

Part IV. Plant Assessment Form

For use with “Criteria for Categorizing Invasive Non-Native Plants that Threaten Colorado’s Wildlands and Agriculture”
By the Colorado Noxious Weed Advisory Committee

Electronic version: December 4, 2008

Table 1. Species and Evaluator Information

Species name (Latin binomial):	Brassica elongata Ehrh. ssp. integrifolia (Boiss.) Breistr.
Synonyms:	Brassica elongata Ehrh. ssp. perisca (Boiss. & Hohen) Thell and Brassica perisca Boiss. & Hohen.
Common names:	Elongated mustard and Wilson weed
Evaluation date (mm/dd/yy):	3/30/10
Evaluator #1 Name/Title:	Brad Lindenmayer/Research Assistant
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Section below for list committee use—please leave blank

List committee members:	enter text here
Committee review date:	enter text here
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:

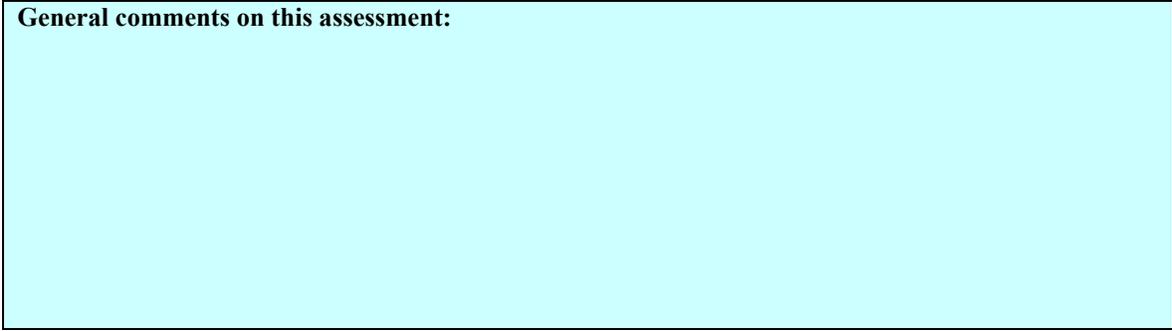


Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	D	Rev'd, Sci. Pub'n	<p>Impact</p> <p>Enter four characters from Q1.1-1.4 below:</p> <p>DBCD</p> <p>Using matrix, determine score and enter below:</p> <p>C</p>	<p>Wildlands Plant Score</p> <p>Using matrix, determine Overall Score and Alert Status from the first, second, and third section scores and enter below:</p> <p>Limited No Alert</p>
1.2	Impact on plant community	B	Rev'd, Sci. Pub'n		
1.3	Impact on higher trophic levels	C	Rev'd, Sci. Pub'n		
1.4	Impact on genetic integrity	D	Rev'd, Sci. Pub'n		
2.1	Role of anthropogenic and natural disturbance	B (2 pts)	Rev'd, Sci. Pub'n	<p>Invasiveness</p> <p>Enter the sum total of all points for Q2.1-2.7 below:</p> <p>17</p> <p>Use matrix to determine score and enter below:</p> <p>A</p>	
2.2	Local rate of spread with no management	A (3 pts)	Rev'd, Sci. Pub'n		
2.3	Recent trend in total area infested within state	B (2 pts)	Other Pub. Mat'l		
2.4	Innate reproductive potential Wksht A	A (3 pts)	Rev'd, Sci. Pub'n		
2.5	Potential for human-caused dispersal	B (2 pts)	Rev'd, Sci. Pub'n		
2.6	Potential for natural long-distance dispersal	B (2 pts)	Rev'd, Sci. Pub'n		
2.7	Other regions invaded	A (3 pts)	Other Pub. Mat'l		
3.1	Ecological amplitude/Range	D	Other Pub. Mat'l	<p>Distribution</p> <p>Using matrix, determine score and enter below:</p> <p>D</p>	
3.2	Distribution/Peak frequency Wrksht B	D	Other Pub. Mat'l		

4.1	Poisonous to livestock	D (0 pts)	Rev'd, Sci. Pub'n
4.2	Detrimental to economic crops	D (0 pts)	Other Pub. Mat'l
4.3	Detrimental to management of agricultural system, rangeland and pasture	B (2 pts)	Other Pub. Mat'l
4.4	Human impacts Wrksht C	D (0 pts)	Other Pub. Mat'l

