

<i>Camelina sativa</i> (Gold-of-pleasure, False flax)		Answer	Score
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to FL climates (USDA hardiness zones; 0-low, 1-intermediate, 2-high)	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)	y	1
2.04	Native or naturalized in regions with an average of 11-60 inches of annual precipitation	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed	y	2
3.03	Weed of agriculture	?	
3.04	Environmental weed	?	
3.05	Congeneric weed	n	0
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	y	1
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	n	-1
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens	n	0
4.07	Causes allergies or is otherwise toxic to humans	n	0
4.08	Creates a fire hazard in natural ecosystems	?	
4.09	Is a shade tolerant plant at some stage of its life cycle	unk	0
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	?	
4.11	Climbing or smothering growth habit	n	0
4.12	Forms dense thickets	n	0
5.01	Aquatic	n	0
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1
6.03	Hybridizes naturally	n	-1
6.04	Self-compatible or apomictic	y	1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	n	-1
6.07	Minimum generative time (years)	1	1

7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y	1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	y	1
7.04	Propagules adapted to wind dispersal	n	-1
7.05	Propagules water dispersed	n	-1
7.06	Propagules bird dispersed	n	-1
7.07	Propagules dispersed by other animals (externally)	n	-1
7.08	Propagules dispersed by other animals (internally)	n	-1
8.01	Prolific seed production	y	1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	n	-1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation		
8.05	Effective natural enemies present in U.S.		
Total Score		4	
Implemented Pacific Second Screening		Yes	
Risk Assessment Results		Evaluate further	

	Reference	Source data
1.01	1. McVay, K.A. et al. 2008 (revised). Camelina Production in Montana. MontGuide, Montana State University. MT200701AG.	Cultivated, but no evidence of selection for reduced weediness. 1. Evidence of cultivation dating back as early as 600 BC in the Rhine River Valley.
1.02		
1.03		
2.01	1. PERAL NAPPFAST Global Plant Hardiness (http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lgnd.tif). 2. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924 (02 June 2008). 3. McVay, K.A. et al. 2008 (revised). Camelina Production in Montana. MontGuide, Montana State University. MT200701AG.	No computer analysis was performed. 1. Native global plant hardiness zones (NAPPFAST: 1-9; USDA: 3-9). 2. Asia-Temperate -- Armenia, Azerbaijan, China, Georgia, Kazakhstan, Mongolia, Russian Federation (Ciscaucasia, Dagestan); Europe -- Albania, Austria, Belarus, Belgium, Bulgaria, Czechoslovakia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Romania, Sweden, Switzerland, Ukraine, United Kingdom. 3. Native to Central Asia and the Mediterranean with both annual and winter annual biotypes known to exist.
2.02		No computer analysis was performed. Native range is well known; refer to source data from 2.01.
2.03	1. Köppen-Geiger climate map (http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf). 2. Refer to all references in question 2.01.	1. Distribution in the native and cultivated ranges is very widespread and occurs in more than 3 climatic groups.
2.04	1. Globalis (http://globalis.gvu.unu.edu/ [Accessed: 9/30/2010]).	1. 0-2000 mm (0-79 in) in Asia-Temperate -- Armenia, Azerbaijan, China, Georgia, Kazakhstan, Mongolia, Russian Federation (Ciscaucasia, Dagestan); 100-1000 mm (4-39 in) in Europe -- Albania, Austria, Belarus, Belgium, Bulgaria, Czechoslovakia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Romania, Sweden, Switzerland, Ukraine, United Kingdom.

