
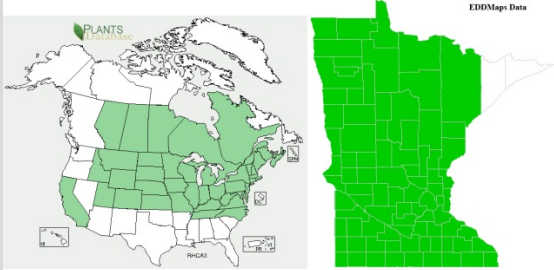


MN NWAC Risk Assessment Worksheet (04-2011)	Common Name	<i>Latin Name</i>
	European Buckthorn	<i>Rhamnus cathartica L.</i>
Reviewer	Affiliation/Organization	6/03/2013
Anthony B. Cortilet 	MN Dept. of Agriculture	

Box	Question	Answer	Outcome
1	Is the plant species or genotype non-native?	Yes – Native to northern Europe and Asia. Native to Sweden, Russia, Siberia, China, northern Caucasus mountains, and North Africa.	Box 3
2	Does the plant species pose significant human or livestock concerns or has the potential to significantly harm agricultural production?		
	A. Does the plant have toxic qualities that pose a significant risk to livestock, wildlife, or people?		
	B. Does the plant cause significant financial losses associated with decreased yields, reduced quality, or increased production costs?		
3	Is the plant species, or a related species, documented as being a problem elsewhere?	Yes – European buckthorn is known to be problematic throughout the northern half of the US and throughout Canada.	Box 6
4	Is the plant species' life history & Growth requirements understood?		
5	Gather and evaluate further information:	(Comments/Notes)	
6	Does the plant species have the capacity to establish and survive in Minnesota?	Yes – Buckthorn is well established in Minnesota	

Box	Question	Answer	Outcome
	<p>A. Is the plant, or a close relative, currently established in Minnesota?</p> 	<p>Yes – European buckthorn has been recorded in all but 2 counties in MN</p>	<p>Box 7</p>
	<p>B. Has the plant become established in areas having a climate and growing conditions similar to those found in Minnesota?</p>		
7	<p>Does the plant species have the potential to reproduce and spread in Minnesota?</p>	<p>Yes – European buckthorn has been reproducing and spreading in MN for many decades since its introduction.</p>	
	<p>A. Does the plant reproduce by asexual/vegetative means?</p>	<p>No</p>	<p>7C</p>
	<p>B. Are the asexual propagules effectively dispersed to new areas?</p>		
	<p>C. Does the plant produce large amounts of viable, cold-hardy seeds?</p>	<p>Yes – European buckthorn produces many seeds protected by fruits attractive to birds. Seeds can also remain dormant in the seedbank for many years.</p>	<p>7F</p>
	<p>D. If this species produces low numbers of viable seeds, does it have a high level of seed/seedling vigor or do the seeds remain viable for an extended period?</p>		
	<p>E. Is this species self-fertile?</p>		
	<p>F. Are sexual propagules – viable seeds – effectively dispersed to new areas?</p>	<p>Yes – Birds are known to be a huge distribution vector for European buckthorn spread. Water, snow, small mammals and human activity are also highly responsible for spread.</p>	<p>7I</p>

