Plant Risk Evaluator -- PRE™
Evaluation Report

Phyllostachys aurea -- Texas

2017 Farm Bill PRE Project

PRE Score: 18 -- Reject (high risk of invasiveness)
Confidence: 76 / 100
Questions answered: 18 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Completed

Evaluation Date: September 30, 2017

This PDF was created on August 13, 2018

Plant Evaluated

Phyllostachys aurea

Image by BambooJerry, Wikipedia user

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Phyllostachys aurea*) 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

Phyllostachys aurea is naturalized and invasive across the Southeastern U.S.. It forms dense stands through vegetative growth at a very rapid rate, crowding out native vegetation. The species flowers infrequently at an interval of between 7 and 12 years and it is unclear if seed is produced in the U.S.. More information is needed on how much seed production and dispersal contribute to the spread of the species outside of its native range.

General Information

Status: Completed
Screener: Kim Taylor
Evaluation Date: September 30, 2017

Plant Information

Plant: *Phyllostachys aurea*

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

Kartesz indicates Phyllostachys aurea is naturalized across the southeastern U.S., including Texas, as well as in California. GRIN indicates it is also naturalized in Australia, New Zealand, and Hawaii.

Reference(s):

- U.S. National Plant Germplasm Network (0). Taxonomy - GRIN-Global Web v 1.9.8.2 Phyllostachys aurea.
- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).

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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:

Kartesz indicates Phyllostachys aurea is naturalized across the southeastern U.S., including Texas, as well as in California.

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:

Phyllostachys aurea is listed as an "agricultural weed, casual alien, cultivation escape, environmental weed, naturalised, weed" by the Global Compendium of Weeds. USDA Plants indicates Phyllostachys aurea is listed as a Category II invasive plant by the Florida Exotic Pest Plant Council. It is also listed by the Information Index for Selected Alien Plants in Hawaii. The Invasive Plant Atlas of the U.S. indicates the species is invasive in Alabama, Florida, Georgia, Maryland, South Carolina, and Virginia. "Escaped populations, however, are generally restricted to the southern United States from Texas to Florida and from Arkansas to North Carolina. Golden bamboo also occurs outside of cultivation on the islands of Hawaii and Oahu. Populations are also reported in Oregon and 3 California counties, but the extent of escaped cultivars on the West Coast is poorly documented. Generally golden bamboo occurs in urban areas near planting sites. In Texas, golden bamboo occurs in the Lower Galveston Bay watershed within urban and residential areas of Houston. In Tennessee, golden bamboo persists in areas where it was cultivated, but as of 1994, no populations had escaped from the cultivated area."

Reference(s):

- Invasive Plant Atlas of the United States (0). golden bamboo: Phyllostachys aurea (Cyperales: Poaceae): Invasive Plant Atlas of the United States.
- Gucker, C. L. (2009). Phyllostachys aurea.
- Pacific Island Ecosystems at Risk (PIER) (0). Phyllostachys aurea (PIER species info).
- Global Compendium of Weeds (GCW) (0). Phyllostachys aurea information from the Global Compendium of Weeds (GCW).
- USDA, & NRCS (2017). The Plants Database.
- FLEPPC (2017). List of Invasive Plant Species.

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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 Invasive Plant Atlas of the U.S. indicates the species is invasive in Alabama, Florida, Georgia, Maryland, South Carolina, and Virginia. "Escaped populations, however, are generally restricted to the southern United States from Texas to Florida and from Arkansas to North Carolina."

Reference(s):

- Invasive Plant Atlas of the United States (0). golden bamboo: Phyllostachys aurea (Cyperales: Poaceae): Invasive Plant Atlas of the United States.
- Gucker, C. L. (2009). Phyllostachys aurea.

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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:

18 species of Phyllostachys are listed in the Global Compendium of Weeds including several which are invasive in the southeastern U.S.

Reference(s):

- Global Compendium of Weeds (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: **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:

Less than half of the species range has a similar climate to Texas.

Reference(s):

- GBIF (0). Phyllostachys aurea (André) Rivière & C.Rivière - 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:

"Infestations of bamboo displace native vegetation, alter habitat, and upset food chains. For streams, bamboo leaf litter alters stream food webs starting with litter-feeding stream invertebrates." "Infestations are commonly found around old homesites and can rapidly expand in size. Phyllostachys aurea can form dense, monocultural thickets that displace native species. Once this plant is established, it is difficult to remove." "Although golden bamboo is generally found near planting sites, in some areas there has been extensive spread that has negatively impacted native plant communities."

Reference(s):

- Invasive Plant Atlas of the United States (0). golden bamboo: Phyllostachys aurea (Cyperales: Poaceae): Invasive Plant Atlas of the United States.
- Gucker, C. L. (2009). Phyllostachys aurea.
- TexasInvasives.org (0). Texas Invasives Phyllostachys aurea.

