

Family: *Brassicaceae*

Taxon: *Barbarea vulgaris*

Synonym: *Barbarea arcuata* (Opiz ex J. Presl & C. Presl) **Common Name:** bittercress
B. vulgaris var. *arcuata* (Opiz ex J. Presl & C. Presl) rocket cress
Campe barbarea (L.) W. Wight ex Piper wintercress
Erysimum arcuatum Opiz ex J. Presl & C. Presl yellow rocket
Erysimum barbarea L.

Questionnaire : current 20090513 **Assessor:** Assessor **Designation:** H(HPWRA)
Status: Assessor Approved **Data Entry Person:** Assessor **WRA Score** 17

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)	Low
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	Intermediate
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)	
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)	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	
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	
405	Toxic to animals	y=1, n=0	y
406	Host for recognized pests and pathogens	y=1, n=0	y
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y

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	
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	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	y
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	y=1, n=-1	y
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	

Designation: H(HPWRA)

WRA Score 17

Supporting Data:

101	2010. Flora of North America Editorial Committee. Flora of North America: North of Mexico, Volume 7. Magnoliophyta: Salicaceae to Brassicaceae. Oxford University Press, Oxford, UK	[Is the species highly domesticated? No] "Several varieties have been recognized, and they represent some of the many points along one continuum. In my opinion, it is better not to recognize any infraspecific taxa in North America."
102	2013. WRA Specialist. Personal Communication.	NA
103	2013. WRA Specialist. Personal Communication.	NA
201	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Species suited to tropical or subtropical climate(s) 2-High] "Barbarea vulgaris is probably of Mediterranean origin (J. Vaughan pers. commun.) and is now cosmopolitan in temperate regions." ... "Barbarea vulgaris has an obligate requirement for vernalization; its southward spread, in terms of successful reproduction, is limited to areas with several weeks at 5°C or less"
202	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Quality of climate match data? 1-High]
203	2010. Flora of North America Editorial Committee. Flora of North America: North of Mexico, Volume 7. Magnoliophyta: Salicaceae to Brassicaceae. Oxford University Press, Oxford, UK	[Broad climate suitability (environmental versatility)? Yes. Distribution in temperate regions, and elevation range exceeding 1000 m, demonstrate environmental versatility] "Waste places, ditches, riverbanks, damp grasslands, roadsides, fields, disturbed sites; 0-3000 m"
204	2001. Wu, Z.Y./Raven, P.H. (eds.). Flora of China. Vol. 8 (Brassicaceae through Saxifragaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Native or naturalized in regions with tropical or subtropical climates? Presumably Yes. Occurs in Sri Lanka and India] "Along ditches, river banks, damp grasslands, waste places, roadsides, fields, disturbed sites; 700–4100 m. Heilongjiang, Jiangsu, Jilin, Xinjiang [India, Japan, Kashmir, Kazakstan, Korea, Mongolia, Pakistan, Russia, Sri Lanka, Tajikistan; SW Asia, Europe; naturalized elsewhere]."
205	2001. Hanelt, P. (ed.). Mansfeld's Encyclopedia of Agricultural and Horticultural Crops (except Ornamentals), Volume 1. Springer-Verlag, Berlin, Heidelberg, New York	[Does the species have a history of repeated introductions outside its natural range? Yes] "Wild in Europe and W Asia, but it has been often introduced to other continents."
301	1988. Webb, C. J./Sykes, W.R./Garnock-Jones, P.J.. Flora of New Zealand, Volume IV: Naturalised pteridophytes, gymnosperms, dicotyledons. Botany Division, DSIR, Christchurch, New Zealand http://FloraSeries.LandcareResearch.co.nz	[Naturalized beyond native range? Yes. New Zealand] "N.: Auckland, Rotorua; S.: Marlborough (Kaikoura), Canterbury, Westland, Otago, Southland. "
301	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Naturalized beyond native range? Yes] "Distribution: Great Basin, northern Sierra Nevada, and southern North Coast Ranges, to 1000 m. Expected to expand its range in California. Most contiguous states, except a few southern and western states."
301	2013. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Naturalized beyond native range? Yes] "Naturalized: AUSTRALASIA New Zealand: New Zealand NORTHERN AMERICA Canada United States SOUTHERN AMERICA Southern South America: Argentina - Chubut, Rio Negro"
302	2013. WRA Specialist. Personal Communication.	[Garden/amenity/disturbance weed? A disturbance adapted weed that impacts agriculture. See 3.03]
303	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Agricultural/forestry/horticultural weed? Yes] "Barbarea vulgaris is an important weed of small-seeded grain and hay crops in Ontario (Alex and Switzer 1983). Out of seven major weed species in spring wheat in Russia, <i>Barbarea vulgaris</i> caused the third greatest reductions in crop yield (Nesterova and Chukanova 1981). This weediness is based on a combination of rapid increase in numbers (Fertig 1968), inedibility of the rachis at maturity (which causes rejection by cows of hay containing the rachis (Fertig 1963; Dutt et al. 1982), long-term seed dormancy and intermittent recruitment. " ... "Barbarea vulgaris is one of the worst weeds in vegetable and small fruit fields in Belgium (Himme et al. 1984, 1985)."

