Plant Risk Evaluator -- PRE™
Evaluation Report

Dioscorea bulbifera -- Georgia

2017 Farm Bill PRE Project

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

Privacy: Public
Status: Submitted

Evaluation Date: August 26, 2017

This PDF was created on August 13, 2018

Plant Evaluated

Dioscorea bulbifera

Image by Jee & Rani Nature Photography

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Dioscorea bulbifera*) 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

Air potato is a vigorous vine that can grow up to 70 feet or more in length, reaching to the canopy of tall trees and creating a fuel ladder. The primary form of reproductive spread is through bubils (aerial tubers) which can float and be dispersed a long way through water ways or by mechanical equipment. I have personally witnessed this species growing in disturbed urban areas in Atlanta Georgia where it has grown up and over other native and non native species. It clearly possesses the potential to be invasive in Georgia because of its vigor and ability to spread easily, which is unfortunate as its large heart shaped leaves and interesting tuberous growth makes it an attractive and interesting ornamental plant. It is recommended that Dioscorea bulbifera not be considered as a good commercial plant for Georgia.

General Information

Status: Submitted
Screener: Kylie Bucalo
Evaluation Date: August 26, 2017

Plant Information

Plant: *Dioscorea bulbifera*

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

Answer / Justification:

"Currently, D. bulbifera is widely naturalized and cultivated in tropical and subtropical areas in America, the West Indies, and Pacific Islands (ISSG, 2012; USDA-ARS, 2012)."

Reference(s):

- CABI (0). Dioscorea bulbifera (air potato).

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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:

Air potato has been introduced and naturalized in Florida and Georgia.

Reference(s):

- USDA Plants Database (0). Plants Profile for Dioscorea bulbifera (air yam).

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:

Invasive in states of North America, parts of South America, and some countries in the pacific

Reference(s):

- CABI (0). Dioscorea bulbifera (air potato).

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:

"Due to its ability to displace native species and disrupt natural processes such as fire and water flow, air potato has been listed as one of Florida’s most invasive plant species since 1993, and was placed on the Florida Noxious Weed List by the Florida Department of Agriculture and Consumer Services in 1999." GAEPPC ranks air potato as a category 3 plant which is described as "Category 3 - 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."

Reference(s):

- UF/IFAS Center for Aquatic and Invasive Plants (0). Dioscorea bulbifera – UF/IFAS Center for Aquatic and Invasive Plants.
- Smithsonian Institution (0). Dioscorea bulbifera_ Smithsonian.
- Georgia Invasive Species Task Force (0). List of Non-native Invasive Plants in Georgia - Georgia Invasive Species Task Force- LIST.

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:

Dioscorea alata (the winged yam) is invasive in Florida.

Reference(s):

- UF/IFAS Center for Aquatic and Invasive Plants (0). Dioscorea alata – UF/IFAS Center for Aquatic and Invasive Plants.

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

Answer / Justification:

"Currently, D. bulbifera is widely naturalized and cultivated in tropical and subtropical areas in America, the West Indies, and Pacific Islands (ISSG, 2012; USDA-ARS, 2012)." AIr potato has a very wide distribution, and cannot be a >50% climate match to Georgia. Particularly clusters of occurrences in Africa, Mexico, South America, northern Australia and the pacific islands.

Reference(s):

- CABI (0). Dioscorea bulbifera (air potato).
- GBIF (0). Dioscorea bulbifera L._GBIF.
- USDA Plants Database (0). Plants Profile for Dioscorea bulbifera (air yam).

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:

Air potato can grow extremely quickly, roughly 8 inches per day. It typically climbs to the tops of trees and has a tendency to take over native plants.

Reference(s):

- UF/IFAS Center for Aquatic and Invasive Plants (0). Dioscorea bulbifera – UF/IFAS Center for Aquatic and Invasive Plants.

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

- 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:

"In areas where surface fires would have been common in the absence of yam vines, yam ladder fuels could encourage crown fires" . Many field observations indicate that the weight of yams can break stems of supporting vegetation and cause mortality of trees and shrubs (reviews by [51,66,78]). Increased dead material in areas where yams have killed associated vegetation could increase fire frequency, intensity, or severity. Although these changes in fire regimes and behavior are speculative, they highlight the need for more information about how yams may affect the fire ecology of invaded habitats. " "Because yam vines use other vegetation for support, they can damage or kill this vegetation as well as provide ladder fuels into the canopy" "Due to its ability to displace native species and disrupt natural processes such as fire and water flow, air potato has been listed as one of Florida’s most invasive plant species since 1993" Low because information seems speculative.

Reference(s):

- UF/IFAS Center for Aquatic and Invasive Plants (0). Dioscorea bulbifera – UF/IFAS Center for Aquatic and Invasive Plants.
- Smithsonian Institution (0). Dioscorea bulbifera_ Smithsonian.
- Forest Service (0). Dioscorea spp..

