground with sickles. Plants are tied into small sheaves and dried in the sun for 4–10 days."
101	2012. WRA Specialist. Personal Communication.	[Is the species highly domesticated? No] No evidence that invasive traits are domesticated out of the species. [numerous variety demonstrating long association with humans though]
102	2012. WRA Specialist. Personal Communication.	[Has the species become naturalized where grown? NA]
103	2012. WRA Specialist. Personal Communication.	[Does the species have weedy races? NA]
201	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical" 2-High] Native to Asia.
201	2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical" 2-High] Naturalized: AFRICA Macaronesia: Spain - Canary Islands East Tropical Africa: Kenya; Tanzania West-Central Tropical Africa: Zaire South Tropical Africa: Angola; Malawi; Mozambique; Zimbabwe Southern Africa: Botswana; South Africa Western Indian Ocean: Mauritius; Reunion ASIA-TEMPERATE Arabian Peninsula: Yemen Caucasus: Azerbaijan; Georgia Siberia: Russian Federation - Eastern Siberia [s.], Western Siberia [s.] China: China Eastern Asia: Japan ASIA-TROPICAL Indian Subcontinent: Bhutan; India [n.]; Sri Lanka Malesia: Philippines AUSTRALASIA Australia: Australia New Zealand: New Zealand EUROPE Northern Europe: Norway [s.]; Sweden [s.] Middle Europe: Austria; Czech Republic; Germany; Hungary; Switzerland East Europe: Belarus; Estonia; Latvia; Lithuania; Russian Federation - European part; Ukraine [incl. Krym] Southeastern Europe: Bulgaria; Romania Southwestern Europe: Spain [n.e.] NORTHERN AMERICA Canada Mexico United States PACIFIC North-Central Pacific: United States - Hawaii South-Central Pacific: French Polynesia Southwestern Pacific: Fiji; New Caledonia; Niue SOUTHERN AMERICA Caribbean: Antigua and Barbuda; Bahamas; Barbados; Cuba; Dominica; Grenada; Guadeloupe; Hispaniola; Jamaica; Martinique; Netherlands Antilles; Puerto Rico; St. Kitts and Nevis; St. Lucia; St. Vincent and Grenadines; Trinidad and Tobago - Trinidad; Virgin Islands (British) - Virgin Gorda; Virgin Islands (U.S.) - St. Croix Mesoamerica: Belize; Guatemala; Nicaragua Northern South America: French Guiana Brazil: Brazil Western South America: Peru Southern South America: Argentina; Paraguay - Alto Paraguay
202	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Quality of climate match data? 2 - High] Native to Asia.

202	2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Quality of climate match data? 2 - High] Naturalized in: AFRICA Macaronesia: Spain - Canary Islands East Tropical Africa: Kenya; Tanzania West-Central Tropical Africa: Zaire South Tropical Africa: Angola; Malawi; Mozambique; Zimbabwe Southern Africa: Botswana; South Africa Western Indian Ocean: Mauritius; Reunion ASIA-TEMPERATE Arabian Peninsula: Yemen Caucasus: Azerbaijan; Georgia Siberia: Russian Federation - Eastern Siberia [s.], Western Siberia [s.] China: China Eastern Asia: Japan ASIA-TROPICAL Indian Subcontinent: Bhutan; India [n.]; Sri Lanka Malesia: Philippines AUSTRALASIA Australia: Australia New Zealand: New Zealand EUROPE Northern Europe: Norway [s.]; Sweden [s.] Middle Europe: Austria; Czech Republic; Germany; Hungary; Switzerland East Europe: Belarus; Estonia; Latvia; Lithuania; Russian Federation - European part; Ukraine [incl. Krym] Southeastern Europe: Bulgaria; Romania Southwestern Europe: Spain [n.e.] NORTHERN AMERICA Canada Mexico United States PACIFIC North-Central Pacific: United States - Hawaii South-Central Pacific: French Polynesia Southwestern Pacific: Fiji; New Caledonia; Niue SOUTHERN AMERICA Caribbean: Antigua and Barbuda; Bahamas; Barbados; Cuba; Dominica; Grenada; Guadeloupe; Hispaniola; Jamaica; Martinique; Netherlands Antilles; Puerto Rico; St. Kitts and Nevis; St. Lucia; St. Vincent and Grenadines; Trinidad and Tobago - Trinidad; Virgin Islands (British) - Virgin Gorda; Virgin Islands (U.S.) - St. Croix Mesoamerica: Belize; Guatemala; Nicaragua Northern South America: French Guiana Brazil: Brazil Western South America: Peru Southern South America: Argentina; Paraguay - Alto Paraguay
203	1983. Duke, J.A.. Brassica juncea (L.) Czern - Handbook of Energy Crops. http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_juncea.html	[Broad climate suitability (environmental versatility) ? Yes] "Ranging from Boreal Wet to Tropical Thorn through Tropical Wet Forest Life Zones, Indian Mustard is reported to tolerate annual precipitation of 500 to 4,200 mm, annual temperature of 6 to 27°C, and pH of 4.3 to 8.3."
203	2012. Missouri Botanical Garden. Brassica juncea. http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/plant-finder/plant-details/kc/a669/brassica-juncea.aspx	[Broad climate suitability (environmental versatility) ? Yes] USDA Hardiness Zones: 2-11.
204	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Native or naturalized in regions with tropical or subtropical climates? Yes] Widely naturalized and in Hawaii, escaped from cultivation and naturalized near the Volcano House, Laupahoioi, and Puuulaula, Hawaii.
205	1983. Duke, J.A.. Brassica juncea (L.) Czern - Handbook of Energy Crops. http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_juncea.html	[Does the species have a history of repeated introductions outside its natural range? Yes] "Primary center of origin thought to be central Asia (northwest India), with secondary centers in central and western China, eastern India, Burma, and through Iran to Near East. Has been cultivated for centuries in many parts of Eurasia. The principle growing countries are Bangladesh, Central Africa, China, India, Japan, Nepal, and Pakistan, as well as southern Russia north of the Caspian Sea."