303	2006. NatureServe. Invasive Species Assessment Protocol: U.S. National Assessments - <i>Barbarea vulgaris</i> . www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsm91_054506.pdf	[Agricultural/forestry/horticultural weed? Yes] "It is an important agricultural weed, regulated as a noxious weed seed in at least 6 states. From its usual initial establishment points of cultivated fields or waste places, it can spread to a variety of upland and wetland habitats, including prairies/grasslands, upland forests and woodlands, riparian herbaceous vegetation and wet meadows, wetland forests (riparian and swamps), and partially open upland habitats (old fields and forest edges)."
304	2006. NatureServe. Invasive Species Assessment Protocol: U.S. National Assessments - <i>Barbarea vulgaris</i> . www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsm91_054506.pdf	[Environmental weed? No] "Although it can achieve reasonably high abundance in invaded areas, especially areas with intermittent disturbance, it does not appear to have significant impacts on biodiversity; the species is a weak competitor and does not influence ecosystem processes. Control is easily accomplished through hand-pulling, mowing, or herbicide, although the seed bank may persist for 10 years or more." ... 'No mention of disproportionate impacts on particular native species found in the literature; assumption is that any impacts are not significant.'
305	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Congeneric weed? Yes. Numerous references list <i>Barbarea intermedia</i> , <i>Barbarea stricta</i> , & <i>Barbarea verna</i> as weeds]
401	1988. Webb, C. J./Sykes, W.R./Garnock-Jones, P.J.. Flora of New Zealand, Volume IV: Naturalised pteridophytes, gymnosperms, dicotyledons. Botany Division, DSIR, Christchurch, New Zealand http://FloraSeries.LandcareResearch.co.nz	[Produces spines, thorns or burrs? No] "Glabrous biennial to perennial. Stems branched above, 30-60-(100) cm tall. Rosette lvs lyrate-pinnate, (5)-10-20-(25) x 1-3-(4) mm; terminal lobe rounded-oblong; lateral lobes in (0)-1-3-(5) pairs, the distal pair > width of terminal lobe; margins toothed or sinuate. Upper stem lvs becoming simple, obovate or ovate, coarsely toothed."
402	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Allelopathic? Possibly] "The species is not known to be allergenic. However, some evidence indicates allelochemic (Gresser and Holm 1964) or toxic compounds are produced (erucic acid and goiterin, a haemolytic compound (Appelqvist, pers. Commun.)."
403	1988. Webb, C. J./Sykes, W.R./Garnock-Jones, P.J.. Flora of New Zealand, Volume IV: Naturalised pteridophytes, gymnosperms, dicotyledons. Botany Division, DSIR, Christchurch, New Zealand http://FloraSeries.LandcareResearch.co.nz	[Parasitic? No] "Glabrous biennial to perennial." [Brassicaceae]
