

Ohio Invasive Plant Assessment Protocol

Botanical Name: *Berberis thunbergii*
 Common Name: Japanese Barberry Step I Outcome: **Invasive**
 Family Name: Berberidaceae Step II Score: **54**
 Posted Date: 7/20/16 Step II Outcome: **Invasive**
 Initial assessment conducted by: Allison Mastalerz

	Score	Notes	References
<ul style="list-style-type: none"> - reproduces readily within the original site (1 pt.) - has runners or spreading rhizomes that root easily (3 pts.) - fragments easily and fragments can be easily dispersed (4 pts.) - has runners or spreading rhizomes that root easily AND fragments easily and fragments can be easily dispersed (5 pts.) - Information unknown (U) <p>5. Sexual Reproduction</p> <ul style="list-style-type: none"> - no sexual reproduction (0 pts.) - infrequent sexual reproduction (1 pt.) - frequent sexual reproduction, but high variation among years in seed production (3 pts.) - frequent sexual reproduction (one or more events per year) (5 pts.) - Information unknown (U) <p>6. Number of Viable Seeds or Propagules per Plant</p> <ul style="list-style-type: none"> - few (0-10) (1 pt.) - moderate (11-1,000) (3 pts.) - prolific (>1,000) (5 pts.) - Information unknown (U) <p>7. Flowering Period</p> <ul style="list-style-type: none"> - one month or less per year (0 pts.) - two months (1 pt.) - three to five months (2 pts.) - longer than five months (3 pts.) - Information unknown (U) <p>8. Dispersal Ability</p> <ul style="list-style-type: none"> - low potential for long-distance seed/propagule dispersal (>1km) (0 pts.) - medium potential for long-distance seed/propagule dispersal (3 pts.) - high potential for long-distance seed/propagule dispersal (5 pts.) 	3	<p>17: Although species spreads primarily through seed, it is also capable of vegetative spread through rhizomes and layering. 19: plants can seed but also spread by "shoots arising from stolons and/or rhizomes within one to several dm of the roots".</p>	3,4,10,11,17,19
	3	<p>Species produces viable seed, but seed production depends on which cultivar it is, light availability, and stem density. 38: Progeny from purple cultivars include green-leaved plants.</p>	2,4,10,15,24,25,30,38,39
	5	<p>Seed output varies with cultivar identity. Some can produce more than 1,000 seeds/plant/year while others cannot. 15: The species itself produces 478 seeds per plant with 61.5% germination (increases in subsequent years with additional maturity). 26: germination is 85% in year 1, 10% in year 2, and 1% in year 3; survival is low (approx. 22.8%) but usually not important overall because so many seeds are dispersed. 30: High light => 1500 fruits per plant, Med Light => 1800 fruits per plant, Low Light => 200 fruits per plant.</p>	4,10,15,23,26,30
	1	<p>April to May</p>	2,4,10,14
		<p>Dispersed by birds and small mammals. 19: berries often remain on plants into the winter.</p>	

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- Information unknown (U)	3	Remain on plants into the winter. 27: barberry seeds collected in traps in the maple-beech forest (mostly near a bird perch), in the old field and mostly in the plantation. 30: 10 bird species observed eating barberry fruits but are consumed late in the season (a low food priority), many seedlings observed near an adult but some seedlings seem as far as over 80m from the nearest adult.	4,10,15,19,23,25, 27,30
9. Generation Time - long juvenile period (>5 or more years for trees, 3 or more years for other growth forms) (0 pts.) - short juvenile period (<5 years for trees, <3 years for other forms) (3 pts.) - Information unknown (U)	0	15: Various cultivars can produce seeds, but usually after they are a few years old with seed production increasing in some genotypes and cultivars with age.	15,26
10. Establishment - unable to invade natural areas (0 pts.) - can only colonize certain habitat stages (e.g. early successional habitats) (1 pt.) - aggressively colonizes and establishes in edge habitats (3 pts.) - aggressively colonizes and establishes in intact and healthy natural areas (6 pts.) - Information unknown (U)	6	Species documented as establishing in healthy, natural forests. 15: seedlings have 40% survival in deciduous forests. 17: Can invade established forests (but primarily in previously disturbed forests and sometimes in undisturbed ones); disturbance of site favors invasion. 18: open fields, disturbed forest edges, and forest matrix in mid-Atlantic region; although species was observed in forests at some old home sites, it has also been found in areas distant from such sites. 33,36,37: barberry is one of the first shrubs to leaf out in early spring.	.0,15,17,18,24,25,30,33,3
Step II: Ecological Importance			
11. Impact on Ecosystem Processes - no known effect on ecosystem-level processes (0 pts.) - moderate effects on ecosystem-level processes (e.g., changes in nutrient cycling)(3 pts.)		Can create dense thickets which displace native vegetation. Also	