301	1996. Virtue, J.G.. Improving the assessment of new weed threats: developing techniques with cruciferous weeds of cropping. http://www.caws.org.au/awc/1996/awc199610851.pdf	[Naturalized beyond native range? Yes] Naturalized in South Australia grain growing areas.
301	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Naturalized beyond native range? Yes] Widely naturalized and in Hawaii, escaped from cultivation and naturalized near the Volcano House, Laupahoehoi, and Puuulaula, Hawaii.
302	2012. WRA Specialist. Personal Communication.	[Garden/amenity/disturbance weed? No] Scored as an environmental weed.
303	2003. Groves, R.H./Hosking, J.R./Batianoff, G.N. et al.. Weed categories for natural and agricultural ecosystem weed management. Bureau of Rural Sciences, Canberra	[Agricultural/forestry/horticultural weed?] Considered to be a minor agricultural weed in Australia and is being controlled.
303	2003. Monsanto LiTD.. Risk assessment and risk management plan - General Release of Roundup Readyâ canola (Brassica napus) in Australia. http://cera-gmc.org/docs/decdocs/03-353-001.pdf	[Agricultural/forestry/horticultural weed?] An occasional weed of cultivated and disturbed habitats.
303	2012. Canadian Food Inspection Agency. Biology Document BIO2007-01 The biology of Brassica juncea (Canola/Mustard). Canadian Food Inspection Agency, http://www.inspection.gc.ca/plants/plants-with-novel-traits/applicants/biology-documents/bio2007-01/eng/1	[Agricultural/forestry/horticultural weed?] "Despite a long history of cultivation in western Canada, B. juncea has not become an abundant weed, and therefore there is good reason to conclude that it does not have the weedy characteristics of wild mustard and may be less prone than B. napus and B. rapa to become a problem as a volunteer weed. The difference in weed ranking among the cultivated species can be largely attributed to differences in cultivated acreage and, more recently, herbicide resistance in B. napus. However, B. juncea has some attributes that may reduce its weediness in comparison to B. napus, such as shatter resistance, small seed size and thin seed coat in yellow-seeded cultivars."
303	2012. USDA Natural Resources Conservation Service. Brassica juncea (L.) Czern. Brown mustard BRJU - conservation plant characteristics. United States Department of Agriculture, http://plants.usda.gov/java/charProfile?symbol=BRJU	[Agricultural/forestry/horticultural weed? Listed as a noxious weed in Michigan.
304	2008. Swearingen, J.M.. Survey of Invasive Plants Impacting National Parks in the United States. National Park Service, Center for Urban Ecology, Washington, DC http://www.invasive.org/weedus/surveyynps.pdf	[Environmental weed? Yes] Brassica juncea is reported as an invasive species in Lake Mead, Nevada, affecting natural areas in the National Park system. B. juncea is also on numerous state's noxious weed lists.
305	2000. Sanders, A./Minnich, R.. Brassica tournefortii in Bossard, C. C., J.M. Randall, and M. C. Hoshovsky. Invasive Plants of California's Wildlands. University of California Press, Berkeley http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm	[Congeneric weed? Yes] Brassica tournefortii develops dense stands in the Coachella and Imperial valleys appear to suppress native wildflowers. Because of its early phenology, it appears to monopolize available soil moisture as it builds canopy and matures seed long before many native species have begun to flower. In coastal southern California, it locally dominates exotic grasslands in dry, open sites, especially disturbed areas. It expands over larger areas when drought suppresses other exotic annuals such as Bromus rubens, Avena fatua, Brassica geniculata, and Erodium cicutarium. Sahara mustard increases fuel loads and fire hazard in desert scrub and coastal sage scrub. It also establishes from a soil seedbank after fire. "During rains, a sticky gel forms over the seed case that permits seeds to disperse long distances by adhering to animals. The rapid spread of Brassica tournefortii through the Sonoran Desert, with first occurrences along roadsides, may be related to its ability to adhere to automobiles during rare periods of wet weather.
401	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Produces spines, thorns or burrs? No] Glabrate and somewhat glaucous annual herbs 3-12 dm tall, branched above. Lower leaves lyrate-pinnatifid, 10-20 cm long, 5-8 cm wide, upper leaves reduced, eventually becoming linear-lanceolate, margins usually entire, sessile, not clasping the stem. Siliqua (2-)3-4 cm long, the beak 4-9 mm long.
402	2007. Snapp, S.S./Date, K.U./Kirk, W./O'Neil, K./Kremen, A./Bird, G.. Root, shoot tissues of Brassica juncea and Cereal secale promote potato health. Plant Soil. 294: 55-72. http://www.springerlink.com/content/t21738527p268015/fulltext.pdf	[Allelopathic?] This experiment incorporated the biomass of Brassica juncea (used as a cover crop) to evaluate the potential of Brassica to promote potato root and tuber health through the suppression of the fungus Rhizoctonia solani and other soil-borne diseases. "The incorporation or exposure to whole mustard plants was consistently effective at suppressing soil-borne fungi and promoting healthy roots and tubers, especially at higher rates of biomass."