404	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Unpalatable to grazing animals Depends on the stage] "While the early stages of growth of yellow rocket (prior to silique formation) are relatively high in protein and low in fibre, the later stages are inedible, low in nutritive value and result in the refusal of hay (in which stems of <i>B. vulgaris</i> are mixed) by cows and goats (Schreiber and Fertig 1955; Dutt et al. 1963). Ensiling may overcome some of the problem and at least kills the seeds which otherwise pass through the animals and may be spread with manure or refuse hay (Fertig et al. 1963; Andersen 1968; Staniforth 1975)."
405	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Toxic to animals? Yes, if ingested in large quantities] "Mammals which eat large amounts of isothiocyanates may suffer from their toxic (e.g. from nitriles) and sometimes goitrogenic effects (Kjaer 1960)."
405	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Toxic to animals? Yes, if ingested in large quantities] "Like many species in the mustard family, yellow rocket foliage and especially the seeds contain glucosinolates and can cause digestive tract irritation when ingested in a large quantity. Thyroid dysfunction can develop when quantities of plant material are ingested over time. Livestock confined to pastures that consist primarily of yellow rocket and other members of the family are most likely to exhibit toxicity problems. Symptoms can include colic, diarrhea, excessive salivation, weight loss, neurological disturbances and thyroid enlargement."
406	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Host for recognized pests and pathogens? Yes] "A list of diseases of <i>B. vulgaris</i> in North America includes: <i>Albugo candida</i> (Pers. Ex Chev.) Kuntze, white-rust; <i>Alternaria</i> sp., leaf spot; <i>Cercospora barbarea</i> (Sacc.) Chupp, leaf spot; <i>Peronospora parasitica</i> Pers. ex Fr., downy mildew; <i>Ramularia barbareae</i> Pk., leaf spot; <i>Sclerotium rofsii</i> Sacc., stem rot; <i>Xanthomonas barbareae</i> Burkh., black rot; <i>Ragoletis verrucosans</i> , curly top virus; <i>Aureogenus vastans</i> , yellow dwarf virus (all the above from Anonymous (1960)); potato-yellow dwarf virus (King 1966); cucumber mosaic virus Bruckart and Lorbeer 1976; Rist and Lorbeer 1989); <i>Plasmodiophora brassicae</i> Wor. (Connors 1961); <i>Spiroplasma citri</i> which causes brittle root disease of horseradish (O'Hayer et al. 1982); <i>Sclerotinia</i> spp. (in the seedling stage, or after mechanical damage to rosettes, Morgan (1971)). In Europe it is also a host of <i>Erysimum latent virus</i> (Shukla et al. 1976)."

