# *Plant Risk Evaluator -- PRE™*
# *Evaluation Report*

# *Mahonia bealei* -- Georgia

*2017 Farm Bill PRE Project*

**PRE Score:** 15 -- Evaluate this plant further
**Confidence:** 71 / 100
**Questions answered:** 20 of 20 -- Valid (80% or more questions answered)

**Privacy:** Public
**Status:** Completed

**Evaluation Date:** May 9, 2017

*This PDF was created on July 06, 2018*

# Plant Evaluated

*Mahonia bealei*

Image by Jim the Photographer

# Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Mahonia bealei*) 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

M.bealei is described as a serious "plant to watch" regarding its invasive potential in the southeast by many of the resources I found. I can appreciate its potential as an ornamental species as its sweet smelling blooms open in winter when not much else is showing, and the fruits are very attractive. However given that M.bealei has the ability to grow very well in extremely low light level conditions it seems the species could become a serious invasive threat to Georgia's woodlands and forests. I have personally witnessed this species in natural areas of Georgia, where they had either escaped an urban garden, or been planted purposefully along a cleared section of wooded trail. In this instances they had not become abundant but their prolific fruits were quite large, and if left unmanaged i could see how this low light thriver may out-compete other native under story plants. I would agree with the outcome of this screening that the species needs more investigation or should be considered with caution. This plant could become a serious threat in the region of concern given the plants biology and tolerance for low light woodland environments, and continued selling and planting will increase the likelihood of escape and further naturalization.

## General Information

**Status:** Completed
**Screener:** Kylie Bucalo
**Evaluation Date:** May 9, 2017

## Plant Information

**Plant:** *Mahonia bealei*

## Regional Information

**Region Name:** Georgia

## 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:**

USDA Plant profile indicates it is distributed throughout the southeast and present in the region of concern. Excerpt from Flora of North America resource indicates that it was "introduced to Georgia, Alabama, North Carolina and Virginia" and also that the species has become "locally naturalized in the southeastern United States".

**Reference(s):**


- efloras.org (0). Berberis bealei in Flora of North America @ efloras.org.
- USDA Plants Database (0). Plants Profile for Mahonia bealei (Beale's barberry)- USDA.


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

**Answer / Justification:**

USDA Plant profile indicates that M. bealei is naturalized both in the region of concern and in other climate matching areas within the southeast such as NC and SC.

**Reference(s):**


- efloras.org (0). Berberis bealei in Flora of North America @ efloras.org.
- USDA Plants Database (0). Plants Profile for Mahonia bealei (Beale's barberry)- USDA.


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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:**

The GAEPPC evaluates M.bealei as a Category 3 plant which is described as an "Exotic plant that is a minor problem in Georgia natural areas, or is not yet known to be a problem in Georgia but is known to be a problem in adjacent states." The species is described as a "very serious invasive" in Maryland and appears as an "invasive species of concern" in a resource from the Mid-Atlantic Exotic Pest Plant Council. The sale of Mahonia bealei in Michigan is prohibited (with specific reference to plants that are subject to black stem rust). Mahonia Bealei also appears on a list of DC invasive pollinator plants in the Department of Energy and Environment resource.

**Reference(s):**


- [Anonymous] (0). Invader of the Month_M. bealei - Invasive species of concern_Maryland.
- DC Department of Energy & Environment (0). Native and Invasive Pollinator Plants- DC DOEE.
- Georgia Exotic Pest Plant Council (0). List of Non-Native Invasive Plants in Georgia - Georgia Exotic Pest Plant Council.
- USDA Plants Database (0). Plants Profile for Mahonia bealei (Beale's barberry)- USDA.


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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:**

The GAEPPC evaluates M.bealei as a Category 3 plant which is described as an "Exotic plant that is a minor problem in Georgia natural areas, or is not yet known to be a problem in Georgia but is known to be a problem in adjacent states." The North Carolina Native Plant Society lists M.bealei as a Rank 2 - Significant Threat which is described as "Exotic plant species that display some invasive characteristics, but do not appear to present as great a threat native communities in NC as the species listed in Rank 1." Allen et al. (2006) conclude that M.bealei "should be recognized as an aggressive invader in the Southeastern United States, with the potential for negative impacts on native flora and fauna." Using this information from the southeastern states and showing evidence of invasiveness in Washington DC and Maryland which are both climate matches for the region of concern i have answered this question yes.