Step II

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<ul style="list-style-type: none"> - causes long-term, substantial alterations in the ecosystem (e.g., changing fire regime of an area, changing hydrology of wetlands) (6 pts.) 	3	<p>displace native vegetation. Also species changes soil chemistry and biota by increasing nitrogen in soil. 19,20: barberry is associated with an increase in soil pH and a loss of the organic horizon. 20: barberry litter decomposes extremely rapidly, contributing to the organic layer, and alters nitrogen cycling. 21: But this study did not detect changes in pH and organic matter, but note that it might be because sampled population at a single site was not dense enough.</p>	2,4,10,19,20,21,31,32,36
<p>12. Impact on Rare Organisms</p> <ul style="list-style-type: none"> - no known negative impact on Ohio State-listed or federal-listed plants or animals (0 pts.) - negatively impacts listed species, such as through displacement or interbreeding (3 pts.) 	0		no evidence
<p>13. Impact on Native Animals</p> <ul style="list-style-type: none"> - no known negative impact on animals (0 pts.) - documented direct or indirect negative effects on animal taxa (3 pts.) 	3	<p>28: Gray catbirds and other bird species nest in barberry bushes with equivalent success as in native shrubs. 29: Veerie nests in barberry survived similarly to native shrubs. 31: It forms a browse-resistant shrub layer in areas with high deer density. 34: Blacklegged tick densities were significantly higher in dense barberry patches (these ticks can develop into motile life stages that target humans).</p>	28,29,31,34,35
<p>14. Impact on Native Plants</p> <ul style="list-style-type: none"> - no known negative effects on native plants (0 pts.) - negatively impacts some native plants (increasing their mortality and/or recruitment of certain taxa) (3 pts.) - impacts native plants to such an extent that community structure is greatly altered (6 pts.) 	3	<p>Creates dense thickets, crowding out native vegetation; also changes soil chemistry and biota. 16: affects the microbial community structure. 21: But this study does that there were no impacts of barberry on co-occurring plant species richness, evenness, or diversity (but population at a single site was young). 30: Effects of removing barberry on other plant species (in terms of biomass) was only seen at the highest barberry density levels.</p>	2,10,16,21,30
<p>15. Hybridization</p> <ul style="list-style-type: none"> - no known instances of hybridization with other plant species (0 pts.) 			

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<ul style="list-style-type: none"> - can hybridize with native Ohio plants or commercially-available species, but seeds are inviable (1 pt.) - can hybridize with native Ohio plants or commercially-available species, producing viable seed (3 pts.) 	3	Can hybridize with <i>B. vulgaris</i>	14,15,24,30
<p>16. Population Density</p> <ul style="list-style-type: none"> - occurs only as small, sporadic populations or individuals (1 pt.) - typically forms small, monospecific patches (3 pts.) - is a dominant plant in area where population occurs (absolute cover 15-50%) (4 pts.) - forms an extensive, monospecific stand (absolute cover >50%) (5 pts.) 	3	Can form dense thickets in some places, with adequate time and condition. 18: In mid-Atlantic states, it can occur as isolated individuals or as dense thickets (as of 1997). 19: In New Jersey in 1999, stem density ranged from 0.08 to 3.95 individuals per m2 across 7 sites (ranging from sparse to dense populations); seedling density ranged from 0 to 58 per m2.	2,4,10,18,19
<p>17. Role in Succession in Natural Areas</p> <ul style="list-style-type: none"> - successional information is unknown (0 pts.) - is an early successional species that temporarily invades a disturbed site but does not persist as the site matures (0 pts.) - readily invades disturbed sites and persists, but does not interfere with succession (1 pt.) - readily invades disturbed sites, persists and interferes with succession of native plants (4 pts.) 	1	10: barberry can persist in all successional stages. 20: barberry is associated with increased soil pH and uptake of nitrates and with increased organic matter, which may allow it to invade intact communities.	10,20
<p>18. Number of Habitats Invaded</p> <p><u>Forestlands:</u> Floodplain forest, hemlock-hardwood forest, mixed mesophytic forest, beech-maple forest, oak-maple forest, oak-hickory forest.</p> <p><u>Grasslands:</u> Alvar*, beach-dune community*, bur oak savanna*, slough-grass-bluejoint prairie*, sand barren*, big bluestem prairie, little bluestem prairie (xeric limestone prairie*+), post oak opening*+</p> <p><u>Wetlands:</u> Bog*, fen*, twigrush-wiregrass wet prairie*, marsh, buttonbush swamp, mixed shrub swamp, hemlock-hardwood swamp*, maple-ash-oak swamp, white pine-red maple swamp*</p> <p>* Considered a rare plant community in Ohio by ODW's Biodiversity Database Program.</p> <p>+ = xeric limestone prairies or cedar glades and post oak openings are unique to the Interior Low Plateau Region of Adams, Highland and Pike counties, and are not included in Schneider and Cochrane (1997).</p> <ul style="list-style-type: none"> - not found in any natural habitats in Ohio (0 pts.) - only found in 1 broad category (1 pt.) - found in 2 broad categories or 2 rare habitat types (3 pts.) - found in 3 broad categories or 3 rare habitat types (4 pts.) 	10	"Japanese barberry occurs occasionally in woods, swamps, fields, and dunes in Michigan". 17: Species was found in post-	

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<div style="background-color: #f4a460; width: 20px; height: 100%; display: inline-block; margin-right: 10px;"></div> - found in 4 or more rare habitat types (5 pts.)	4	agricultural forests and sometimes in continuous woodlands in Massachusetts. 18: open fields, disturbed forest edges, and forest matrix in mid-Atlantic region. 22: often found in well-drained soils with partial sunlight, such as edges, roadsides, fences, and old fields. 30: "closed forests, woodlands, wetlands, meadows, pastures, fence rows, waste places, etc."	10,17,18,22,30

Total Score:
Number of Unknowns:
Outcome:

54
0
Invasive

Total Points	Assessment Decision
4 or more U	Insufficient Data
0-34	Not Known to be Invasive
35-44	Pending Further Review
45-80	Invasive