Plant Risk Evaluator -- PRE™
Evaluation Report

Berberis thunbergii 'Rose Glow' -- Illinois

2017 Farm Bill PRE Project

PRE Score: 16 -- Reject (high risk of invasiveness)
Confidence: 73 / 100
Questions answered: 19 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Submitted

Evaluation Date: September 27, 2017

This PDF was created on June 15, 2018

Plant Evaluated

Berberis thunbergii 'Rose Glow'

Image by MBOT

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Berberis thunbergii 'Rose Glow'*) 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

Berberis thunbergii 'Rose Glow' presents a high risk in Illinois. The species is invasive in this region and others with a similar climate, where it has significant negative impacts on native plant communities. Invasive stands of Berberis have also been associated with higher populations of ticks that carry lyme disease. The species spreads mostly by seed which is dispersed by birds. In studies, 'Rose Glow' produced about 800-4,400 seeds per plant. The seeds germinate readily and seedlings do not come true to type. Though it's not definitively proven that 'Rose Glow' has escaped cultivation in Illinois, it is certain that this cultivar presents a substantial risk.

General Information

Status: Submitted
Screener: Emily Russell
Evaluation Date: September 27, 2017

Plant Information

Plant: *Berberis thunbergii 'Rose Glow'*

If the plant is a cultivar, how does its behavior differs from its parent's?
'Rose Glow' differs from the species in leaf color. This cultivar produces viable seed but does not come true from seed. Seedlings show variation in size, vigor, leaf color, fruit production etc. so characters of the species as a whole are relevant for some of the questions below.

Regional Information

Region Name: Illinois

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 **High** confidence in this answer based on the available literature.

Answer / Justification:

Berberis thunbergii is naturalized in Europe and eastern North America. It can be assumed that 'Rose Glow' did or would naturalize since this cultivar produces viable seeds that can be dispersed long distances. Seedlings from 'Rose Glow' show variation in size, vigor, leaf color, and fruit production. Genetic testing showed that a purple-leaf variety naturalized in Connecticut: "B. thunbergii var. atropurpurea had minimal genetic influence on feral populations in southern New England. However, a single landscape specimen of B. thunbergii var. atropurpurea, established for many decades, had a significant impact on its surrounding feral population."

Reference(s):

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).
- Lubell, J. Dawn (2008). Assessing the contribution of horticultural genotypes to invasive populations of Berberis thunbergii DC.. Doctoral Dissertations. 1–82.
- Lubell, J. D., Brand M. H., Lehrer J. M., & Holsinger K. E. (2008). Detecting the influence of ornamental Berberis thunbergii var. atropurpurea in invasive populations of Berberis thunbergii (Berberidaceae) using AFLP1. American Journal of Botany. 95, 700–705.
- DAISIE (2008). DAISIE European Alien Species Gateway: Berberis thunbergii.

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 **High** confidence in this answer based on the available literature.

Answer / Justification:

Berberis thunbergii is naturalized in Europe and eastern North America in areas with a climate similar to Illinois. It can be assumed that 'Rose Glow' did or would naturalize since this cultivar produces viable seeds that can be dispersed long distances. Seedlings from 'Rose Glow' show variation in size, vigor, leaf color, and fruit production. Genetic testing showed that a purple-leaf variety naturalized in Connecticut: "B. thunbergii var. atropurpurea had minimal genetic influence on feral populations in southern New England. However, a single landscape specimen of B. thunbergii var. atropurpurea, established for many decades, had a significant impact on its surrounding feral population."

Reference(s):

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).
- Lubell, J. Dawn (2008). Assessing the contribution of horticultural genotypes to invasive populations of Berberis thunbergii DC.. Doctoral Dissertations. 1–82.
- Lubell, J. D., Brand M. H., Lehrer J. M., & Holsinger K. E. (2008). Detecting the influence of ornamental Berberis thunbergii var. atropurpurea in invasive populations of Berberis thunbergii (Berberidaceae) using AFLP1. American Journal of Botany. 95, 700–705.
- DAISIE (2008). DAISIE European Alien Species Gateway: Berberis thunbergii.