**Reference(s):**


- Allen, C. R., Garmestani A. S., Bram J. A., Peck A. E., & Prevost L. B. (2006). When landscaping goes bad: the incipient invasion of Mahonia bealei in the southeastern United States.
- North Carolina Native Plant Society (0). Invasives List- NC wildflower.org.
- Georgia Exotic Pest Plant Council (0). List of Non-Native Invasive Plants in Georgia - Georgia Exotic Pest Plant Council.
- [Anonymous] (0). Invader of the Month_M. bealei - Invasive species of concern_Maryland.
- DC Department of Energy & Environment (0). Native and Invasive Pollinator Plants- DC DOEE.


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

**Answer / Justification:**

Mahonia aquifolium has been described as being highly invasive in Europe (CABI and NPS resource). CABI resource details that M.aquifolium is invasive in Belgium and Germany. Parts of both of these countries are a climate match for the region of concern. It should be noted that M.aquifolium is native to the pacific northwest and is present in the region of concern, however i could not find a source that suggested it was invasive. Additionally the Mahonia genus is closely related to the Berberis genus (infact a syn. for Mahonia bealei is Berberis bealei). The are both classified under the family Berberidaceae. Berberis thunbergii is known to be invasive in NC, which is a climate match for the reason of concern. CL set to medium as i am not certain European climate matches for M.aquifolium are exact to the areas that contain invasive aquifolium. Additionally only one resource lists B.thunbergii as invasive in NC.

**Reference(s):**

- NPS Exotic Plant Managment (0). Invasive plant alert- M.bealei-NPS.
- CABI (0). Mahonia aquifolium (Oregongrape)_CABI.
- Global Invasive Species Database (0). GISD.

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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:**

For this question i have attempted to match the plants distribution with the highlighted areas given in the climate map produced using the PRE climate tool. For domestic distribution of M.bealei the screener compared the distribution given by USDA plant profile resource with the climate matching PRE map, and found the distribution and the highlighted ares of the map matched very closely. For global distribution the screener used the GBIF resource to compare with the PRE climate map. GBIF shows an occurrence in Canberra, Australia which is too far inland and south to be a climate match with the region of concern. Additionally most of the northern Europe occurrences are NOT a climate match, however the occurrences in Spain are likely to be a match. Lastly the distribution throughout China is mostly a match with highlighted climate areas in the PRE derived map. This question could probably go either a yes or a no, its close to 50% matching or over, that is why the CL is set to medium, not becuase of the resources used.

**Reference(s):**

- USDA Plants Database (0). Plants Profile for Mahonia bealei (Beale's barberry)- USDA.
- GBIF (0). Mahonia bealei GBIF distribution.

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# 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:**

There is no evidence of this in the resources.

**Reference(s):**

- [Anonymous] .

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

**Answer / Justification:**

There is no evidence of this in the resources

**Reference(s):**

- [Anonymous] .

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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: **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:**

Leaflets have sharp points, however the screener does not think this warrants a yes answer as the sharp points are not likely to cause serious injury to humans.

**Reference(s):**


- Allen, C. R., Garmestani A. S., Bram J. A., Peck A. E., & Prevost L. B. (2006). When landscaping goes bad: the incipient invasion of Mahonia bealei in the southeastern United States.
- NPS Exotic Plant Managment (0). Invasive plant alert- M.bealei-NPS.


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

**Answer / Justification:**

I have inferred this from the plants biology. I have not seen this in any of the resources. However given that the leaflets are stiff and have pointed ends like holly, can grow up to 4 meters tall and if found densley planted would be fairly impenetrable or atleast hinder, block of slow movement. Additionally these woody shrubs are frequently used in ornamental horticulture for borders or privacy hedges because they will detract passers by with there spiny foliage. If inference is not agreed upon this answer could be changed to a no, specifically because it has not been referred to as forming thickets in any of the resources.

**Reference(s):**


- Allen, C. R., Garmestani A. S., Bram J. A., Peck A. E., & Prevost L. B. (2006). When landscaping goes bad: the incipient invasion of Mahonia bealei in the southeastern United States.
- NPS Exotic Plant Managment (0). Invasive plant alert- M.bealei-NPS.


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# Reproductive Strategies (Questions 11 - 17)

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

- 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 of this is the references.

