

MN NWAC Risk Assessment Worksheet (04-2011)	Common Name	<i>Latin Name</i>
	Common Barberry	<i>Berberis vulgaris</i> L.
Reviewer	Affiliation/Organization	Date (mm/dd/yyyy)
Laura Van Riper	MN Department of Natural Resources	09/10/2015

Box	Question	Answer	Outcome
1	Is the plant species or genotype non-native?	Yes. It is native to Asia and is widely introduced throughout Europe. Common barberry was brought to North America in the 1600s by early New England settlers and escaped from cultivation (Gucker 2009).	Go to Box 3
3	Is the plant species, or a related species, documented as being a problem elsewhere?	Yes. Common barberry is a host of black stem rust (<i>P. graminis</i> f. sp. <i>tritici</i>) of small grains and was the target of a widespread eradication campaign in the United States (Peterson 2005).	Go to Box 6
6	Does the plant species have the capacity to establish and survive in Minnesota?	Yes.	Go to Box 7

Box	Question	Answer	Outcome
	A. Is the plant, or a close relative, currently established in Minnesota?	Yes. Common barberry is established in Minnesota. There was a common barberry eradication program led by the US Department of Agriculture from 1916 to 1980. Approximately 1 million bushes were destroyed in Minnesota. After 1980, the state of Minnesota was the lead and small-scale eradication work continued until 1990 (Peterson et al. 2005). When the project ended in 1990 there were 1,200 “active sites” where common barberry had not yet been considered eradicated (Peterson et al. 2005). From 1998 to 2002, Peterson et al. (2005) surveyed a subset of active sites. They found common barberry plants at 32 of the 72 sites they surveyed. A total of 662 common barberry bushes were found. Common barberry was most common in southeastern Minnesota. There were few barberry shrubs in the western part of the state where wheat is grown. In 2010 USDA APHIS surveyed 33 former common barberry sites in four counties (Becker, Mille Lacs, Morrison, and Todd) in Minnesota (USDA APHIS 2010). One site in Mille Lacs county had a 7 feet tall common barberry bush with five canes full of fruiting berries. All other sites surveyed were negative for common barberry. Common barberry was found in Hennepin county at a Three Rivers Park District site in 2013 http://www.eddmaps.org/county.cfm?sub=5181&id=us_MN_27053).	Go to Box 7
7	Does the plant species have the potential to reproduce and spread in Minnesota?	Yes.	Go to Box 8
	A. Does the plant reproduce by asexual/vegetative means?	Yes. New shoots can form from rhizomes (Peterson 2003).	Go to 7B
	B. Are the asexual propagules effectively dispersed to new areas?	No. Asexual reproduction is more of a mechanism for increasing within a site.	Go to 7C

Box	Question	Answer	Outcome
	C. Does the plant produce large amounts of viable, cold-hardy seeds?	Yes. Plants can produce 1,000 – 2,500 seeds per bush (Gucker 2009). Seeds can remain viable for 7-11 years (Peterson 2003).	Go to 7F
	E. Is this species self-fertile?	<i>Barberry is adapted to cross-pollination, but can self-pollinate (Peterson 2003).</i>	<i>Blue text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
	F. Are sexual propagules – viable seeds – effectively dispersed to new areas?	Yes. Plants produce fleshy berries which are eaten by birds which can then disperse the seeds (Peterson 2003).	Go to 7I

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?	<i>There are no native Berberis species in Minnesota.</i> <i>Berberis × ottawaensis (Schneid.), a cross between common barberry and Japanese barberry (B. thunbergii), occurs in Europe and North America (Gucker 2009). Japanese barberry is present in Minnesota, but not native to Minnesota. Connolly et al. (2013) found that Berberis × ottawaensis was relatively widespread in Connecticut and Massachusetts. They found evidence that the hybrid individuals were capable of producing some viable seed and pollen.</i> <i>While there are distinct morphological characteristics to differentiate Japanese and common barberry in the field, there are plants that can be challenging to identify. Steven Shimek from the MN Department of Agriculture stated, “In some cases the characteristics may be indistinct leaves may be ‘sort of rough’ on the edge, or stems may change color, depending on age. In other cases, the plant may have some characteristics associated with rust-susceptible species and other characteristics associated with rust-resistant species. This may be due to the fact that the plant is not one of the “typical” species, or that the plant belongs to a hybrid variety resulting from a cross between susceptible and resistant species” (10 June 2015).</i>	<i>Blue text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
	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>No. Shrubs begin producing fruit in their 4th – 7th years (Peterson 2003).</i>	<i>Blue text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
	I. Do natural controls exist, species native to Minnesota, that are documented to effectively prevent the spread of the plant in question?	No. No documentation of natural controls was found.	Go to Box 8

