Plant Risk Evaluator -- PRE™
Evaluation Report

Arundo donax -- Texas

2017 Farm Bill PRE Project

PRE Score: 18 -- Reject (high risk of invasiveness)
Confidence: 81 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Completed

Evaluation Date: August 29, 2017

This PDF was created on July 06, 2018

Plant Evaluated

Arundo donax

Image by Forest & Kim Starr

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Arundo donax*) 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

Arundo donax is naturalized and invasive in many warm-temperate to tropical regions of the world. It spreads quickly by vegetative means and establishes new populations by detached fragments moving down water ways. It is not clear if the species produces seed outside of its native range.

General Information

Status: Completed
Screener: Kim Taylor
Evaluation Date: August 29, 2017

Plant Information

Plant: *Arundo donax*

If the plant is a cultivar, how does its behavior differs from its parent's?
This species is not a cultivar.

Regional Information

Region Name: Texas

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:

Arundo donax has naturlized across much of the southern half of the U.S.. It has also naturalized in parts of Africa, Asia, Australia, New Zealand, Europe, South America, Mexico, and Canada.

Reference(s):

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).
- United States Department of Agriculture (2014). USDA-NRCS Plants Database.
- U.S. National Plant Germplasm Network (0). Taxonomy - GRIN-Global Web v 1.9.8.2 Arundo donax.

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

Answer / Justification:

Arundo donax is naturalized across much of the southern U.S. which shares a climate with Texas.

Reference(s):

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).

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

Answer / Justification:

Arundo donax is listed as a noxious plant in Texas; It is also listed by the California Invasive Plant Council, the Hawaiian Ecosystems at Risk Project, Southeast Exotic Pest Plant Council. USDA Plants lists the species as invasive in the lower 48 states, Hawaii, Puerto Rico, and the US Virgin Islands. The Invasive Plant Atlas lists the species is invasive in California, Nevada, Tennessee, Alabama, Georgia, South Carolina, and Florida.

Reference(s):

- Invasive Plant Atlas of the United States (0). giant reed: Arundo donax (Cyperales: Poaceae): Invasive Plant Atlas of the United States.
- United States Department of Agriculture (2014). USDA-NRCS 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 **Very High** confidence in this answer based on the available literature.

Answer / Justification:

The species is listed as a noxious plant in Texas which is the area of interest. Other areas where it is considered invasive with a similar climate include most of the southern U.S.

Reference(s):

- United States Department of Agriculture (2014). USDA-NRCS Plants Database.

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

Answer / Justification:

The Global Compendium of Weeds lists Arundo formosana, A. madagascariensis, and A. plinii as weeds but none appear to be invasive in a similar climate.

Reference(s):

- Global Compendium of Weeds (GCW) (0). Global Compendium of Weeds: species index.

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

Answer / Justification:

About 50% of the total range has a similar climate to Texas.

Reference(s):

- GBIF (0). Arundo donax L. GBIF.

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:

Arundo donax "chokes riversides and stream channels, crowds out native plants, interferes with flood control, increases fire potential, and reduces habitat for wildlife." "Once established, giant reed has the ability to outcompete and completely suppress native vegetation." It is "an aggressive species with an ability to reproduce quickly, allowing it to out-compete native plant species, and has established itself as one of the primary threats to native riparian habitats in its introduced range, dramatically altering ecological and successional processes and altering habitats towards dense, monotypic stands up to 8 m tall. It is listed as one of the 100 world’s worst invasive alien species (ISSG, 2011). This species represent a serious concern in arid and semiarid habitats because it outcompete native vegetation in the access to soil-water. It uses more water than native plants, lowering groundwater tables."

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.
- TexasInvasives.org (0). Texas Invasives Arundo donax.

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

Answer / Justification:

Arundo donax increases fire potential. "It ignites easily and can create intense fires." " It is highly flammable and resprouts quickly after burning. Fires help transform communities of native plants into solid stands of giant reed, changing riverbank forests from flood- to fire-defined habitats-Randall et al. 1996). "A. donax is highly flammable and can change fire regimes in invaded areas."

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.
- Pacific Island Ecosystems at Risk (PIER) (0). Arundo donax (PIER species info).
- TexasInvasives.org (0). Texas Invasives Arundo donax.

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

Answer / Justification:

Arundo donax is noted as having a negative impact on fisheries and aquaculture due to its tendency to clog waterways.

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.

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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:

Texas Invasives notes the species chokes riversides and stream channels. The long, fibrous, interconnecting root mats form a framework which catches debris. The plant is very tall (over 20 feet in height).

Reference(s):

- TexasInvasives.org (0). Texas Invasives Arundo donax.

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:

Arundo donax has long, fibrous, interconnecting root mats. Reproduction is primarily through vegetative means through rhizomes which root and sprout readily.

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.
- Pacific Island Ecosystems at Risk (PIER) (0). Arundo donax (PIER species info).
- TexasInvasives.org (0). Texas Invasives Arundo donax.

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

Answer / Justification:

"Giant reed can float miles downstream where root and stem fragments may take root and initiate new infestations."

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.
- Pacific Island Ecosystems at Risk (PIER) (0). Arundo donax (PIER species info).
- TexasInvasives.org (0). Texas Invasives Arundo donax.

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

Answer / Justification:

Little information is available about sexual reproduction in this species. "A. donax does not produce viable seeds in most areas where it is apparently well-adapted. The importance of sexual reproduction to the species, as well as seed viability, dormancy, germination and seedling establishment have yet to be well studied."

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.
- TexasInvasives.org (0). Texas Invasives Arundo donax.

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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:

3 to 5 fertile florets per spikelet. Spikelets are solitary on contracted panicle. "A. donax does not produce viable seeds in most areas where it is apparently well-adapted. The importance of sexual reproduction to the species, as well as seed viability, dormancy, germination and seedling establishment have yet to be well studied." "No fruits or seeds typically outside of its native range."

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.
- Plants of the World Online (0). Arundo donax L. Plants of the World Online.
- Invasive Plant Atlas of the United States (0). giant reed: Arundo donax (Cyperales: Poaceae): Invasive Plant Atlas of the United States.

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

Answer / Justification:

"A. donax does not produce viable seeds in most areas where it is apparently well-adapted. The importance of sexual reproduction to the species, as well as seed viability, dormancy, germination and seedling establishment have yet to be well studied."

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.

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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: **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:

"A. donax does not produce viable seeds in most areas where it is apparently well-adapted. The importance of sexual reproduction to the species, as well as seed viability, dormancy, germination and seedling establishment have yet to be well studied."

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.

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

Answer / Justification:

Flowers from March to September but it is unclear if the species produces seed outside of its native range

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.

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

Answer / Justification:

There is no evidence suggesting spread by birds or mammals.

Reference(s):

- [Anonymous] .

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

Answer / Justification:

Vegetative propagules are readily and frequently washed downstream where they take root and cause new infestations. "In its native range, wind dispersal of seeds is facilitated by having a dense seed head on the end of a tall, flexible stem, presumably sending the seeds some distance."

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.
- TexasInvasives.org (0). Texas Invasives Arundo donax.

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

Answer / Justification:

GRIN notes that the species is a "potential seed contaminant". "It may be spread locally by agricultural machinery and as a contaminant in soil and crop seeds."

Reference(s):

- CABI (0). Arundo donax (giant reed) - CABI datasheet.
- U.S. National Plant Germplasm Network (0). Taxonomy - GRIN-Global Web v 1.9.8.2 Arundo donax.

Total PRE Score

PRE Score: 18 -- Reject (high risk of invasiveness)
Confidence: 81 / 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:

- Charlotte Reemts 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.

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.