Plant Risk Evaluator -- PRE™
Evaluation Report

Melia azedarach -- Georgia

2017 Farm Bill PRE Project

PRE Score: 20 -- Reject (high risk of invasiveness)
Confidence: 62 / 100
Questions answered: 19 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Completed

Evaluation Date: October 24, 2017

This PDF was created on August 13, 2018

Plant Evaluated

Melia azedarach

Image by Forest & Kim Starr

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Melia azedarach*) 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

Melia azedarach, or Chinabery, is thought to be native to Asia, probably in the regions of India and Pakistan. It has since been cultivated throughout the Middle East and China. This species has become introduced to many tropical regions, and has become invasive to many countries including Botswana, South Africa, United States, Belize, Brazil, and Panama. M. azedarach is a medium sized, deciduous tree with prolific fruiting and seed production. In areas where it is invasive, M. azedarach grows fast, reaches maturity early on, has a relative resistance to insects and pathogens, and can be toxic to birds and mammals. Chinaberry can spread long distance via avian vectors, or on-site via suckers. Methods of biological control on this species is being investigated in South Africa. It is advised that mature M. azedarach trees not be cut down, due to its ability to resprout by stem suckers and root. However, herbicide treatment on cut down trees may be effect, and removing seedlings by hand is effective.

General Information

Status: Completed
Screener: Lila Uzzell
Evaluation Date: October 24, 2017

Plant Information

Plant: *Melia azedarach*

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:

It was introduced for ornamental purposes in the United States in the mid 1800s and has since invaded disturbed areas. It commonly grows along roadsides and forest edges, and has become an ecological threat in many areas. For many countries it has become invasive where it is not native.

Reference(s):

- The University of Georgia Center for Invasive Species and Ecosystem Health (2017). chinaberry, Melia azedarach N/A Sapindales: Meliaceae.
- CABI (2017). Melia azedarach (Chinaberry).

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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:

In comparing the GBIF map with the PRE Climate map, Melia azedarach has become naturalized in all areas with a similar climate, but is also found in additional areas that are not similar. CABI also lists this species as being present or invasive in some areas with a similar climate.

Reference(s):

- CABI (2017). Melia azedarach (Chinaberry).
- GBIF.org (2017). Melia azedarach L..

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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:

This species is listed as a "Category 1 - Exotic plant that is a serious problem in Georgia natural areas by extensively invading native plant communities and displacing native species." in the Georgia EPPC. Areas where it is also listed as invasive include Florida, Louisiana, Virginia, Tennessee, and South Africa. The USDA states that this plant can be invasive or weedy in the United States.

Reference(s):

- Center for Invasive Species and Ecosystem Health, University of Georgia (2017). List of Non-Native Invasive Plants in Georgia - Georgia Exotic Pest Plant Council.
- CABI (2017). Melia azedarach (Chinaberry).
- United States Department of Agriculture (2017). Melia azedarach L. Chinaberrytree-- PLANTS Database.

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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:

Areas with a similar climate to Georgia where it is also listed as invasive include Florida, Louisiana, Virginia, Tennessee, and South Africa.

Reference(s):

- CABI (2017). Melia azedarach (Chinaberry).

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

Answer / Justification:

The Global Compendium of Weeds does not list any other species within the genus Melia as invasive. There is a lack of information on other species from other sources. Perhaps more follow-up should be done for this question.

Reference(s):

- Randall, R. (2012). A Global Compendium of Weeds. 2nd Edition..

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

- 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:

This species is found predominately in similar matching climates, excluding NE United States and SE Australia. M. azedarach can also be found in areas outside of Georgia's climatic region, this species seems to be widespread in areas of Southern Mexico, the Caribbean, and Africa.

Reference(s):

- CABI (2017). Melia azedarach (Chinaberry).
- GBIF.org (2017). Melia azedarach L..
- United States Department of Agriculture (2017). Melia azedarach L. Chinaberrytree-- PLANTS Database.

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

Answer / Justification:

The Georgia EPPC lists this plant as "Category 1 - Exotic plant that is a serious problem in Georgia natural areas by extensively invading native plant communities and displacing native species." Other sources state that it has the potential to grow in dense thickets and affect native vegetation, but mostly grows in high-sun areas, such as roadsides and open areas. This plant has a very rapid growth, has few natural enemies, and can grow in a variety of different soil types. Due to these characteristics, it seems like it could spread from roadsides into forest areas fairly easily.

Reference(s):

- NBII, ISSG (2006). GISD.
- CABI (2017). Melia azedarach (Chinaberry).
- TexasInvasives.org (2017). Texas Invasives.
- United States Department of Agriculture (2017). Melia azedarach L. Chinaberrytree-- PLANTS Database.

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

Answer / Justification:

Lack of sources/information.