Box	Question	Answer	Outcome
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.	Go to Box 9
	A. Does the plant have toxic qualities, or other detrimental qualities, that pose a significant risk to livestock, wildlife, or people?	No. Berries are eaten by birds and livestock. One reason barberries were planted by settlers was to eat the berries, drink their juice and use for medicinal purposes. (Peterson 2003).	Go to 8B
	B. Does, or could, the plant cause significant financial losses associated with decreased yields, reduced crop quality, or increased production costs?	Yes. Common barberry is the alternate host of black stem rust <i>Puccinia graminis</i>. Common barberry “serves as a local source of initial inoculum for stem rust as well as the site of sexual reproduction for the fungus, thus contributing to the development of new pathogen genotypes capable of attacking grain cultivars bred for rust resistance” (Peterson et al. 2005). This stem rust was the cause of epidemics to small grains (Peterson et al. 2005). Peterson et al. 2005, state: “Even though nearly all of the known barberry bushes in Minnesota are located too far from important wheat producing districts to constitute an immediate threat of regional epidemics of stem rust, barberries may still represent a long-term danger. Aecia of <i>P. graminis</i> f. sp. <i>tritici</i> were found on barberry bushes in Fillmore and Winona counties in 1995, in Houston, Fillmore, and Winona counties in 2000, and in Winona County in 2002.” “While the amount of spread from barberry to wheat via susceptible grasses may be epidemiologically insignificant, the danger is that new virulent races of <i>P. graminis</i> f.sp. <i>tritici</i> may be produced in the sexual stage on barberry and eventually find their way to wheat.” “The risks of existing barberry bushes are twofold: (i) they produce an abundance of seed each year, some of which may be carried long distances toward more important wheat producing regions by birds that feed on the berries, and (ii) if wheat production were ever to expand in southeastern Minnesota, that would make it much more likely that the link between the sexual cycle and the disease cycle of wheat stem rust would be reestablished with a consequent increase in the numbers of stem rust races that wheat breeders would have to combat.”	Go to Box 9

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		1,262,000 acres in Minnesota were planted with either winter or spring wheat in 2014. The value of the Minnesota wheat crop was \$368,349,000 in 2014 (National Agriculture Statistics Service 2015). Ug99 is an emerging strain of black stem rust first detected in Uganda in 1999. It has not been found in the United States as of May 2015. If Ug99 does come to the US it is estimated that US wheat or barley crop losses would be 40 to 50%. Common barberry is an alternate host of Ug99. USDA APHIS 2015a, b Note that the Ug99 response plan focuses on monitoring for Ug99 and developing treatments and resistant varieties. Common barberry eradication is not mentioned as an action (USDA ARS XXXX). If Ug99 was identified part of APHIS's role would be to communicate the federal regulations regarding common barberry (M.E. Dabaan, pers. comm. 10 June 2015). Minnesota researchers are concerned about potential impacts of stem rust on Minnesota crops. Statements include: • This proximity of the alternate host and wheat production sets up the potential for an epidemic if a new virulent race should arise. There is no longer a barberry eradication program in Minnesota as there was in yesteryear, so monitoring and managing of the populations of barberry could be a very important pre-emptive step to avoid a disaster in the future....The other scenario is the introduction of the Ug99 race (and its derivatives) of stem rust from Africa...once introduced to MN, this race could undergo recombination in the presence of the alternate host and produce other races which may be virulent against any existing host	

