Plant Risk Evaluator -- PRE™
Evaluation Report

Morus alba -- Minnesota

2017 Farm Bill PRE Project

PRE Score: 15 -- Evaluate this plant further
Confidence: 82 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Submitted

Evaluation Date: September 26, 2017

This PDF was created on June 15, 2018

Plant Evaluated

Morus alba

Image by wplynn

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Morus alba*) 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

Morus alba is a small to medium sized shrub or tree that was introduced to the United States as the food source for silkworm. It escaped cultivation and has become established throughout the United States where it invades old fields, roadsides, forest edges, urban environments, and other disturbed areas. Seed dispersal is usually by birds and other animals. It poses an ecological threat by displacing native species and is known to hybridize and replace the native red mulberry (Morus rubra).

General Information

Status: Submitted
Screener: Mike Monterusso
Evaluation Date: September 26, 2017

Plant Information

Plant: *Morus alba*

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

Answer / Justification:

White mulberry was introduced to the U.S. as a food source for silkworms; it has escaped cultivation and is now established throughout the United States.

Reference(s):

- National Biological Information Infrastructure (NBII), IUCN/SSC Invasive Species Specialist Group (ISSG) (2011). Morus alba. Global invasive Species Database.
- United States Department of Agriculture (2017). Plants Profile for Morus alba (white mulberry).

---

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

Answer / Justification:

This plant is naturalized in Wisconsin

Reference(s):

- Swearingen, J.., & Bargeron C. (2016). White Mulberry. invasive Plant Atlas of the United States.
- United States Department of Agriculture (2017). Plants Profile for Morus alba (white mulberry).

---

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

Answer / Justification:

This plant is noted as being invasive in Wisconsin as well as several other states in the northeast including Connecticut.

Reference(s):

- Swearingen, J.., & Bargeron C. (2016). White Mulberry. invasive Plant Atlas of the United States.
- Brand, M. H., & University of Connecticut (2015). Morus alba, White Mulberry, Common Mulberry - Plant Database - University of Connecticut.

---

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

Answer / Justification:

This plant is noted to be invasive in Wisconsin

Reference(s):

- Swearingen, J.., & Bargeron C. (2016). White Mulberry. invasive Plant Atlas of the United States.
- Wisconsin Department of Natural Resources (2015). White mulberry - Wisconsin DNR.

---

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

- 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 information in the literature that other species of Morus are invasive in a similar climate

Reference(s):

- [Anonymous] .

---

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:

This is a very widespread plant in North America

Reference(s):

- Swearingen, J.., & Bargeron C. (2016). White Mulberry. invasive Plant Atlas of the United States.

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

Answer / Justification:

White mulberry poses an ecological threat by displacing native species, possibly hybridizing with and transmitting a root disease to the native red mulberry

Reference(s):

- Extension (2013). Morus alba, White Mulberry.
- Floridata, & Christman S. (2016). Morus alba Plant Profile.

---

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 are no studies that have specifically addressed fuel characteristics of white mulberry.

Reference(s):

- Stone, K.. (2009). Morus alba. In: Fire Effects Information System. Fire Effects information System.

---

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:

This plant is not known to be a health risk to humans or animals and fish

Reference(s):

- Moore, L.. (2002). White Mulberry. Plant Guide.

---

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

Answer / Justification:

This plants growth habit is of a shrub or tree and is not known to form dense thickets.

Reference(s):

- Stone, K.. (2009). Morus alba. In: Fire Effects Information System. Fire Effects information System.

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:

"...there are accounts of sprouting from stumps..., roots..., and cut stems buried in the soil...."

Reference(s):

- Stone, K.. (2009). Morus alba. In: Fire Effects Information System. Fire Effects information System.

---

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

Answer / Justification:

White mulberry reproduces by seed.

Reference(s):

- Stone, K.. (2009). Morus alba. In: Fire Effects Information System. Fire Effects information System.

---

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:

White mulberry reproduces by seed

Reference(s):

- Stone, K.. (2009). Morus alba. In: Fire Effects Information System. Fire Effects information System.
- FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (2007). Morus alba.

---

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

- 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:

Fruits are multi-seeded berries that contain abundant seed - a single tree is estimated to produce twenty million seeds!

Reference(s):

- National Park Service (2010). White Mulberry.
- Duke, J. A. (1983). Morus alba.

---

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

Answer / Justification:

Greenhouse experiments show variable germination rates: seed germination was higher with cold stratification (55%) but was 34% with no treatment.

Reference(s):

- Stone, K.. (2009). Morus alba. In: Fire Effects Information System. Fire Effects information System.
- HDRA - the organic organisation, Ryton Organic Gardens Coventry (2002). white mulberry doc - TTS19-Morus_alba.pdf.

---

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

Answer / Justification:

"Seed bearing begins at about 5 years of age for white mulberry, 2 years for open-grown red mulberry, and 4 years for red mulberry in the understory."

Reference(s):

- Barbour, J. R., Read R. A., & Barnes R. L. (2008). Morus L.: mulberry.

---

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

Answer / Justification:

Flowering usually occurs in April

Reference(s):

- Extension (2013). Morus alba, White Mulberry.

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

Answer / Justification:

White mulberry fruits are eaten and dispersed by animals including birds, turtles, red foxes, raccoons, and squirrels

Reference(s):

- FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (2007). Morus alba.
- Wisconsin Department of Natural Resources (2015). White mulberry - Wisconsin DNR.
- Wikipedia (2017). Morus alba.

---

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:

Wind and water are not factors involved with seed dispersal of white mulberry.

Reference(s):

- [Anonymous] .

---

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:

There is no evidence in the literature that white mulberry seeds are dispersed via contaminated seed, equipment, vehicles, boats, or clothing/shoes.

Reference(s):

- [Anonymous] .

Total PRE Score

PRE Score: 15 -- Evaluate this plant further
Confidence: 82 / 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:

• Laura Van Riper	November 22, 2017
• Tom Buechel	October 16, 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 # 6318

Date Created: January 22, 2018 - 7:29pm
Date Updated: January 26, 2018 - 10:17am

Submitted by: Matthew Kaproth

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q16. Does this plant produce viable seed within the first three years (for an herbaceous species) to five years (for a woody species) after germination?

Issue Description

Question 16 needs a response - with evidence. I believe it does reach maturity in 5 years...

Issue Resolution (Screener's Response to Issue)

Issue resolved by PRE Data Manager -- changed answer to yes (previously left blank) and provided evidence. Added source.

Issue ID # 5427

Date Created: October 16, 2017 - 9:33am
Date Updated: November 6, 2017 - 8:57am

Submitted by: Tom Buechel

Status: Fixed

Type:
Severity: Minor
Scope: Evaluation as a whole

Issue Description

This may be an example of a plant that does not spread like wildfire but still spreads and becomes a problem. It seems to be opportunistic in a vacant spot. Where there is one fruiting tree there will be eventually many. I disagree with this being a watch item. It is a what a good horticulturist would say "Mulberry" is a garbage can tree.

Issue Resolution (Screener's Response to Issue)

In response to this issue, the question regarding the potential for vegetative reproduction was changed from no to yes. In order to receive additonal points, evidence for wind, water, or human (e.g. equipment, vehicles) would need to be demonstrated, or it would need to be a proven health hazard or demonstrate that it alters fire regimes.

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.