Plant Risk Evaluator -- PRE™
Evaluation Report

Berberis thunbergii 'Crimson Pygmy' -- Minnesota

2017 Farm Bill PRE Project

PRE Score: 14 -- Evaluate this plant further
Confidence: 69 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Submitted

Evaluation Date: August 1, 2017

This PDF was created on June 15, 2018

Plant Evaluated

Berberis thunbergii 'Crimson Pygmy'

Image by Gardenia

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Berberis thunbergii 'Crimson Pygmy'*) in an effort to understand the invasive history, reproductive strategies, and the impact, if any, on the region's native plants and animals. This research reflects the data available at the time this evaluation was conducted.

Summary

The evaluation of Berberis cultivars is particularly interesting because specific studies regarding the invasive potential and fecundity have been done on the wild type and related cultivars. Berberis 'Crimson Pygmy' has been referred to as a relatively safe cultivar and when taken at "face value" it would appear that this is true. However, given that 'Crimson Pygmy' does not reproduce true to seed, it carries with it the potential to revert to wild type. It could also easily cross pollinate and hybridize with nearby varieties, thus contributing to the invasive potential of the cultivar and overall genus.

General Information

Status: Submitted
Screener: Mike Monterusso
Evaluation Date: August 1, 2017

Plant Information

Plant: *Berberis thunbergii 'Crimson Pygmy'*

If the plant is a cultivar, how does its behavior differs from its parent's?
The cultivars behavior does not differ from the parent's except that its small size potentially alters fecundity.

Regional Information

Region Name: Minnesota

Climate Matching Map

To answer four of the PRE questions for a regional evaluation, a climate map with three climate data layers (Precipitation, UN EcoZones, and Plant Hardiness) is needed. These maps were built using a toolkit created in collaboration with GreenInfo Network, USDA, PlantRight, California-Invasive Plant Council, and The Information Center for the Environment at UC Davis.

Click here to see the generated climate matching map for this region. This climate match database is hosted by GreenInfo Network and publicly accessible.

Evaluation Questions

These questions are based in an original article published at the University of California, Davis, and can be found on the PLOS One website, here: https://doi.org/10.1371/journal.pone.0121053

Invasive History and Climate Matching (Questions 1 - 6)

1. Has the species (or cultivar or variety, if applicable; applies to subsequent "species" questions) become naturalized where it is not native?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Yes and no. The quotes below suggests that 'Crimson Pygmy' probably has escaped and its genetics are not pure, meaning seedlings can express traits of the parent or other genotypes. Therefore, short of genetic testing, it is impossible to determine if a particular invading plant originated from 'Crimson Pygmy' or another variety. "A nursery survey respondent reported Emerald Carousel as being spread by birds especially well, another grower has “seen Crimson Pygmy reseed in landscape areas with no to very little management." Gardeners have noted that ‘Crimson Pygmy’ plants will not breed true from seed, and some offspring fail to have the burgundy foliage or the small size observed in the parent (http://davesgarden.com/guides/pf/go/59576). Furthermore, open-pollinated offspring of purple- and yellow-leaved cultivars produce at least 20% green-leaved (resembling the wild type) offspring (Lehrer et al. 2006), which indicates that these cultivars also do not breed true.

Reference(s):

- Matson, E. (2011). Berberis thunbergii DC Weed Risk Assessment -- Wisconsin DNR.

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2. Is the species (or cultivar or variety) noted as being naturalized in the US or world in a similar climate?

- Answer: **Yes**, which contributes **2** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

From Wisconsin DNR: Over 150 occurrences of Japanese barberry have been reported in the state of WI since 1938. While this number does include some cultivated plants, many of the occurrences have been reported from naturalized settings including state natural areas. Furthermore, this species is probably underreported. As in Q1, given that 'Crimson Pygmy' does not reproduce true from seed, it's impossible to determine the source of any one instance of an invasive plant.

Reference(s):

- Matson, E. (2011). Berberis thunbergii DC Weed Risk Assessment -- Wisconsin DNR.

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3. Is the species (or cultivar or variety) noted as being invasive in the U.S. or world?

- Answer: **Yes**, which contributes **2** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

See Q2

Reference(s):

- Matson, E. (2011). Berberis thunbergii DC Weed Risk Assessment -- Wisconsin DNR.

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4. Is the species (or cultivar or variety) noted as being invasive in the US or world in a similar climate?

- Answer: **Yes**, which contributes **3** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

The parent plant, Berberis thunbergii is noted as invasive in Wisconsin and Minnesota. However, a list of suggested restricted cultivars in Minnesota does not include 'Crimson Pygmy'.