Agricultural / Human Impact

Enter the sum total of all points for Q4.1-4.4 below:

2

Use matrix to determine score and enter below:

C

Agricultural Plant Score

Using matrix, determine Overall Score and Alert Status from the second, third and fourth section scores and enter below:

High

Red Alert

Table 3. Documentation

<p>Question 1.1 Impact on abiotic ecosystem processes</p>	<p>D Rev'd, Sci. Pub'n back</p>
<p>Identify ecosystem processes impacted: Negligible impact on any abiotic ecosystem processes is perceived.</p>	
<p>Rationale: No information could be found that directly addressed the impacts of elongated mustard on abiotic ecosystem processes, but several other wild and domesticated relatives in the Brassicaceae family are extremely disrupted by fire whereby seed viability is reduced in Brassica arvensis(1) and soil salinity was found to decrease Brassica napus emergence and plant development (2). Therefore, it can be inferred that Brassica elongata would be similarly affected by abiotic ecosystem processes and not be driving alterations in the ecosystem.</p>	
<p>Sources of information: 1) Went, F.W., Juhren, G., and Juhren, M.C. 1952. Fire and biotic factors affecting germination. Ecology, 33(3): 351-364. 2) Gutierrez Boem, F.H., Scheiner, J.D., and Lavado, R.S. 1994. Some Effects of Soil Salinity on Growth, Development and Yield of Rapeseed (Brassica napus L.). J. Agronomy and Crop Sci., 172(3): 182-187.</p>	
<p>Question 1.2 Impact on plant community composition, structure, and interactions</p>	<p>B Rev'd, Sci. Pub'n back</p>
<p>Identify type of impact or alteration: A moderate alteration of plant community composition has been observed.</p>	
<p>Rationale: As of 2003 the infestation in Nevada was no longer confined to disturbed roadsides, but had begun to invade rangelands and pastures and was found growing among the native species of rabbitbrush, bottlebrush squirreltail, winterfat, juniper, black sagebrush, and Sandberg bluegrass, as well as even competing with cheatgrass (1).</p>	
<p>Sources of information: 1) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Baisn rangelands. Rangelands, 25(1): 32-37.</p>	
<p>Question 1.3 Impact on higher trophic levels</p>	<p>C Rev'd, Sci. Pub'n back</p>
<p>Identify type of impact or alteration: Minor impacts on higher trophic levels are perceived.</p>	
<p>Rationale: No utilization of elongated mustard for any purpose by any species of wildlife has been observed (1). It can be expected that displacement of utilized plant species by elongated mustard would result in a loss of forage and/or habitat for native browsers and grazers.</p>	
<p>Sources of information: 1) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Baisn rangelands. Rangelands, 25(1): 32-37.</p>	
<p>Question 1.4 Impact on genetic integrity</p>	<p>D Rev'd, Sci. Pub'n back</p>
<p>Identify impacts: There is no known hybridization between B. elongata and other brassicacea species</p>	
<p>Rationale: While it is known that elongated mustard is an obligate outcrosser (1), there have been no reported instances of hybridization with other brassicacea species. It must be noted, however, that hybridization between brassicacea is quite common (2,3)</p>	