406	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Host for recognized pests and pathogens? Yes] "Yellow rocket is a host to several pests and diseases that affect vegetable crops, including certain nematodes, cucumber mosaic virus, curly top virus, and potato yellow dwarf virus."
407	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Causes allergies or is otherwise toxic to humans? Unknown] "The species is not known to be allergenic. However, some evidence indicates allelochemic (Gresser and Holm 1964) or toxic compounds are produced (erucic acid and goiterin, a haemolytic compound (Appelqvist, pers. Commun.)."
407	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Causes allergies or is otherwise toxic to humans? No evidence] "Occasionally humans consume the young leaves as salad greens or as a cooked vegetable." [See toxic effects to animals. 4.05]
407	2013. Plants for a Future Database. <i>Barbarea vulgaris</i> . http://www.pfaf.org/user/Plant.aspx?LatinName=Barbarea+vulgaris [Accessed 25 Oct 2013]	[Causes allergies or is otherwise toxic to humans? Possibly] "There is a report that ingestion of the leaves can lead to kidney malfunction[222]."
408	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Creates a fire hazard in natural ecosystems? No evidence. Short lived herbaceous plant] "Throughout its range, yellow rocket is an early spring dominant and is abundant in early successional stages on disturbed sites (Kott 1963; Rabotnov 1964; Werner 1977 ; Keever 1980). It has had a long history of occupation of disturbed or briefly available habitats (Salisbury 1942)."
409	1996. Rutledge, C.R./McLendon, T.. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Northern Prairie Wildlife Research Center Online, Jamestown, ND http://www.npwrc.usgs.gov/resource/plants/explanation/index.htm	[Is a shade tolerant plant at some stage of its life cycle? Yes] Response to shade: Can grow in open (bare ground) to woodland (with complete canopy cover)."
409	2013. Learn 2 Grow. <i>Barbarea vulgaris</i> . http://www.learn2grow.com/plants/barbarea-vulgaris/ [Accessed 25 Oct 2013]	[Is a shade tolerant plant at some stage of its life cycle?] "They grow well in full sun to partially shaded location."
410	2013. Plants for a Future Database. <i>Barbarea vulgaris</i> . http://www.pfaf.org/user/Plant.aspx?LatinName=Barbarea+vulgaris [Accessed 25 Oct 2013]	[Tolerates a wide range of soil conditions? Yes] "Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well drained soil. Suitable pH: acid, neutral and basic (alkaline) soils."
411	1988. Webb, C. J./Sykes, W.R./Garnock-Jones, P.J.. Flora of New Zealand, Volume IV: Naturalised pteridophytes, gymnosperms, dicotyledons. Botany Division, DSIR, Christchurch, New Zealand http://FloraSeries.LandcareResearch.co.nz	[Climbing or smothering growth habit? No] "Glabrous biennial to perennial. Stems branched above, 30-60-(100) cm tall. Rosette lvs lyrate-pinnate, (5)-10-20-(25) x 1-3-(4) mm; terminal lobe rounded-oblong; lateral lobes in (0)-1-3-(5) pairs, the distal pair > width of terminal lobe; margins toothed or sinuate. Upper stem lvs becoming simple, obovate or ovate, coarsely toothed. "
412	1996. Rutledge, C.R./McLendon, T.. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Northern Prairie Wildlife Research Center Online, Jamestown, ND http://www.npwrc.usgs.gov/resource/plants/explanation/index.htm	[Forms dense thickets? No] "Ecological distribution: Riparian or other moist communities. Gardens, clover and alfalfa fields, small grain fields, pastures, stream banks, moist woods, waste places, and roadsides. Common in recently disturbed areas and is considered an early succession species."
501	1988. Webb, C. J./Sykes, W.R./Garnock-Jones, P.J.. Flora of New Zealand, Volume IV: Naturalised pteridophytes, gymnosperms, dicotyledons. Botany Division, DSIR, Christchurch, New Zealand http://FloraSeries.LandcareResearch.co.nz	[Aquatic? No] "Rather rare and local on waste land and pasture, especially in wet soils."
502	1988. Webb, C. J./Sykes, W.R./Garnock-Jones, P.J.. Flora of New Zealand, Volume IV: Naturalised pteridophytes, gymnosperms, dicotyledons. Botany Division, DSIR, Christchurch, New Zealand http://FloraSeries.LandcareResearch.co.nz	[Grass? No] "Glabrous biennial to perennial." [Brassicaceae]
503	1988. Webb, C. J./Sykes, W.R./Garnock-Jones, P.J.. Flora of New Zealand, Volume IV: Naturalised pteridophytes, gymnosperms, dicotyledons. Botany Division, DSIR, Christchurch, New Zealand http://FloraSeries.LandcareResearch.co.nz	[Nitrogen fixing woody plant? No] "Glabrous biennial to perennial." [Brassicaceae]
504	2001. Wu, Z.Y./Raven, P.H. (eds.). Flora of China. Vol. 8 (Brassicaceae through Saxifragaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Herbs biennial or rarely perennial, glabrous throughout or sparsely hairy. Stems (20-)30-80(-100) cm tall, erect, angled, branched above."