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: **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:

Several sources indicate that the fruiting bodies of this species are toxic. The fruits are poisonous to humans and mammals, and birds that ingest the seeds may become paralyzed.

Reference(s):

- NBII, ISSG (2006). GISD.
- MacDonald, G., Sellers B., Langeland K., Duperron-Bond T., & Ketterer-Guest E. (2017). Melia azederach – UF/IFAS Center for Aquatic and Invasive Plants.
- CABI (2017). Melia azedarach (Chinaberry).

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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:

M. azedarach has the potential to grow in dense thickets and affect native vegetation, but mostly grows in high-sun areas, such as roadsides and open areas. This plant has a very rapid growth, has few natural enemies, and can grow in a variety of different soil types.

Reference(s):

- CABI (2017). Melia azedarach (Chinaberry).
- TexasInvasives.org (2017). Texas Invasives.

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:

"Chinaberry also reproduces vegetatively when the tree is cut, producing suckers that form a dense stand of vegetation".

Reference(s):

- MacDonald, G., Sellers B., Langeland K., Duperron-Bond T., & Ketterer-Guest E. (2017). Melia azederach – UF/IFAS Center for Aquatic and Invasive Plants.

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

Answer / Justification:

CABI states that "M. azedarach regenerates rapidly from seed and by suckering giving rise to its potential as a weed." Suckering seems to be a typical method of producing new plants, however the center for Aquatic and Invasive Plants IFAS states that this plant can spread vegetatively only if it is cut.

Reference(s):

- CABI (2017). Melia azedarach (Chinaberry).
- MacDonald, G., Sellers B., Langeland K., Duperron-Bond T., & Ketterer-Guest E. (2017). Melia azederach – UF/IFAS Center for Aquatic and Invasive Plants.

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

Answer / Justification:

"The seeds may retain their viability for up to two years (Anon., 2001). A high proportion of the seeds germinate (Anon., 2001)."

Reference(s):

- CABI (2017). Melia azedarach (Chinaberry).

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

Answer / Justification:

"Seed production is prolific and avian vectors disperse the seed, and seedlings are able to establish below the canopy of the parent plant (Brown and Gubb, 1986). There are 1400-3500 fruit per kg (air dried) and 4000-13,000 seeds per kg (National Academy of Sciences, 1983)...A high proportion of the seeds germinate (Anon., 2001)."

Reference(s):

- CABI (2017). Melia azedarach (Chinaberry).

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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 / Justification:

lack of information.

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

Answer / Justification:

"This is a rapidly growing species capable of precocious flowering, sometimes flowering while still a seedling and it may flower throughout the year (Weber, 2003). "

Reference(s):

- CABI (2017). Melia azedarach (Chinaberry).

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

Answer / Justification:

The time and lenght of fruiting/seed set depends on where M. azedarach is found, but it produces seed anywhere from 3-6 months out of the year.

Reference(s):

- CABI (2017). Melia azedarach (Chinaberry).

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:

M. azedarach seeds are commonly spread by birds, which allow the seeds to travel over long distances.

Reference(s):

- MacDonald, G., Sellers B., Langeland K., Duperron-Bond T., & Ketterer-Guest E. (2017). Melia azederach – UF/IFAS Center for Aquatic and Invasive Plants.

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

Answer / Justification:

The fruits are large, hard, and sticky, with a marble-like seed. This is uncharacteristic of wind/water dispersed seeds. M. azedarach seeds are typically dropped below the parent tree, or dispersed by birds.

Reference(s):

- The University of Georgia Center for Invasive Species and Ecosystem Health (2017). chinaberry, Melia azedarach N/A Sapindales: Meliaceae.
- MacDonald, G., Sellers B., Langeland K., Duperron-Bond T., & Ketterer-Guest E. (2017). Melia azederach – UF/IFAS Center for Aquatic and Invasive Plants.

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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:

There are no sources that mention this, but given the size of the seed this seems unlikely.

Reference(s):

- [Anonymous] .

Total PRE Score

PRE Score: 20 -- Reject (high risk of invasiveness)
Confidence: 62 / 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:

• Stewart Chandler	January 15, 2018
• John "Doc" Ruter	January 10, 2018
• Karan Rawlins	November 21, 2017

This evaluation has a total of 3 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 # 5913

Date Created: November 21, 2017 - 11:45am
Date Updated: January 26, 2018 - 7:57am

Submitted by: Karan Rawlins

Status: Fixed
Type: Suggestion
Severity: Major
Scope: Q10. Does the plant produce impenetrable thickets, blocking or slowing movement of animals, livestock, or humans?

Issue Description

There may be lack of published information, but it is common knowledge in south Georgia, that M. azedarach commonly fills fencerows and old fields, roadsides, in essence any area left unmanaged. I believe the answer should be Yes.

Issue Resolution
No resolution has been entered for this issue.

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.