Box	Question	Answer	Outcome
	G. Can the species hybridize with native species (or other introduced species) and produce viable seed and fertile offspring in the absence of human intervention?		
	H. If the species is a woody (trees, shrubs, and woody vines) is the juvenile period less than or equal to 5 years for tree species or 3 years for shrubs and vines?		
	I. Do natural controls exist, species native to Minnesota, that are documented to effectively prevent the spread of the plant in question?	No – No natural controls are known to exist.	Box 8
8	Does the plant species pose significant human or livestock concerns or has the potential to significantly harm agricultural production, native ecosystems, or managed landscapes?	Yes – European buckthorn is a serious threat to native ecosystems and managed landscapes. It has also been linked to agriculture as an overwintering host to the soybean aphid and as an alternate host for alfalfa mosaic virus and crown rust (<i>Puccinia coronata</i> Corda var. <i>avenae</i>), which causes oat rust disease.	
	A. Does the plant have toxic qualities, or other detrimental qualities, that pose a significant risk to livestock, wildlife, or people?	No – other than habitat degradation. (NOTE: as of time of completing this risk assessment, a publication is forthcoming producing evidence of laboratory studies that have shown impacts of the chemical emodin (a chemical in the leaves and berries of buckthorn that may have indirect impacts on certain amphibians)	8B
	B. Does, or could, the plant cause significant financial losses associated with decreased yields, reduced crop quality, or increased production costs?	Not determined at this time in agronomic systems (soybean aphid connection not well defined at this time and no clear impacts on MN Agriculture related to alfalfa mosaic virus and crown fungus). Could be detrimental to forestry operations, but financial losses are not well documented at this time.	8C

Box	Question	Answer	Outcome
	C. Can the plant aggressively displace native species through competition (including allelopathic effects)?	<p>Yes – European buckthorn infestations have been shown to displace native forest understory and greatly reduce forest biodiversity.</p> <p>European buckthorn infestations have been shown to significantly alter native forest soils, altering natural succession, and creating a more suitable environment for increased buckthorn production and spread.</p> <p>Buckthorn leaves are full of a toxin called emodin that discourages herbivory. Research is being conducted on impacts emodin has on the environment after falling from the tree. Studies have shown emodin can impair certain amphibians such as frogs to successfully produce offspring.</p> <p>Studies vary on allelopathy for European Buckthorn. Some suggest allelopathy is occurring in the soil but cannot differentiate any single target yet. It may be as other studies suggest that multiple soil changing characteristics in buckthorn populations are simply to blame and not a cause of any allelopathy.</p>	Box 9
	D. Can the plant hybridize with native species resulting in a modified gene pool and potentially negative impacts on native populations?		
	E. Does the plant have the potential to change native ecosystems (adds a vegetative layer, affects ground or surface water levels, etc.)?		
	F. Does the plant have the potential to introduce or harbor another pest or serve as an alternate host?		

Box	Question	Answer	Outcome
9	Does the plant species have clearly defined benefits that outweigh associated negative impacts?	None –that would outweigh the negatives. European buckthorn was once thought to be beneficial as wildlife cover and food in transition areas between forest and grasslands and the berries are sought after by small mammals and birds.	
	A. Is the plant currently being used or produced and/or sold in Minnesota or native to Minnesota?	No – was sold in Minnesota until becoming a Restricted Noxious Species in 1999.	Box 10
	B. Is the plant an introduced species and can its spread be effectively and easily prevented or controlled, or its negative impacts minimized through carefully designed and executed management practices?		
	C. Is the plant native to Minnesota?		
	D. Is a non-invasive, alternative plant material commercially available that could serve the same purpose as the plant of concern?		
	E. Does the plant benefit Minnesota to a greater extent than the negative impacts identified at Box #8?		
10	Should the plant species be enforced as a noxious weed to prevent introduction &/or dispersal; designate as prohibited or restricted?	Yes	
	A. Is the plant currently established in Minnesota?	Yes – see Box 6	10B
	B. Does the plant pose a serious human health threat?	No – European buckthorn does not pose a serious threat to humans.	10C

Box	Question	Answer	Outcome
	C. Can the plant be reliably eradicated (entire plant) or controlled (top growth only to prevent pollen dispersal and seed production as appropriate) on a statewide basis using existing practices and available resources?	No – European Buckthorn is hard to control for multiple reasons. It is a forest species which makes traditional large-scale herbicide application unfeasible on large stands. Seed banks continue to produce buckthorn seedlings following treatments requiring long-term management that requires a large commitment of time and financial resources by landowners. Recruitment of seeds from neighboring sources through birds and mammals is problematic in areas being reclaimed or restored of buckthorns.	List as a Restricted Noxious Weed.
11	Should the plant species be allowed in Minnesota via a species-specific management plan; designate as specially regulated?		
Final Results of Risk Assessment			
	Review Entity	Comments	Outcome
	NWAC Listing Subcommittee	First review – 06/20/2013, Final Review 08/12/2013	Restricted Noxious Weed
	NWAC Full-group	Reviewed – 12/18/13	Vote 13 – 0 to remain as a Restricted Noxious Weed
	MDA Commissioner	Reviewed – 2/24/2014	Approved NWAC Recommendation
	FILE #: MDARA00023COMBU_2_24_2014	Restricted Noxious Weed	