601	2013. WRA Specialist. Personal Communication.	[Evidence of substantial reproductive failure in native habitat? No evidence]
602	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Produces viable seed? Yes] "Reproduces by seed. Seed production is often high."
603	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Hybridizes naturally? Unknown] "Given the taxonomic difficulties with this genus, the possibility of hybridization is difficult to evaluate." ... "Hinds (1986) found that some collections from New Brunswick were intermediate between <i>Barbarea orthoceras</i> and <i>B. vulgaris</i> , thus they may represent hybridization."
604	2008. Van Leur, H.. Genetics, chemistry and ecology of a qualitative glucosinolate polymorphism in <i>Barbarea vulgaris</i> . PhD Dissertation. Wageningen University, Wageningen, Netherlands	[Self-compatible or apomictic? Yes, but seed set is low] "Even though <i>B. vulgaris</i> has been reported to be a self-compatible plant (Lawalrée, 1955), selfings yielded very few viable seeds."
604	2013. Plants for a Future Database. <i>Barbarea vulgaris</i> . http://www.pfaf.org/user/Plant.aspx?LatinName=Barbarea+vulgaris [Accessed 25 Oct 2013]	[Self-compatible or apomictic? Yes] "The plant is self-fertile."
605	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Requires specialist pollinators? No] "The reliance on outcrossing and on pollination by nonspecific Hymenoptera suggests a likelihood of hybridization."
605	2013. Plants for a Future Database. <i>Barbarea vulgaris</i> . http://www.pfaf.org/user/Plant.aspx?LatinName=Barbarea+vulgaris [Accessed 25 Oct 2013]	[Requires specialist pollinators? No] "The flowers are hermaphrodite (have both male and female organs) and are pollinated by Flies, bees, beetles, self."
606	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Reproduction by vegetative fragmentation? No] "Reproduces by seed. Seed production is often high."
607	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Minimum generative time (years)? 2] "Plants exists as rosettes until flower stems develop at maturity, typically in the second season."
701	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Yes] "Most seeds are ejected a short distance from the parent plant when pods snap open, but some can disperse to greater distances with water, soil movement, agricultural equipment, as a seed and feed contaminant, and by clinging to animals, the shoes and clothing of humans, and vehicle tires."
702	2010. Flora of North America Editorial Committee. Flora of North America: North of Mexico, Volume 7. Magnoliophyta: Salicaceae to Brassicaceae. Oxford University Press, Oxford, UK	[Propagules dispersed intentionally by people? Yes] "...sometimes grown as a potherb..."
703	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Propagules likely to disperse as a produce contaminant? Yes] "Most seeds are ejected a short distance from the parent plant when pods snap open, but some can disperse to greater distances with water, soil movement, agricultural equipment, as a seed and feed contaminant, and by clinging to animals, the shoes and clothing of humans, and vehicle tires."
704	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Propagules adapted to wind dispersal? No] "Most seeds are ejected a short distance from the parent plant when pods snap open, but some can disperse to greater distances with water, soil movement, agricultural equipment, as a seed and feed contaminant, and by clinging to animals, the shoes and clothing of humans, and vehicle tires."
705	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Propagules water dispersed? Yes] "Most seeds are ejected a short distance from the parent plant when pods snap open, but some can disperse to greater distances with water..."
706	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Propagules bird dispersed? No] "Most seeds are ejected a short distance from the parent plant when pods snap open, but some can disperse to greater distances with water, soil movement, agricultural equipment, as a seed and feed contaminant, and by clinging to animals, the shoes and clothing of humans, and vehicle tires."
707	1996. Rutledge, C.R./McLendon, T.. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Northern Prairie Wildlife Research Center Online, Jamestown, ND http://www.npwr.usgs.gov/resource/plants/explan/t/index.htm	[Propagules dispersed by other animals (externally)? Yes] "Seeds are coated with adhesive mucus which can promote attachment to animals."