2.05	<p>1. McVay, K.A. et al. 2008 (revised). <i>Camelina</i> Production in Montana. MontGuide, Montana State University. MT200701AG. 2. USDA, NRCS. 2010. The PLANTS Database (http://plants.usda.gov, 30 September 2010). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 3. ISSG Database, http://www.issg.org/database/welcome/. Accessed: 9/23/2010.</p>	<p>1. <i>Camelina</i> has just recently been introduced to Montana. 2. Present in lower 48 states of continental USA except for AK, AL, CA, CO, FL, GA, IN, MS, NV, TN, TX and HI. 3. <i>C. sativa</i> is economically important as a human food due to its oil. Further economic importance includes its potential as a petroleum substitute/alcohol. <i>C. sativa</i> together with other oilseed crops, have garnered interest as potential sources of biodiesel (WSSA, 2008). <i>C. sativa</i> has attracted interest as an oil crop because of its ability to grow in various climatic conditions, low nutrient requirements and resistance to disease and pests (Francis & Warwick, 2009). Furthermore, the cultivated seed oil from this species was previously used as a food or lamp oil, and sometimes it was used for soap and dye production. It was formerly used for medicinal purposes, and today it is still sometimes applied in the veterinary medicine (Hanelt, 2001).</p>
3.01	<p>1. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948 [Accessed: 8/11/2010]).</p>	<p>1. Naturalized widely elsewhere.</p>
3.02	<p>1. ISSG Database, http://www.issg.org/database/welcome/. Accessed: 9/23/2010.</p>	<p>1. Occurs in ruderal/disturbed areas such as roadsides, railways and waste places or weedy places.</p>
3.03	<p>1. Rice, P.M. . INVADERS Database System (http://invader.dbs.umt.edu). Division of Biological Sciences, University of Montana, Missoula, MT 59812-4824. Accessed: 9/30/2010. 2.a-b. ISSG Database, http://www.issg.org/database/welcome/. Accessed: 9/23/2010. 3. Holm, L. et al. 1979. A Geographical Atlas of World Weeds. John Wiley and Sons, New York.</p>	<p>Cannot be determined at this time. 1. Collected by J.W. Blankinship as a weed in grain fields: Bozeman, MT (1898), Belgrade, MT (1901). 2.a. Occurs in agricultural areas, range/grasslands, and fields (grain, flax, alfalfa). 2.b. It has been considered an agricultural weed; however, <i>C. sativa</i> is primarily a minor weed in flax and not often a problem in other crops.</p>
3.04	<p>1. ISSG Database, http://www.issg.org/database/welcome/. Accessed: 9/23/2010.</p>	<p>Cannot be determined at this time. 1.a. Occurs in grasslands, prairies, scrub/shrublands, open woods, and lakeshores. 1.b. It has been considered an environmental weed.</p>
3.05	<p>1. Holm, L. et al. 1979. A Geographical Atlas of World Weeds. John Wiley and Sons, New York.</p>	<p>1. One or more taxa within the genus are present in literature but not as a serious or principal weed.</p>
4.01		<p>No evidence.</p>
4.02	<p>1. Strattpm, A. et al. 2007. <i>Camelina</i> . Institute for Agriculture and Trade Policy, Rural Communities Program. iatp.org. Accessed: 9/28/2010. 2. ISSG Database, http://www.issg.org/database/welcome/. Accessed: 9/23/2010.</p>	<p>1. Allelopathic. 2. It has been described as an allelopathic crop affecting other crops.</p>