Reference(s):

- Minnesota Department of Agriculture (2017). Japanese Barberry.
- Wisconsin Department of Natural Resources (2015). Japanese barberry - Wisconsin DNR.

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5. Are other species of the same genus (or closely related genera) invasive in a similar climate?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

The parent species (wild type) and several cultivars are noted as invasive in Minnesota and Wisconsin.

Reference(s):

- Minnesota Department of Agriculture (2017). Japanese Barberry.
- Wisconsin Department of Natural Resources (2015). Japanese barberry - Wisconsin DNR.

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6. Is the species (or cultivar or variety) found predominately in a climate matching the region of concern?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

No recorded distribution for 'Crimson Pygmy' could be found. The parent species (wild type) is not predominately in a region with a climate matching the region of concern.

Reference(s):

- GBIF Secretariat (2017). Berberis thunbergii DC. - Checklist View.

Impact on Native Plants and Animals (Questions 7 - 10)

7. Does this plant displace native plants and dominate (overtop or smother) the plant community in areas where it has established?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

'Crimson Pygmy' does not show this characteristic specifically. However, wild type parent species does.

Reference(s):

- Wisconsin Department of Natural Resources (2015). Japanese barberry - Wisconsin DNR.

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8. Is the plant noted as promoting fire and/or changing fire regimes?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"Japanese barberry generally invades areas that rarely burn and does not seem to increase the threat of fire"

Reference(s):

- Zouhar, K. (2008). Berberis thunbergii. In: Fire Effects Information System.

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9. Is the plant a health risk to humans or animals/fish? Has the species been noted as impacting grazing systems?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Hand-cutting of established clumps is difficult and time consuming due to the long, arching stems and prolific thorns. Berberis spp was reported to be mildly toxic.

Reference(s):

- Zouhar, K. (2008). Berberis thunbergii. In: Fire Effects Information System.
- Resources, University of California Agriculture (2017). Toxic Plants (by common name).

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10. Does the plant produce impenetrable thickets, blocking or slowing movement of animals, livestock, or humans?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

No evidence found for 'Crimson Pygmy' specifically. However, the wild type parent does.

Reference(s):

- Minnesota Department of Agriculture (2017). Japanese Barberry.

Reproductive Strategies (Questions 11 - 17)

11. Does this species (or cultivar or variety) reproduce and spread vegetatively?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

The parent type was used to answer this question. "Vegetative propagation is also an option for this adaptable plant. Any stem that touches the ground can root, as can any bits of root left in the ground after pulling up a plant."

Reference(s):

- Harmon, E. (2006). Invasion Biology Introduced Species Summary Project - Columbia University.
- Wisconsin Department of Natural Resources (2015). Japanese barberry - Wisconsin DNR.

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12. If naturally detached fragments from this plant are capable of producing new plants, is this a common method of reproduction for the plant?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

While Berberis spp. can reproduce vegetatively, this is not the primary, natural method of reproduction, which is by seed.

Reference(s):

- [Anonymous] .

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13. Does the species (or cultivar or variety) commonly produce viable seed?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

Fecundity of a variety of cultivars was published in a 2012 study.

Reference(s):

- Brand, M. H., Lehrer J. M., & Lubell J. D. (2012). Fecundity of Japanese Barberry (Berberis thunbergii) Cultivars and Their Ability to Invade a Deciduous Woodland. Invasive Plant Science and Management. 5, 464–476.

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14. Does this plant produce copious viable seeds each year (> 1000)?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

A brief review shows seeds/plant to range from 90-558.

Reference(s):

- Brand, M. H., Lehrer J. M., & Lubell J. D. (2012). Fecundity of Japanese Barberry (Berberis thunbergii) Cultivars and Their Ability to Invade a Deciduous Woodland. Invasive Plant Science and Management. 5, 464–476.
- Knight, T. M., Havens K., & Vitt P. (2011). Will the use of Less Fecund Cultivars Reduce the Invasiveness of Perennial Plants?. BioScience. 61, 816–822.

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15. Is there significant germination (>25%) of seeds the next growing season, with no requirement of an infrequent environmental condition for seeds to germinate (i.e. fire) or long dormancy period?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

"Overall, most barberry cultivars can be expected togerminate at 60% or higher under optimum germination conditions."

Reference(s):

- Brand, M. H., Lehrer J. M., & Lubell J. D. (2012). Fecundity of Japanese Barberry (Berberis thunbergii) Cultivars and Their Ability to Invade a Deciduous Woodland. Invasive Plant Science and Management. 5, 464–476.