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		resistance we may have here. (pers. comm. Madeleine Smith, University of Minnesota, 6 July 2015) Common barberry is a big problem and eradication should be a priority., pers. comm. Jochum Wiersma, University of Minnesota, 6 July 2015.	
	C. Can the plant aggressively displace native species through competition (including allelopathic effects)?	<i>Has been noted to form dense thickets (Ma and Moore 2008).</i>	<i>Blue text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
	D. Can the plant hybridize with native species resulting in a modified gene pool and potentially negative impacts on native populations?	<i>No. Not known to hybridize with native species. There are no native Berberis species in Minnesota. Berberis × ottawaensis (Schneid.), a cross between common barberry and Japanese barberry (B. thunbergii), occurs in Europe and North America (Gucker 2009). Japanese barberry is present in Minnesota, but not native to Minnesota. Connolly et al. (2013) found that Berberis × ottawaensis was relatively widespread in Connecticut and Massachusetts. They found evidence that the hybrid individuals were capable of producing some viable seed and pollen.</i>	<i>Blue text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
	E. Does the plant have the potential to change native ecosystems (adds a vegetative layer, affects ground or surface water levels, etc.)?	<i>Has been noted to form dense thickets, adding to the shrub layer (Ma and Moore 2008).</i>	<i>Blue text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>

Box	Question	Answer	Outcome
	F. Does the plant have the potential to introduce or harbor another pest or serve as an alternate host?	<i>Yes. Common barberry is the alternate host of black stem rust Puccinia graminis. Common barberry “serves as a local source of initial inoculum for stem rust as well as the site of sexual reproduction for the fungus, thus contributing to the development of new pathogen genotypes capable of attacking grain cultivars bred for rust resistance” (Peterson et al. 2005). This stem rust was the cause of epidemics to small grains (Peterson et al. 2005).</i>	<i>Blue text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
9	Does the plant species have clearly defined benefits that outweigh associated negative impacts?	No.	Go to Box 10
	A. Is the plant currently being used or produced and/or sold in Minnesota or native to Minnesota?	No. Common barberry has been outlawed from sale since eradication campaigns began circa 1919 (Peterson et al. 2005).	Go to Box 10
10	Should the plant species be enforced as a noxious weed to prevent introduction &/or dispersal; designate as prohibited or restricted?		
	A. Is the plant currently established in Minnesota?	Yes (Peterson 2003, Peterson et al. 2005).	Go to 10B.
	B. Does the plant pose a serious human health threat?	No.	Go to 10C.
	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?	Plants can be killed using standard control techniques for invasive woody plants. The federal government literally declared war on common barberry during World War I, and attempted to eradicate this plant from the state. After seventy years of federally-mandated and state-assisted eradication efforts, it became apparent that there was neither the political will nor the available money and workforce to complete the eradication process (Peterson 2003). Though it might be physically possible to resume eradication efforts with new and more effective chemicals, today’s political climate would no longer allow funding or	Prohibited noxious weed on the control list

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		unfettered access to the large number of private properties listed as active sites at the end of eradication efforts more than two decades ago, let alone the presumed additional sites that decades of neglect may have allowed (Peterson et al. 2005). The risks quoted from Peterson et al. 2005 in Box 8B do not seem compelling enough to motivate Minnesota's legislature to divert current available resources to another common barberry eradication effort. Peterson et al. (2005), state, "It will be difficult, if not impossible, to totally eradicate <i>B. vulgaris</i> from the wooded, hilly terrain of southeastern Minnesota. Nevertheless, the large concentrations of barberry bushes should be eliminated as they are identified." This indicates the plant is too widespread for the Prohibited Noxious Weed Eradicate List. With a formal eradication effort stopped, the existing common barberry plants are reproducing and spreading on the landscape. Due to the economic impacts of common barberry and statutes listing control as something that MDA can require of landowners, putting common barberry on the control list is likely the most straightforward way to convey and clarify the current regulatory status of common barberry.	
Final Results of Risk Assessment			
	Review Entity	Comments	Outcome
	NWAC Listing Subcommittee	Unanimous agreement to recommend to full membership for listing as a Prohibited Noxious Weed.	Recommend to NWAC for listing as a Prohibited Noxious Weed on the Control List
	NWAC Full-group	11 in favor and 0 opposed.	REGULATE. LIST AS A PROHIBITED NOXIOUS WEED ON THE CONTROL LIST.

Box	Question	Answer	Outcome
	MDA Commissioner	Approved NWAC Recommendation	LIST AS A PROHIBITED NOXIOUS WEED ON THE CONTROL LIST.
	FILE # CommonBarberry_2015_MDARA0054COBB		

References:

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