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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 **High** confidence in this answer based on the available literature.

Answer / Justification:

Berberis thunbergii is invasive in the Midwest, Mid-Atlantic, and New England. 'Rose Glow' is prohibited in New York, Maine, New Hampshire, Vermont, and Massachusetts.

Reference(s):

- Midwest Invasive Plant Network (2015). Midwest Invasive Plant List.
- Swearingen, J., Slattery B., Reshetiloff K., & Zwicker S. (2010). Plant Invaders of Mid-Atlantic Natural Areas. 168.
- Maine Department of Agriculture, Conservation and Forestry (2017). CRITERIA FOR LISTING INVASIVE TERRESTRIAL PLANTS.
- NH Department of Agriculture, Markets & Food, Division of Plant Industry (2017). Fact Sheet: Prohibited Invasive Plant Species Rules, Agr 3800.
- Massachusetts Department of Agricultural Resources (2009). Massachusetts Prohibited Plant List.
- Vermont Agency of Agriculture, Food & Markets (2013). Quarantine # 3 - Noxious Weeds.
- New York State Department of Environmental Conservation (2014). Invasive Species Regulations - NYS Dept. of Environmental Conservation.

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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 **High** confidence in this answer based on the available literature.

Answer / Justification:

Berberis thunbergii is invasive in the Midwest, Mid-Atlantic, and New England. 'Rose Glow' is prohibited in New York, Maine, and Vermont, parts of which share a climate with Illinois.

Reference(s):

- Midwest Invasive Plant Network (2015). Midwest Invasive Plant List.
- Swearingen, J., Slattery B., Reshetiloff K., & Zwicker S. (2010). Plant Invaders of Mid-Atlantic Natural Areas. 168.
- Maine Department of Agriculture, Conservation and Forestry (2017). CRITERIA FOR LISTING INVASIVE TERRESTRIAL PLANTS.
- Vermont Agency of Agriculture, Food & Markets (2013). Quarantine # 3 - Noxious Weeds.
- New York State Department of Environmental Conservation (2014). Invasive Species Regulations - NYS Dept. of Environmental Conservation.

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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:

Berberis vulgaris is invasive in the Midwest.

Reference(s):

- Midwest Invasive Plant Network (2015). Midwest Invasive Plant List.

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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 **Very High** confidence in this answer based on the available literature.

Answer / Justification:

Berberis thunbergii 'Rose Glow' will grow in many climates.

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: **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:

Japanese barberry forms dense thickets that shade out and displace native plants. It can thrive in deep shade. Japanese barberry also raises the pH of soil and accelerates nutrient cycling on the forest floor, which give it a further competitive edge to dominate native plant communities.

Reference(s):

- Ehrenfeld, J. G., Kourtev P., & Huang W. (2001). Changes in Soil Functions Following Invasions of Exotic Understory Plants in Deciduous Forests. Ecological Applications. 11, 1287–1300.
- Harmon, E. (2006). Invasion Biology Introduced Species Summary Project - Columbia University.

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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:

Ticks that carry lyme disease have higher populations in areas infested with Berberis thunbergii. "Removal of Japanese barberry will significantly decrease the abundance of ticks, their infection prevalence with B. burgdorferi, and the environmental risk of Lyme disease. It is also clear that Japanese barberry infestations pose an indirect threat to public health. (Williams) "The Japanese barberry can also hybridize with the common barberry (Berberis vulgaris) and become susceptible to black stem rust." Black stem rust is a fungus that attacks cereal crops and is a serious threat to wheat crops in Canada and the United States. Berberis vulgaris is a host for this fungus and Japanese barberry is generally not susceptible.