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16. Does this plant produce viable seed within the first three years (for an herbaceous species) to five years (for a woody species) after germination?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

"They start producing fruits around 5 years of age."

Reference(s):

- Miller, D., Howe K., Cox H., & Jacquart E. (2005). Assessment of Japanese barberry (Berberis thunbergii) in Indiana’s Natural Areas .

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17. Does this plant continuously produce seed for >3 months each year or does seed production occur more than once a year?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Berberis thunbergii flowers and sets seed once/year in spring.

Reference(s):

- [Anonymous] .

Dispersal (Questions 18 - 20)

18. Are the plant's propagules frequently dispersed long distance (>100 m) by mammals or birds or via domestic animals?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

While birds do not seem to be a significant vector for the expansion of specific Berberis spp. populations, they could contribute to the establishment of new populations some distance from the original plant. Consider the following: "...birds are the most common animal dispersers of barberries (Berberis spp.). Birds that disperse barberries either feed directly on the fruit pulp and discard the seeds locally or ingest the entire fruit and defecate the seeds elsewhere... The brightly colored fruits of Japanese barberry are available to birds throughout the winter, but they do not seem to be preferred and are generally a low-priority food item for many birds."

Reference(s):

- Zouhar, K. (2008). Berberis thunbergii. In: Fire Effects Information System.

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19. Are the plant's propagules frequently dispersed long distance (>100 m) by wind or water?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

No evidence found.

Reference(s):

- [Anonymous] .

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20. Are the plant's propagules frequently dispersed via contaminated seed (agriculture or wildflower packets), equipment, vehicles, boats or clothing/shoes?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

While no reference to 'Crimson Pygmy' specifically was found, Wisconsin DNR reported that the parent species could be disbursed by humans.

Reference(s):

- Matson, E. (2011). Berberis thunbergii DC Weed Risk Assessment -- Wisconsin DNR.

Total PRE Score

PRE Score: 14 -- Evaluate this plant further
Confidence: 69 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

PRE Score Legend

The PRE Score is calculated by adding the point totals for each (answered) question.
< 13 : accept (low risk of invasiveness)
13 - 15 : evaluate further
> 15 : reject (high risk of invasiveness)

Questions Answered Legend

It is important to answer at least 16 questions to consider a PRE Score as "valid".
>= 16 : valid (80% or more questions answered)
<= 15 : invalid (not enough questions answered)

Organization Ownership and Content Privacy

Organization: 2017 Farm Bill PRE Project
Content Privacy: Public

Evaluation Reviewers

The PRE approach is to base decisions on science and make decisions by consensus of diverse horticultural stakeholders. The literature review and process of answering PRE's questions are based on science; the decisions of which plants to prioritize are based on consensus. To ensure this process is in place and that PRE is collaborative, volunteer stakeholders are recruited from each region to review evaluations. The following experts in their profession (plant science, conservation, or horticultural trade) have participated as volunteer PRE reviewers for this evaluation:

• Matthew Kaproth	January 22, 2018
• Tom Buechel	November 10, 2017

This evaluation has a total of 2 reviewer(s).

Evaluation Issues

The following section lists all public issues for this evaluation. Issues provide a way for stakeholder reviewers to communicate any concerns or suggestions they might have with the plant or evaluation. Please email PlantRight@suscon.org if additional action is required to resolve open issues.

Issue ID # 5801

Date Created: November 10, 2017 - 7:42am
Date Updated: November 30, 2017 - 7:48am

Submitted by: Tom Buechel

Status: Fixed
Type: Comment
Severity: Minor
Scope: Evaluation as a whole

Issue Description

Same note as other Berberis thunbergii cultivar.

Issue Resolution (Screener's Response to Issue)

Agreed. Same resolution as issue 5799 (Q4 changed from "no" to "yes")

About PRE and this Plant Evaluation Report

The PlantRight Plant Risk Evaluator -- PRE is an online database and platform enabling those involved in non-native, terrestrial plant production to know before they grow if a plant poses a regional invasive risk. This tool offers many benefits, and we encourage you to visit the PRE website (https://pre.ice.ucdavis.edu) for more information.

If you are a nursery trade association, or involved in the research, development or distribution of horticultural plants we invite you to join the PRE community. If you are a plant scientist, affiliated with a horticultural college or botanic garden, and would like to learn more about becoming a PRE Screener, please drop us an email, PlantRight@suscon.org, requesting a PRE Account.

PRE beta funding is provided by Sustainable Conservation (http://www.suscon.org/) and a USDA Farm Bill grant.