403	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Parasitic? No] Brassicaceae.
404	1989. Semalulu, S.S./Rousseaux, C.G.. Suspected oriental mustard seed (<i>Brassica juncea</i>) poisoning in cattle. Canadian Veterinary Journal. 30: 595-596. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1681090/?page=1	[Unpalatable to grazing animals? No] Cattle in Saskatchewan ate seed of <i>Brassica juncea</i> .
404	2012. USDA Natural Resources Conservation Service. <i>Brassica juncea</i> (L.) Czern. Brown mustard BRJU - conservation plant characteristics. United States Department of Agriculture, http://plants.usda.gov/java/charProfile?symbol=BRJU	[Unpalatable to grazing animals? No] Palatable for a browse animal; palatable for a graze animal; fodder.
405	1989. Semalulu, S.S./Rousseaux, C.G.. Suspected oriental mustard seed (<i>Brassica juncea</i>) poisoning in cattle. Canadian Veterinary Journal. 30: 595-596. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1681090/?page=1	[Toxic to animals?] Acute mustard seed toxicosis was observed in three cattle in Saskatchewan, Canada. The cattle died after grazing on the <i>Brassica juncea</i> seed that had been piled in a field.
405	2012. Specialized Information Services, U.S. National Library of Medicine. TOXNET toxicology data network [online database]. National Institutes of Health, http://toxnet.nlm.nih.gov/	[Toxic to animals?] No evidence of toxicity.
405	2012. USDA Natural Resources Conservation Service. <i>Brassica juncea</i> (L.) Czern. Brown mustard BRJU - conservation plant characteristics. United States Department of Agriculture, http://plants.usda.gov/java/charProfile?symbol=BRJU	[Toxic to animals?] No toxicity.
406	1983. Duke, J.A.. <i>Brassica juncea</i> (L.) Czern - Handbook of Energy Crops. http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_juncea.html	[Host for recognized pests and pathogens?] <i>B. juncea</i> is less susceptible to insect pests and disease than other Indian Brassicas but is susceptible to some.
407	1983. Duke, J.A.. <i>Brassica juncea</i> (L.) Czern - Handbook of Energy Crops. http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_juncea.html	[Causes allergies or is otherwise toxic to humans? No] <i>Brassica juncea</i> is used extensively around the world as a food or medicinal. "Reported to be anodyne, aperitif, diuretic, emetic, rubefacient, and stimulant, Indian Mustard is a folk remedy for arthritis, footache, lumbago, and rheumatism. Seed used for tumors in China. Root used as a galactagogue in Africa. Sun-dried leaf and flower are smoked in Tanganyika to "get in touch with the spirits." Ingestion may impart a body odor repellent to mosquitoes. Believed to be aperient and tonic, the volatile oil is used as a counterirritant and stimulant. In Java the plant is used as an antisiphilitic emmenagogue. Leaves applied to the forehead are said to relieve headache. In Korea, the seeds are used for abscesses, colds, lumbago, rheumatism, and stomach disorders. Chinese eat the leaves in soups for bladder, inflammation or hemorrhage. Mustard oil is used for skin eruptions and ulcers. "
408	2012. USDA Natural Resources Conservation Service. <i>Brassica juncea</i> (L.) Czern. Brown mustard BRJU - conservation plant characteristics. United States Department of Agriculture, http://plants.usda.gov/java/charProfile?symbol=BRJU	[Creates a fire hazard in natural ecosystems? No] Not fire resistant.
409	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Is a shade tolerant plant at some stage of its life cycle? No] Full sun.
409	2012. Missouri Botanical Garden. <i>Brassica juncea</i> . http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/plant-finder/plant-details/kc/a669/brassica-juncea.aspx	[Is a shade tolerant plant at some stage of its life cycle? No] Full sun.