Sources of information: 1) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Baisn rangelands. Rangelands, 25(1): 32-37.	
2) Reiger, M.A., Preston, C. and Powles, S.B. 1999. Risks of gene flow from transgenic herbicide-resistant canola (<i>Brassica napus</i>) to weedy relatives in southern Australian cropping systems. Aust. J. Agric. Res., 50: 115-28.	
3) Jorgenen, R.B. and Anderson, B. 1994. Spontaneous Hybridization Between Oilseed Rape (<i>Brassica napus</i>) and Weedy <i>B. campestris</i> (<i>Brassicaceae</i>): A Risk of Growing Genetically Modified Oilseed Rape. American Journal of Botany, 81(12): 1620-1626.	
Question 2.1	Role of anthropogenic and natural disturbance in establishment B Rev'd, Sci. Pub'n back
Describe role of disturbance: A moderate threat of invasion has been observed as elongated mustard can establish in undisturbed areas, but will readily establish in areas with anthropogenic disturbance.	
Rationale: Elongated mustard has been observed to have spread along disturbed roadsides in Nevada and has moved 200 miles along the Highway 50 east and west as well as 50 miles north and south along lesser roads (1,2). However, it has also been observed that elongated mustard plants are establishing themselves beyond graded roadsides and highway rights-of-way and have begun to establish in undisturbed rangelands and pastures (1).	
Sources of information: 1) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Baisn rangelands. Rangelands, 25(1): 32-37.	
2) DiTomasso, J.M. and Healy, E.A. 2007. Weeds of California and other western states, Vol. 1. University of California Division of Agriculture and Natural Resources, pp. 469-470.	
Question 2.2	Local rate of spread with no management A Rev'd, Sci. Pub'n back
Describe rate of spread: Elongated mustard has been found to increase its area of infestation quite rapidly.	
Rationale: Elongated mustard was first indentified in North America near Portland, OR in 1911 where it apparently did not persist. In 1968 it was collected near Eureka, NV. Over the next 30 years it established itself over a 10,000 square mile area in eastern Nevada (1, 2).	
Sources of information: 1) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Baisn rangelands. Rangelands, 25(1): 32-37.	
2) DiTomasso, J.M. and Healy, E.A. 2007. Weeds of California and other western states, Vol. 1. University of California Division of Agriculture and Natural Resources, pp. 469-470.	
Question 2.3	Recent trend in total area infested within state B Other Pub. Mat'l back
Describe trend: The infested area within the state is slowly increasing	
Rationale: Elongated mustard was first reported in Colorado in the Spring of 2004 near Salida, CO, north of Highway 50 along the Fremont/Chafee county line. This is the only site of infestation reported and has grown to about 100 acres (1). The USDA-NRCS PLANTS Database confirms it presence in the state of Colorado (2).	

Sources of information: 1) CWMA. 2010. Weed Spotter Archive. Accessed April 8, 2010 at http://www.cwma.org/weedspotter_archive.html .	
2) USDA-NRCS. 2010. PLANTS Database. Accessed April 8, 2010 at http://plants.usda.gov/	
Question 2.4 Innate reproductive potential	A Rev'd, Sci. Pub'n back
Describe key reproductive characteristics: Elongated mustard can reach reproductive maturity in one year, can produce seeds every year with seed production spanning over three months annually. Additionally, elongated mustard can spread through rhizominous lateral roots and root fragments.	
Rationale: Elongated mustard has been observed to grow as a winter annual, a biennial, and a short-lived perennial (1,2). This affords it the flexibility to produce seed every year, or every other year or spread by rhizomes. Seed production of elongated mustard occurs from late spring to summer and can resume in the fall with adequate moisture (1). Seeds have extremely high germination (84-90%) under favorable conditions, but is reduced by cold temperatures (3). It should be noted that elongated mustard is an obligate out-crosser and has been found to be self-incompatible (1). When in the vegetative phase of growth, elongated mustard can spread through rhizominous lateral roots which can fragment (1). Very fine fragments have been observed to establish, but are slow to grow and have not been observed to flower (1).	
Sources of information: 1) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Baisn rangelands. Rangelands, 25(1): 32-37.	
2) DiTomasso, J.M. and Healy, E.A. 2007. Weeds of California and other western states, Vol. 1. University of California Division of Agriculture and Natural Resources, pp. 469-470.	
3) Young, J.A., Clements, C.D., and Wilson, R. 2003. Brassica elongata ssp. integrifolia seed germination. J. Range Manage., 56: 623-626.	
Question 2.5 Potential for human-caused dispersal	B Rev'd, Sci. Pub'n back
Identify dispersal mechanisms: Elongated mustard has been observed to spread along roadsides and has the potential to move along irrigation canals.	
Rationale: Elongated mustard is largely a roadside pest (1,2) that can likely be spread by grading, mowing, and passing traffic. Over 30 years it has spread over a 10,000 square mile area, mostly along Highway 50 in eastern Nevada as well as secondary roads (1). It has also been noted that the current area infested is not in crop production, but if it became established in areas with irrigated agriculture, it may spread via irrigation canals (1).	
Sources of information: 1) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Baisn rangelands. Rangelands, 25(1): 32-37.	
2) DiTomasso, J.M. and Healy, E.A. 2007. Weeds of California and other western states, Vol. 1. University of California Division of Agriculture and Natural Resources, pp. 469-470.	
Question 2.6 Potential for natural long-distance dispersal	B Rev'd, Sci. Pub'n back
Identify dispersal mechanisms: Seeds are often dispersed by wind as they are carried with tumbling detached plant tops or seed pods can also be transported long distances by wind.	