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

Answer / Justification:

The tuber is actually edible to humans.

Reference(s):

- [Anonymous] .

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

Answer / Justification:

vine like habit.

Reference(s):

- CABI (0). Dioscorea bulbifera (air potato).
- UF/IFAS Center for Aquatic and Invasive Plants (0). Dioscorea bulbifera – UF/IFAS Center for Aquatic and Invasive Plants.
- Smithsonian Institution (0). Dioscorea bulbifera_ Smithsonian.
- Forest Service (0). Dioscorea spp..

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

Answer / Justification:

Vegeative reproduction is most common, though the formation of aerial tubers. New plants develop from bulbils that form on the plant, and these bulbils serve as a means of dispersal. The aerial stems of air potato die back in winter, but resprouting occurs from bulbils and underground tubers. The primary means of spread and reproduction are via bulbils. The smallest bulbils make control of air potato difficult due to their ability to sprout at a very small stage.

Reference(s):

- UF/IFAS Center for Aquatic and Invasive Plants (0). Dioscorea bulbifera – 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 **High** confidence in this answer based on the available literature.

Reference(s):

- [Anonymous] .

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

- 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:

In areas where seed is produced, Dioscorea bulbifera seeds are wind-dispersed (Hammer, 1998). Even where flowering occurs more regularly, sexual reproduction via seed is still likely of secondary importance. Seeds of D. bulbifera and other members of the genus are believed to undergo an obligate dormancy period of several months before they germinate. This strategy is probbably an evolutionary adaptation to ensure the presence of viable seeds in the seed bank when breaks in forest canopy cover occur.

Reference(s):

- Smithsonian Institution (0). Dioscorea bulbifera_ Smithsonian.

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

Answer / Justification:

In areas where they are produced, Dioscorea bulbifera seeds are wind-dispersed (Hammer, 1998). Even where flowering occurs more regularly, sexual reproduction via seed is still likely of secondary importance. Seeds of D. bulbifera and other members of the genus are believed to undergo an obligate dormancy period of several months before they germinate. This strategy is probbably an evolutionary adaptation to ensure the presence of viable seeds in the seed bank when breaks in forest canopy cover occur.

Reference(s):

- Smithsonian Institution (0). Dioscorea bulbifera_ Smithsonian.

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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: **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:

"In areas where they are produced, Dioscorea bulbifera seeds are wind-dispersed (Hammer, 1998). Even where flowering occurs more regularly, sexual reproduction via seed is still likely of secondary importance. Seeds of D. bulbifera and other members of the genus are believed to undergo an obligate dormancy period of several months before they germinate. This strategy is probbably an evolutionary adaptation to ensure the presence of viable seeds in the seed bank when breaks in forest canopy cover occur. "

Reference(s):

- Smithsonian Institution (0). Dioscorea bulbifera_ Smithsonian.

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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:

leave blank.

Reference(s):

- [Anonymous] .

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:

"In areas where they are produced, Dioscorea bulbifera seeds are wind-dispersed (Hammer, 1998). Even where flowering occurs more regularly, sexual reproduction via seed is still likely of secondary importance. Seeds of D. bulbifera and other members of the genus are believed to undergo an obligate dormancy period of several months before they germinate. This strategy is probbably an evolutionary adaptation to ensure the presence of viable seeds in the seed bank when breaks in forest canopy cover occur. "

Reference(s):

- Smithsonian Institution (0). Dioscorea bulbifera_ Smithsonian.

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

Reference(s):

- [Anonymous] .

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

- 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:

Bubils float and may be dispersed by flood waters "Seeds are dispersed by wind." "Water is also a major means of dispersal, so care must be taken to first eliminate populationsalong water bodies where bulbils may be easily spread. In addition, extra time must be utilized after flood events, as spread may be extensive."

Reference(s):

- CABI (0). Dioscorea bulbifera (air potato).
- Smithsonian Institution (0). Dioscorea bulbifera_ Smithsonian.
- Forest Service (0). Dioscorea spp..
- UF/IFAS Center for Aquatic and Invasive Plants (0). Dioscorea bulbifera – 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: **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:

"Mowers and other brush-cutting equipment may also disperse long distances, either through contaminated equipment or throwing of the bulbils during the mowing operation."

Reference(s):

- UF/IFAS Center for Aquatic and Invasive Plants (0). Dioscorea bulbifera – UF/IFAS Center for Aquatic and Invasive Plants.

Total PRE Score

PRE Score: 16 -- Reject (high risk of invasiveness)
Confidence: 80 / 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:

This evaluation does not have any reviewers.

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.

There are currently no issues associated with this evaluation.

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.