410	1983. Duke, J.A.. Brassica juncea (L.) Czern - Handbook of Energy Crops. http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_juncea.html	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes] "Reported from the African and Eurosiberian Centers of Diversity, Indian Mustard, or cvs thereof is reported to tolerate drought, high pH, insects, low pH, salt, smog, and weeds. According to IBPGR's Genetic Resources of Cruciferous Crops, the oilseed is more properly called Indian Mustard, the leaf mustard, Chinese Mustard." Tolerates soil pH of 4.3-8.3.
410	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)?] Soil pH 5.5-6.0.
411	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Climbing or smothering growth habit? No] Annual herbs 3-12 dm tall.
412	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Forms dense thickets? No] Annual herbs 3-12 dm tall.
501	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Aquatic? No] Annual herb 3-12 dm tall; terrestrial.
502	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Grass? No] Brassicaceae.
503	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Nitrogen fixing woody plant? No] Herbaceous; Brassicaceae.
504	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] Herbaceous without underground storage organs.
601	2012. WRA Specialist. Personal Communication.	[Evidence of substantial reproductive failure in native habitat? No] No evidence. [widely naturalized; long history of use]
602	1983. Duke, J.A.. Brassica juncea (L.) Czern - Handbook of Energy Crops. http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_juncea.html	[Produces viable seed? Yes] Grow from seed.
602	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Produces viable seed? Yes] Grow from seed.
603	1983. Duke, J.A.. Brassica juncea (L.) Czern - Handbook of Energy Crops. http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_juncea.html	[Hybridizes naturally ? Yes] "All varieties of B. campestris, B. napus, and B. juncea, as well as the species themselves, intercross freely, so all must be sufficiently isolated for seed production. B. juncea is two-thirds self-pollinating and one-third insect pollinating."
604	1983. Duke, J.A.. Brassica juncea (L.) Czern - Handbook of Energy Crops. http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_juncea.html	[Self-compatible or apomictic? Yes] "All varieties of B. campestris, B. napus, and B. juncea, as well as the species themselves, intercross freely, so all must be sufficiently isolated for seed production. B. juncea is two-thirds self-pollinating and one-third insect pollinating."
605	2012. Aventis CropScience N.V.. Field evaluation of hybrid and parental Brassica juncea lines - European Notification number: B/BE/01/V3. http://www.biosafety.be/DTB/deliberate-releases-of-transgenic-plants/field-evaluation-of-brassica-juncea-hybrids-and-	[Requires specialist pollinators? No] Pollination of Brassica juncea primarily occurs through wind and by insects.
606	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Reproduction by vegetative fragmentation? No] Annual.