<p>Rationale: Once elongated mustard has reached its perennial growth stage, the tops of the plants can detach at the ground and tumble great distances whereupon seed pods will shatter into two halves and can disperse seeds (1). Oftentimes, seeds will remain attached to one half of the seed pod, which is also easily dispersed by wind long distances (1). Additionally, the seeds dehisce explosively from the seed pods when released (1).</p>	
<p>Sources of information: 1) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Baisn rangelands. Rangelands, 25(1): 32-37.</p>	
<p>Question 2.7 Other regions invaded</p>	<p>A Other Pub. Mat'l back</p>
<p>Identify other regions: Elongated mustard has been reported in several ecosytems in Oregon and Nevada in addition to Colorado.</p>	
<p>Rationale: The USDA-NRCS PLANTS Database reports elongated mustard in Oregon as well as two counties in eastern Nevada (1) that have ecosystems analgous to Colorado roadsides, sagebrush shrublands, foothils shrublands, and pinon-juniper woodlands (2, 3).</p>	
<p>Sources of information: 1) USDA-NRCS. 2010. PLANTS Database. Accesses April 8, 2010 at http://plants.usda.gov/</p> <p>2) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Baisn rangelands. Rangelands, 25(1): 32-37.</p> <p>3) DiTomasso, J.M. and Healy, E.A. 2007. Weeds of California and other western states, Vol. 1. University of California Division of Agriculture and Natural Resources, pp. 469-470.</p>	
<p>Question 3.1 Ecological amplitude/Range</p>	<p>D Other Pub. Mat'l back</p>
<p>Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Elongated mustard was first reported along roadsides in Colorado in the Spring of 2004 by Larry Walker, Chaffee County Weed Supervisor. This infestation has grown to about 100 acres along Highway 50 on the Fremont/Chaffee County line.</p>	
<p>Rationale: Within Colorado, elongated mustard is limited to a relatively small roadside infestation and has not yet invaded other ecosystems (1).</p>	
<p>Sources of information: 1) CWMA. 2010. Weed Spotter Archive. Accessed April 8, 2010 at http://www.cwma.org/weedspotter_archive.html.</p>	
<p>Question 3.2 Distribution/Peak frequency</p>	<p>D Other Pub. Mat'l back</p>
<p>Describe distribution: It is known that elongated mustard is present along roadsides in Colorado, but constitutes less than 5% of that ecological type.</p>	
<p>Rationale: Currently, elongated mustard is found on less than 5% of all Colorado roadsides and has been limited to about 100 acres along Highway 50 on the Fremont/Chaffee county line (1).</p>	

Sources of information: 1) CWMA. 2010. Weed Spotter Archive. Accessed April 8, 2010 at http://www.cwma.org/weedspotter_archive.html .	
Question 4.1 Poisonous to Livestock	D Rev'd, Sci. Pub'n back
Describe impacts in terms of high probability of death, long-term health impacts, or short-term health impacts: Elongated mustard is not known to be poisonous to livestock.	
Rationale: The literature indicates that no record of livestock poisoning could be found, even from its Old World area of origin (1).	
Sources of information: 1) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Basin rangelands. <i>Rangelands</i> , 25(1): 32-37.	
Question 4.2 Detrimental to Economic Crops	D Rev'd, Sci. Pub'n back
Describe impacts to all aspects of cropping systems (see guidelines): Elongated mustard has the potential to hybridize with canola (<i>Brassica napus</i>) and could potentially affect its genetic integrity.	
Rationale: With the growing cultivation of canola and other Brassicacea for biofuels in Colorado, there is a small risk of elongated mustard hybridizing with these crops as it has been shown that canola will hybridize with other weedy relatives (1). However, this would require extensive spread from the current infestation to impact cropland.	
Sources of information: 1) Reiger, M.A., Preston, C. and Powles, S.B. 1999. Risks of gene flow from transgenic herbicide-resistant canola (<i>Brassica napus</i>) to weedy relatives in southern Australian cropping systems. <i>Aust. J. Agric. Res.</i> , 50: 115-28.	
Question 4.3 Detrimental to Mgmt of Agricultural System, Rangeland and Pasture	B Rev'd, Sci. Pub'n back
Describe impacts to water diversion systems, increased water use, reduced forage for livestock: Elongated mustard has the potential to moderately reduce forage for livestock in rangeland.	
Rationale: Elongated mustard has been observed to compete with several range species, such as rabbitbrush, bottlebrush squirreltail, Sandberg bluegrass, black sagebrush, and juniper (1). The displacement of grass species has the potential to reduce forage availability for cattle in rangeland grazing situations.	
Sources of information: 1) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Basin rangelands. <i>Rangelands</i> , 25(1): 32-37.	
Question 4.4 Human Health Impacts	D Rev'd, Sci. Pub'n back
Describe key human impacts such as; irritants, property values, recreational values, and industry impacts: There are no known adverse effects of elongated mustard directly on humans.	