707	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Propagules dispersed by other animals (externally)? Yes] "Most seeds are ejected a short distance from the parent plant when pods snap open, but some can disperse to greater distances with water, soil movement, agricultural equipment, as a seed and feed contaminant, and by clinging to animals, the shoes and clothing of humans, and vehicle tires."
708	1996. Rutledge, C.R./McLendon, T.. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Northern Prairie Wildlife Research Center Online, Jamestown, ND http://www.npwrc.usgs.gov/resource/plants/explanation/index.htm	[Propagules survive passage through the gut? Yes] "Remain viable after passing through the digestive tracts of cattle, horses, and pigs."
708	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Propagules survive passage through the gut? Yes] "Some seeds survive ingestion by animals."
801	1996. Rutledge, C.R./McLendon, T.. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Northern Prairie Wildlife Research Center Online, Jamestown, ND http://www.npwrc.usgs.gov/resource/plants/explanation/index.htm	[Prolific seed production (>1000/m ²)? Yes] "Salisbury 0942), in a random sample of 25 siliques, found that seed number ranged from 3 to 21 per silique with an average of 13 + 0.56 (SE). The average seed weight in a sample of 172 seeds was 0.0006 g and the average number of seeds for a large plant was 38 000."
802	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Evidence that a persistent propagule bank is formed (>1 yr)? Yes] "Baskin and Baskin (1989) buried fresh seeds of <i>B. vulgaris</i> 7 cm deep in soil in nylon mesh bags in an unheated greenhouse in Kentucky' Seed samples were exhumed monthly for over 2 yr. They found that exhumed seeds could germinate in any month of the growing season but would not germinate while buried. Baskin and Baskin (1989) buried fresh seeds of <i>B. vulgaris</i> 7 cm deep in soil in nylon mesh bags in an unheated greenhouse in Kentucky' Seed samples were exhumed monthly for over 2 yr. They found that exhumed seeds could germinate in any month of the growing season but would not germinate while buried."
802	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Evidence that a persistent propagule bank is formed (>1 yr)? Yes] "Seeds have been reported to survive for up to 10-20 years under field conditions."
803	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Well controlled by herbicides? Yes] "In established alfalfa in the northeastern United States applications of simazine, atrazine or terbacil on 15 Sept. gave effective control of <i>Barbarea vulgaris</i> rosettes (Hastings and Kust 1970b). In Quebec alfalfa fields metribuzin at 0.56 kg ha ⁻¹ pre-emergence gave fairly good control while 2,4-DB at 1.4-1.68 kg ha ⁻¹ gave very good control (Ferron 1974). Ferron (1974) also reported that MCPAamine or -ester and 2, -D-amine, all at 0.42-0.56 kg ha ⁻¹ postemergence gave good control but 2,4-D-ester was not effective in oats, herbage legumes and newly established alfalfa. Fawcett and Jennings (1978) state that 2,4-D controls <i>B. vulgaris</i> in pastures. In oats, chlorbromuron was satisfactory (Ferron 1974). Other herbicides which have been used to control <i>B. vulgaris</i> include chloroluron and bromoxynil (Fedorushenko 1973), lenacil (Lobanov 1973), chorsulfuron (Smirnov and Zakherenko 1984) and flurochloridone and pyridate (Bayer 1986). Herbicides applied in arable land usually encounter seedlings or young rosettes of <i>B. vulgaris</i> ."
804	1991. MacDonald, M.A./Cavers, P.B.. The biology of Canadian weeds.: 97. <i>Barbarea vulgaris</i> R. Br.. Canadian Journal of Plant Science. 71(1): 149-166.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Muenscher (1980) suggested disking or harrowing badly infested fields in late summer and early autumn, and mowing low enough to cut off all the flowering stalks. However, rosettes which are clipped and root systems which are fragmented often regenerate. Plants which have produced seeds should not be clipped because the seeds are dispersed (and will be viable even if the inflorescence is still green when clipped) and the basal rosettes regenerate (Schreiber 1962; MacDonald, unpublished)."
805	2012. Wagner, W.L./Herbst, D.R./Khan, N./Flynn, T.. Hawaiian Vascular Plant Updates: A Supplement to the Manual of the Flowering Plants of Hawai'i & Hawai'i's Ferns & Fern Allies. http://botany.si.edu/pacificislandbiodiversity/hawaii_anflora/supplement.htm	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown] Not reported to be present in the Hawaiian Islands

Summary of Risk Traits

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m
- Widely naturalized
- A disturbance-adapted agricultural weed
- Related *Barbarea* species have become invasive
- Unpalatable at later growth stage
- Toxic to cattle and other animals if consumed in large quantities
- Host of crop pathogens
- Shade tolerant
- Tolerates many soil types
- Self-compatible (with lowered seed set)
- Typically reaches maturity in 2 years
- Seeds easily dispersed by sticking to animals, people, or machinery
- Viable seeds may be dispersed after ingestion by animals
- Prolific seed production
- Forms a long-lived seed bank (10-20 years)
- Will resprout after rosettes or roots are cut

Low Risk Traits

- *Barbarea vulgaris* has an obligate requirement for vernalization
- An early successional species
- Unarmed (no spines, thorns or burrs)
- Occasionally consumed as a salad green or a cooked vegetable
- Does not spread vegetatively
- Well-controlled by herbicides