607	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Minimum generative time (years)? 1] Annual.
701	1996. Virtue, J.G.. Improving the assessment of new weed threats: developing techniques with cruciferous weeds of cropping. http://www.caws.org.au/awc/1996/awc199610851.pdf	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Yes] Brassica juncea is naturalized in commercial grain areas in South Australia.
702	1983. Duke, J.A.. Brassica juncea (L.) Czern - Handbook of Energy Crops. http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_juncea.html	[Propagules dispersed intentionally by people? Yes] "Primary center of origin thought to be central Asia (northwest India), with secondary centers in central and western China, eastern India, Burma, and through Iran to Near East. Has been cultivated for centuries in many parts of Eurasia. The principle growing countries are Bangladesh, Central Africa, China, India, Japan, Nepal, and Pakistan, as well as southern Russia north of the Caspian Sea."
702	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Propagules dispersed intentionally by people? Yes] "Brassica juncea has undergone extensive selection in various parts of the world. Several forms cultivated in Hawaii as leafy vegetables were originally domesticated and selected in Chin and Japan"
703	2002. Mulligan, G.A.. Weedy mustards, Brassicaceae (Cruciferae) of Canada. Canadian Field-Naturalist. 116: 623-631. http://weedscanada.ca/Weedy_mustards.htm	[Propagules likely to disperse as a produce contaminant? Yes] "Annual, introduced from Europe as a seed contaminant. Often cultivated for greens. Present in PQ in 1875 (Rousseau 1968) and was collected in a potato field, at Winnipeg, MB, by J. Fletcher in 1896. Cultivated fields, roadsides, and waste places in all provinces from NF to BC. Reaches greatest abundance in Prairie Provinces."
704	2012. Arizona-Sonora Desert Museum. Sahara mustard (Brassica tournefortii) - Invaders citizen scientists combat invasive species -. Arizona-Sonora Desert Museum, http://www.desertmuseum.org/invaders/invaders_saharamustard.php	[Propagules adapted to wind dispersal?] In Brassica tournefortii, the dried plants break off at the base and tumble like Russian thistle (tumbleweed, Salsola tragus), spreading seeds rapidly across the landscape. When wet, the seeds are sticky with mucilage and can be transported long distances by animals and perhaps vehicles.
704	2012. WRA Specialist. Personal Communication.	[Propagules adapted to wind dispersal? Unknown] [perhaps]
705	2012. WRA Specialist. Personal Communication.	[Propagules water dispersed? Unknown]
706	2012. WRA Specialist. Personal Communication.	[Propagules bird dispersed? Unknown]
707	2012. WRA Specialist. Personal Communication.	[Propagules dispersed by other animals (externally)? Unknown] [possibly, Brassica tournefortii does]
708	2012. WRA Specialist. Personal Communication.	[Propagules survive passage through the gut? Unknown]
801	1983. Duke, J.A.. Brassica juncea (L.) Czern - Handbook of Energy Crops. http://www.hort.purdue.edu/newcrop/duke_energy/Brassica_juncea.html	[Prolific seed production (>1000/m ²)?] Seeds about 5,660–6,000 per 0.01 kg (1/3 oz).
801	2012. USDA Natural Resources Conservation Service. Brassica juncea (L.) Czern. Brown mustard BRJU - conservation plant characteristics. United States Department of Agriculture, http://plants.usda.gov/java/charProfile?symbol=BRJU	[Prolific seed production (>1000/m ²)?] Seed per pound: 283,040
802	2012. Aventis CropScience N.V.. Field evaluation of hybrid and parental Brassica juncea lines - European Notification number: B/BE/01/V3. http://www.biosafety.be/DTB/deliberate-releases-of-transgenic-plants/field-evaluation-of-brassica-juncea-hybrids-and-	[Evidence that a persistent propagule bank is formed (>1 yr)?] Survival of Brassica juncea is limited to the seed phase. Seeds can remain dormant for several years under optimal conditions.
802	2012. WRA Specialist. Personal Communication.	[Evidence that a persistent propagule bank is formed (>1 yr)? Unknown]
803	2012. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown]

804	2012. USDA Natural Resources Conservation Service. <i>Brassica juncea</i> (L.) Czern. Brown mustard BRJU - conservation plant characteristics. United States Department of Agriculture, http://plants.usda.gov/java/charProfile?symbol=BRJU	[Tolerates, or benefits from, mutilation, cultivation, or fire? No] Not fire resistant.
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]

Summary of Risk Traits

High Risk Traits

- Widely naturalized
- Minor agricultural weed
- Environmental weed
- Broad environmental tolerance
- Seed is possibly toxic to cattle
- Wide soil tolerance
- Self compatible
- Hybridizes naturally
- Unintentional dispersal through agricultural practices
- Possibly prolific seed production

Low Risk Traits

- No spines, thorns, burrs (aid management and limits dispersal)
- Not toxic to humans
- Not a fire hazard
- Not shade tolerant
- Doesn't reproduce by vegetative fragments.