References:

Center for Invasive Species and Ecosystem Health. 2013. European Buckthorn: <http://www.invasive.org/browse/subinfo.cfm?sub=3070>

Converse, C.K. 1985. Element Stewardship Abstract, Rhamnus cathartica. The Nature Conservancy.

Dziuk, P.M. 1998. Buckthorn and its Control. Minnesota Department of Agriculture Pest Alert; 4 pages. <http://www.mda.state.mn.us/news/publications/pestsplants/badplants/buckthornfactsheet.pdf>

EDDMaps: European Buckthorn Distribution in Minnesota. <http://www.eddmaps.org/distribution/usstate.cfm?sub=3070>

- Elizabeth J. Czarapata. 2005. *Invasive Plants of the Upper Midwest: an illustrated guide to their identification and control*. University of Wisconsin Press. 215 pages.
- Heneghan, Liam, C. Rauschenberg, F. Fatemi, and M. Workman. 2004. European Buckthorn (*Rhamnus cathartica*) and its effects on some ecosystem properties in an urban woodland. *Ecological Restoration*. Vol. 22, number 4; 275 - 280. ISSN 1522-4740
- J.M. Randall and J. Marinelli. 1996. *Invasive Plants: Weeds of the Global Garden*. Brooklyn Botanical Garden. Brooklyn, N.Y. 111 pages.
- Klionsky, S.M., K.L. Amatangelo, and D.M. Waller. 2010. Above and Belowground Impacts of European Buckthorn (*Rhamnus cathartica*) on Four Native Forbs. *Restoration Ecology*. 1-10. http://www.botany.wisc.edu/waller/PDFs/KlionskyAmatWaller_2010_RestorEcol.pdf
- Knight, K.S., J.S. Kurylo, A.G. Endress, J. R. Stewart, and P.B. Reich. 2007. Ecology and ecosystem impacts of common buckthorn (*Rhamnus cathartica*): a review. *Biological Invasions*. 9: 925-937
- Michigan Department of Natural Resources & Michigan Natural Features Inventory. 2012. Common buckthorn (*Rhamnus cathartica*). Invasive Species – Best Control Practices. 7 Pages: <http://mnfi.anr.msu.edu/invasive-species/CommonBuckthornBCP.pdf>
- Missouri Department of Conservation. Common Buckthorn Field Guide: <http://mdc.mo.gov/discover-nature/field-guide/common-buckthorn>
- MN DNR: Common Buckthorn (*Rhamnus cathartica*): <http://www.dnr.state.mn.us/invasives/terrestrialplants/woody/commonbuckthorn.html>
- MN DOT. Minnesota Noxious Weeds. 2013: <http://www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf>
- Ohio Department of Natural Resources – Division of Forestry. 2013. Common Buckthorn (*Rhamnus cathartica*): http://ohiodnr.com/forestry/trees/buckthorn_com/tabid/5345/Default.aspx
- The Richard B. King Laboratory. 2007. Northern Illinois University. Invasive Species, Habitat Restoration, and Reintroduction Biology of the Spotted Salamander: http://www.bios.niu.edu/rking/lab/eco_restoration.html
- University of Minnesota Extension: Buckthorn Control: <http://www.extension.umn.edu/distribution/horticulture/00075.html>
- USDA Plants Database. Plants Profile – *Rhamnus cathartica* L. <http://plants.usda.gov/java/profile?symbol=rhca3>