Reference(s):

- Williams, S. C., Ward J. S., Worthley T. E., & III K. C. Staffor (2009). Managing Japanese barberry (Ranunculales: Berberidaceae) infestations reduces blacklegged tick (Acari: Ixodidae) abundance and infection prevalence with Borrelia burgdorferi (Spirochaetales: Spirochaetaceae). Environmental entomology. 38, 977–984.
- Harmon, E. (2006). Invasion Biology Introduced Species Summary Project - Columbia University.

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

- 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:

Berberis thunbergii forms dense, thorny thickets.

Reference(s):

- Zouhar, K. (2008). Berberis thunbergii. In: Fire Effects Information System.
- Harmon, E. (2006). Invasion Biology Introduced Species Summary Project - Columbia University.

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 **High** confidence in this answer based on the available literature.

Answer / Justification:

"Japanese barberry stems arise from seeds, sprout from the root crown, sprout from rhizomes, and arise from the rooting of long stems that touch the ground at variable distances from the root base."

Reference(s):

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

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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 **Low** confidence in this answer based on the available literature.

Answer / Justification:

"Any stem that touches the ground can root, as can any bits of root left in the ground after pulling up a plant." But there is no evidence of fragments detaching commonly in the wild.

Reference(s):

- Harmon, E. (2006). Invasion Biology Introduced Species Summary Project - Columbia University.

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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:

'Rose Glow' does produce viable seed.

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.
- Lovinger, S., & Anisko T. (2004). Benign Berberis: Shrub trials at Longwood Gardens help identify Japanese barberry cultivars with limited invasive potential. American Nurseryman. 200, 36-39.

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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:

Mature plants of 'Rose Glow' can produce copious viable seeds, but may not do so every year or in all settings. In a Connecticut study, 'Rose Glow' plants that were 5-7 years old from cuttings had 810 seeds per plant, but 4-5 years later fruit production increased to 4,400 per plant. In a previous Connecticut study of 10-20 year old plants in the landscape, 'Rose Glow' also produced only about 800 seeds per plant.

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.
- Lehrer, J. M., Brand M. H., & Lubell J. D. (2006). Four Cultivars of Japanese Barberry Demonstrate Differential Reproductive Potential under Landscape Conditions. HortScience. 41, 762–767.

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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 **Medium** confidence in this answer based on the available literature.

Answer / Justification:

A Connecticut study saw 77.8% germination of 'Rose Glow' seeds after 90 days cold stratification in the greenhouse. However, seeds sown in a dry deciduous woods site of 'Rose Glow' had only 12.5% germination the first year. Based on germination requirements, the answer is "yes" there is no long dormancy period.

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 / Justification:

'Rose Glow' plants that were 5-7 years old from cuttings produced 810 seeds per plant.

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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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 **Very High** confidence in this answer based on the available literature.

Answer / Justification:

Flowering period is mid-spring in Illinois and fruit ripens in the fall.

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 **High** confidence in this answer based on the available literature.

Answer / Justification:

Seeds are dispersed by frugivorous birds and small mammals. While not a favorite of songbirds, fruits will be eaten if there is nothing else available. Wild turkey and grouse, on the other hand, do prefer the berries.

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 **Low** confidence in this answer based on the available literature.

Answer / Justification:

There is no evidence of dispersal by wind or water.

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 **Low** confidence in this answer based on the available literature.

Answer / Justification:

There is no evidence of accidental dispersal by humans.

Reference(s):

- [Anonymous] .

Total PRE Score

PRE Score: 16 -- Reject (high risk of invasiveness)
Confidence: 73 / 100
Questions answered: 19 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:

- Kim Shearer November 13, 2017

This evaluation has a total of 1 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 # 6209

Date Created: December 22, 2017 - 9:21am
Date Updated: February 19, 2018 - 7:29pm

Submitted by: Steve Worth

Status: Fixed
Type: Comment
Severity: Minor
Scope: Plant Information

Issue Description

This plant is becoming less relevant to the industry as improved varieties become available

Issue Resolution (Screener's Response to Issue)

Thank you for the comment.

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.