4.03		No evidence.
4.04	1. Strattpm, A. et al. 2007. <i>Camelina</i> . Institute for Agriculture and Trade Policy, Rural Communities Program. iatp.org. Accessed: 9/28/2010. 2. Pilgeram, A.L. et al. 2007. <i>Camelina sativa</i> , A Montana Omega-3 and Fuel Crop. In: Issues in new crops and new uses. J. Janick and A. Whipkey (eds.). ASHS Press, Alexandria, VA.	1. Uses and potential markets: livestock and pet feed. 2. The palatability of the crop when green is not lost on grazing animals including antelope in Montana.
4.05	1. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948 [Accessed: 8/11/2010]). 2. Strattpm, A. et al. 2007. <i>Camelina</i> . Institute for Agriculture and Trade Policy, Rural Communities Program. iatp.org. Accessed: 9/28/2010. 3.a-b. McVay, K.A. et al. 2008 (revised). <i>Camelina</i> Production in Montana. MontGuide, Montana State University. MT200701AG.	1. Animal food: fodder (seeds used in the birdseed trade). 2. Uses and potential markets: livestock and pet feed; birdseed. 3.a. <i>Camelina</i> meal was utilized for livestock. 3.b. <i>Camelina</i> meal has the potential to enhance the food quality of fish, meat, poultry and dairy products. It can be used for production of omega-3 enriched feed products, but high concentrations must be avoided due to anti-nutritive compounds called glucosinolates, which can reduce livestock performance and health.
4.06	1. Strattpm, A. et al. 2007. <i>Camelina</i> . Institute for Agriculture and Trade Policy, Rural Communities Program. iatp.org. Accessed: 9/28/2010. 2. Davis, P.B. <i>The invasion potential and competitive ability of Camelina sativa (L.) Crantz (Camelina) in rangeland ecosystems</i> . Diss. Montana State University, 2010. Bozeman, Montana.	<i>C. sativa</i> is a host for some recognized pathogens, but it does not appear to be a significant primary host (i.e., there are suitable alternative or alternate hosts). 1. Diseases and pests in trials have not warranted control measures, but some concerns include: downy mildew (<i>Peronospora camelinae</i>); Turnip Yellow Mosaic virus; blackleg (<i>Lepotosphacria maculans</i>), <i>Camelina</i> is highly resistant; black spot (<i>Alternaria brassicae</i>), <i>Camelina</i> is highly resistant; flea beetle, is a known <i>Camelina</i> pest but not a severe problem. 2. <i>Peronospora camelinae</i> Gaum (downy mildew) has been observed as a problem west of the continental divide in Montana (McVay and Lamb 2008).
4.07	1. Strattpm, A. et al. 2007. <i>Camelina</i> . Institute for Agriculture and Trade Policy, Rural Communities Program. iatp.org. Accessed: 9/28/2010. 2.a-b. McVay, K.A. et al. 2008 (revised). <i>Camelina</i> Production in Montana. MontGuide, Montana State University. MT200701AG.	1. Uses and potential markets: edible oil, cosmetics. 2.a. <i>Camelina</i> oil was utilized for cooking and fuel oil. 2.b. Can increase nutritional value to a range of baked goods and spreads, and potential health benefits of omega-3.

4.08	1. Guo, David. "Power Plant: Camelina finding new purpose as biofuel source." Pittsburgh Post-Gazette 27 July 2008. 2. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010. 2. Pilgeram, A.L. et al. 2007. <i>Camelina sativa</i> , A Montana Omega-3 and Fuel Crop. In : Issues in new crops and new uses. J. Janick and A. Whipkey (eds.). ASHS Press, Alexandria, VA.	1. One of the most vital things to monitor, is moisture content. Camelina's oiliness can spell barn fire in a flash. Safety guidelines call for camelina to be stored at no more than 8 percent humidity. For safe storage, 6 percent is the ideal, while at 10 percent concerns arise about spontaneous combustion. Jim Neuburger had little trouble imagining what a camelina-fueled wildfire might look like, given that the plant is 40 percent oil. 2. The cultivated seed oil from this species was previously used as a lamp oil. 3. The Romans used camelina oil for lamp fuel.
4.09		No evidence.
4.10	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010.	1. Dry sandy soils; prefers well-drained soils.
4.11		
4.12		
5.01	1. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948 [Accessed: 8/11/2010]).	1. Family: <i>Brassicaceae</i>
5.02	1. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948 [Accessed: 8/11/2010]).	1. Family: <i>Brassicaceae</i>
5.03	1. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948 [Accessed: 8/11/2010]).	1. Family: <i>Brassicaceae</i>
5.04	1. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948 [Accessed: 8/11/2010]).	1. Family: <i>Brassicaceae</i>
6.01		No evidence.
6.02	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010. 2. McVay, K.A. et al. 2008 (revised). Camelina Production in Montana. MontGuide, Montana State University. MT200701AG.	1. The propagule of reproduction of <i>C. sativa</i> is the seed. 2. Camelina seed that makes good soil contact after harvest usually germinates within two to three weeks following the first significant rain event.
6.03		No evidence.