**Reference(s):**

- [Anonymous] .

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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:**

No evidence of this in the references

**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:**

All references refer to the winter blooming flowers that produce clusters of grape-like seeds.

**Reference(s):**


- efloras.org (0). Berberis bealei in Flora of North America @ efloras.org.
- NPS Exotic Plant Managment (0). Invasive plant alert- M.bealei-NPS.
- Dave's Garden (0). Mahonia bealei_Dave's Garden.


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

**Answer / Justification:**

Allen et al (2006) describes a close relative (M.aquifolium) as having "high seed production" but the screener felt this did not warrant a yes. Additionally this same resource speculates that cultivated species of Mahonia may have a higher reproductive potential because of the likelihood they have been bred for bigger fruits and flowers. This is something to consider for the industry when selecting plants to sell or even ornamental cutivars if there are any, as obviously this would increase seed number and therefore increase threat if they escaped ornamental cultivation. I have selected no, given the above information, and also feedback from a reviewer.

**Reference(s):**


- [Anonymous] .


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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:**

Inserting comments from reviewer "Dirr and Heuser suggest 1-2 month cold stratification for best germination. Plants in the wild will have seed germinate in the spring after a natural stratification period. rarely seen in the wild in south Georgia where chilling hours are much lower than in north Georgia where it is common"

**Reference(s):**

- [Anonymous] .

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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: **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:**

Excerpt from Allen et al. 2006 "Most M. bealei on our sites were at least 4 years old before reaching sexual maturity". No other references cited this. Should be noted that the age given was for an experimental set of plants in Clemson, SC and not representative of the species as a whole.

**Reference(s):**

- Allen, C. R., Garmestani A. S., Bram J. A., Peck A. E., & Prevost L. B. (2006). When landscaping goes bad: the incipient invasion of Mahonia bealei in the southeastern United States.

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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: **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:**

Yes answer inferred from resources. Eflora resource states that flowers are present from December thru March. Allen et al. (2006) resource states flowers appear in winter or late spring and the berries remain through the summer, I think it is a fair assumption to answer this question yes given the directions in the PRE information about how to answer this question.

**Reference(s):**


- Allen, C. R., Garmestani A. S., Bram J. A., Peck A. E., & Prevost L. B. (2006). When landscaping goes bad: the incipient invasion of Mahonia bealei in the southeastern United States.
- efloras.org (0). Berberis bealei in Flora of North America @ efloras.org.


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# 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:**

Allen et al. 2006. suggest M.bealei is spread by warblers and other passerine birds in the southeast, but also note that they do not have evidence of this. This research group also describe other congeneric species being distributed by black bears (M.repens), and other western Berberis species being dispersed by white tailed and mule deer. National Parks Invasive plant Alert resource suggest Mahonia bealei's fruits are "rapidly eaten by birds"

**Reference(s):**


- Allen, C. R., Garmestani A. S., Bram J. A., Peck A. E., & Prevost L. B. (2006). When landscaping goes bad: the incipient invasion of Mahonia bealei in the southeastern United States.
- NPS Exotic Plant Managment (0). Invasive plant alert- M.bealei-NPS.


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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:**

Not mentioned in any of the references. Also fruit type is not amiable to wind dispersal.

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

**Answer / Justification:**

Not mentioned in any references

**Reference(s):**

- [Anonymous] .

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# Total PRE Score

**PRE Score:** 15 -- Evaluate this plant further
**Confidence:** 71 / 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:

- John "Doc" Ruter January 9, 2018

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 # 6277

**Date Created:** January 9, 2018 - 11:50am
**Date Updated:** February 16, 2018 - 11:38am

**Submitted by:** John "Doc" Ruter

**Status:** Fixed
**Type:** Suggestion
**Severity:** Minor
**Scope:** Q14. Does this plant produce copious viable seeds each year (>1000)?

**Issue Description**

An individual plant may not produce >1000 seed but several plants together certainly can. I'd answer yes.

Question 15 - Dirr and Heuser suggest 1-2 month cold stratification for best germination. Plants in the wild will have seed germinate in the spring after a natural stratification period. rarely seen in the wild in south Georgia where chilling hours are much lower than in north Georgia where it is common

**Issue Resolution (Screener's Response to Issue)**

I answered no. gievn that the reviewer indicated that one plant cannot produce > 1000 seed.

# 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.