Rationale: Elongated mustard does not have spines or irritating sap, but rather has leaves with rounded teeth and a smooth stalk (1) and the leaves are even without pubescence (2). There is no evidence of elongated mustard altering a fire regime, which could result in decreased property values, nor would it hinder recreation. Finally, there would be no direct impacts on agricultural or horticultural industries as a result of listing elongated mustard, because it is not grown as an ornamental.
Sources of information: 1) DiTomasso, J.M. and Healy, E.A. 2007. Weeds of California and other western states, Vol. 1. University of California Division of Agriculture and Natural Resources, pp. 469-470. 2) Young, J.A., Clements, C.D., and Wilson, R. 2003. A new exotic weed on Great Baisn rangelands. Rangelands, 25(1): 32-37.

Worksheet A

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Reaches reproductive maturity in 2 years or less	Yes: 1 pt
Dense infestations produce >1,000 viable seed per square meter	No: 0 pts
Populations of this species produce seeds every year.	Yes: 1 pt
Seed production sustained over 3 or more months within a population annually	Yes: 1 pt
Seeds remain viable in soil for three or more years	No: 0 pts
Viable seed produced with <i>both</i> self-pollination and cross-pollination	No: 0 pt
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	Yes: 1 pt
Fragments easily and fragments can become established elsewhere	Yes: 2 pts
Resprouts readily when cut, grazed, or burned	No: 0 pt
	6 pts
	Total Unknowns
	A (6+ pts)
Note any related traits: enter text here	

Worksheet B - Colorado Ecological Types and Land Use

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Major Ecological and Land Use Types	Minor Ecological and Land Use Types	Code*
Freshwater and Aquatic Systems	lakes, ponds, reservoirs	score
	rivers, streams, canals	score
Riparian and wetlands	Riparian forest	score
	Riparian shrublands	score
	Wet meadows	score
Grasslands	Shortgrass prairie	score
	Tallgrass prairie	score
	Sandsage prairie	score
	Montane meadows	score
Irrigated Agriculture	Hay meadows	score
	Irrigated crops (alfalfa, corn, sugar beets)	score
Dryland Agriculture	Dryland crops (wheat, corn, millet, dryland grass hay, sunflowers, mustard for biodiesel)	score
Developed Lands	Urban, exurban, industrial	C. 5-20%
Arid Shrublands	Sagebrush shrublands	score
	Foothills shrublands	score
	Gambel oak shrublands	score
Woodlands	Pinyon - juniper	score
	Ponderosa pine	score
	Limber pine	score
Forest	Lodgepole pine	score
	Spruce-fir	score
Alpine	Boulder and rock fields	score
	Dwarf shrublands	score
	Tundra	score
Barrens (lower elevation)	Dunes	score
	Rock outcrops	score
	Canyonlands	score

* A. means >50% of type occurrences are invaded; B means >20% to 50%; C. means >5% to 20%; D. means present but ≤5%; U. means unknown (unable to estimate percentage of occurrences invaded).

Worksheet C – Human Impacts

Human health impacts; irritants (sap), spines, poisonous, and/or smoke impacts	No: 0 pt
Property values are decreased due to increased risk of fire	No: 0 pts
Decreased property value due to moderate to heavy infestations	No: 0 pts
Decreased land value for recreational use; boating, fishing, camping, etc.	No: 0 pts
Impact of listing detrimental to industry; agriculture, horticulture, nursery, and/or seed	No: 0 pt
	Total Pts Total Unknowns
	D (0 pts)
Note any related traits: enter text here	