6.04	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010.	1. The seeds result from either self-pollination, or cross pollination by visiting insects; seeds are hermaphroditic.
6.05	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010.	1. Cross-pollination by visiting insects.
6.06	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010.	1. The propagule of reproduction of <i>C. sativa</i> is the seed.
6.07	1. Strattpm, A. et al. 2007. <i>Camelina</i> . Institute for Agriculture and Trade Policy, Rural Communities Program. iatp.org . Accessed: 9/28/2010	1. Reaches maturity late June to early August (when sown in late November to early December)
7.01	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010. 2. McVay, K.A. et al. 2008 (revised). <i>Camelina</i> Production in Montana. MontGuide, Montana State University. MT200701AG.	1. This species has an unspecialized mode of dispersal. 2. <i>Camelina</i> has very small seed. Filling cracks by taping or caulking truck beds and storage bins should be done prior to harvest to prevent seed loss.
7.02	1.a-b. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010.	1.a. This species has an unspecialized mode of dispersal. 1.b. <i>C. sativa</i> is economically important as a human food due to its oil. Further economic importance includes its potential as a petroleum substitute/alcohol. <i>C. sativa</i> together with other oilseed crops, have garnered interest as potential sources of biodiesel (WSSA, 2008). <i>C. sativa</i> has attracted interest as an oil crop because of its ability to grow in various climatic conditions, low nutrient requirements and resistance to disease and pests (Francis & Warwick, 2009). Furthermore, the cultivated seed oil from this species was previously used as a food or lamp oil, and sometimes it was used for soap and dye production. It was formerly used for medicinal purposes, and today it is still sometimes applied in the veterinary medicine (Hanelt, 2001).
7.03	1. USDA/ARS-GRIN [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland (http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15948 [Accessed: 9/23/2010]). 2.	1. Weed: also potential seed contaminant. 2. <i>Camelina sativa</i> was introduced to the Americas as a crop contaminant (Putnam et al. 1993) where it has remained a weed in the production of flax.
7.04	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010.	1. This species has an unspecialized mode of dispersal.
7.05	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010.	1. This species has an unspecialized mode of dispersal.
7.06	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010.	1. This species has an unspecialized mode of dispersal.

7.07	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010.	1. This species has an unspecialized mode of dispersal.
7.08	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010.	1. This species has an unspecialized mode of dispersal.
8.01	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010. 2. McVay, K.A. et al. 2008 (revised). Camelina Production in Montana. MontGuide, Montana State University. MT200701AG.	1. Each plant can produce between 100 and 1000 seeds. 2. Seed pods are approximately 1/4 inch long containing numerous seeds.
8.02	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010. 2. Strattpm, A. et al. 2007. <i>Camelina</i> . Institute for Agriculture and Trade Policy, Rural Communities Program. iatp.org . Accessed: 9/28/2010	1. Seeds do not exhibit dormancy (IENICA, 2002; Robinson, 1987 in Putnam et al., 1993). 2. No seed dormancy, often not a problem with other crops.
8.03	1. ISSG Database, http://www.issg.org/database/welcome/ . Accessed: 9/23/2010. 2.a-b. McVay, K.A. et al. 2008 (revised). Camelina Production in Montana. MontGuide, Montana State University. MT200701AG.	1. Sulfentrazone, a PRE herbicide, completely eliminated <i>C. sativa</i> from treated plots regardless of rate in an experiment conducted in Montana in 2006 and 2007. The PRE herbicides reduced the <i>C. sativa</i> stand 15 to 56% at the half rate and 17 to 70% at the full rate. The results of the experiments indicate that there are several herbicides that have the potential to be utilized for <i>C. sativa</i> control (WSSA, 2008). 2.a. Volunteer camelina is easily controlled with typical fall chemical fallow operations. 2.b. Seedlings that survive the winter can be readily controlled by chemical fallow operations in the subsequent years or by broadleaf herbicides utilized in cereal production practice.
8.04		
8.05		