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

Answer / Justification:

"Altered fire frequency, severity, or behavior in habitats invaded by golden bamboo was not described in the available literature. David Taylor, a botanist for the Daniel Boone National Forest in Kentucky, reports that fire spread is unlikely in bottomland habitats where golden bamboo grows, unless the area experiences an extreme drought. In extreme drought conditions, Taylor suggests golden bamboo may fuel a "fire storm". In an experiment, dry golden bamboo leaves and stems burned "hot". Although fire behavior and severity in golden bamboo stands have not been studied or reported in detail, pictures below suggest that stand and fuel structure can vary by time since cutting and/or site conditions. Although the golden bamboo stand in the picture on the left lacks basal leaves, fire is likely to carry through these stands if there are dead stem and leaves present on the ground. Flames typically reach the leafy canopy, producing "spectacular" fires. Stems make popping sounds as the moisture in the nodes is heated and expands to split open the nodes."

Reference(s):

- Gucker, C. L. (2009). Phyllostachys aurea.

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:

Phyllostachys aurea is not known to be poisonous. The seed and stem are edible. "As well as having detrimental effects on the environment this bamboo may also damage property and pose as a potential health threat from its harbouring of a fungus responsible for the Histoplasmosis disease." "P. aurea infestations may pose a serious indirect risk to human health as blackbird and starling species often roost in Phyllostachys invasive bamboos and can serve as vectors for the human respiratory disease, Histoplasmosis (Glahn et al., 1994; Miller, 2013). The microscopic fungus, Histoplasmacapsulatum, is found where bird droppings accumulate within the bamboo infestation. This fungus produces airborne fungal spores which when inhaled can cause the disease Histoplasmosis. The disease produces very few symptoms, but can have serious health effects."

Reference(s):

- CABI (0). Phyllostachys aurea (golden bamboo) - cabi.
- Plants for a Future (0). Phyllostachys aurea Golden Bamboo, Fishpole Bamboo PFAF Plant Database.

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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:

"Often found as dense thickets along roadsides and residential right of ways." "Infestations are commonly found around old homesites and can rapidly expand in size. Phyllostachys aurea can form dense, monocultural thickets that displace native species. Once this plant is established, it is difficult to remove." "Rhizome growth by golden bamboo clones can result in the development of dense thickets and colonies. A single golden bamboo clump can produce up to 9.3 miles (15 km) of stems in its lifetime."

Reference(s):

- Invasive Plant Atlas of the United States (0). golden bamboo: Phyllostachys aurea (Cyperales: Poaceae): Invasive Plant Atlas of the United States.
- Gucker, C. L. (2009). Phyllostachys aurea.
- TexasInvasives.org (0). Texas Invasives Phyllostachys aurea.

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:

"Plants arising from branched rhizomes." "Reproduces vegetatively via budding of root rhizomes and runners." "Plants spread by rhizomes." "Vegetative spread occurs through rhizomes. The division of clumps and moving of rhizome fragments are the primary methods of golden bamboo reproduction."

Reference(s):

- Invasive Plant Atlas of the United States (0). golden bamboo: Phyllostachys aurea (Cyperales: Poaceae): Invasive Plant Atlas of the United States.
- Gucker, C. L. (2009). Phyllostachys aurea.
- TexasInvasives.org (0). Texas Invasives Phyllostachys aurea.

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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.

Answer / Justification:

"Golden bamboo sprouts after cutting, and dispersal is primarily through vegetative means. Researchers suspect that golden bamboo may be dispersed by rhizome fragments discarded in yard waste." "There is also a high risk potential for naturalization through improper rhizome disposal, and rhizome dispersal by water. Documentation shows infestations are spreading offsite without the aid of human cultivation by water."

Reference(s):

- Gucker, C. L. (2009). Phyllostachys aurea.
- CABI (0). Phyllostachys aurea (golden bamboo) - cabi.

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

Answer / Justification:

"Spikelets are solitary with 8 to 12 flowers, but are rarely seen." Rarely flowers (for decades). Flowering usually signifies death of the plant." "Flowering is very rare (maybe once every 7 to 12 years)." "Although golden bamboo is capable of reproducing by seed, the rarity of flowering in the United States makes sexual reproduction unlikely." "It flowers every 7 to 12 years, but seed production is rarely observed." P. aurea rarely flowers and it is unclear if the plant dies or is able to resprout from rhizomes aftern flowering. While seed appears to be viable, since flowering is so uncommon, seed production is not a standard method of reproduction.

Reference(s):

- United States Department of Agriculture, Animal, & Service P. Health Ins (2012). Weed Risk Assessment for Phyllostachys aurea Carr. ex A. & C. Rivière (Poaceae) – Golden bamboo.
- Invasive Plant Atlas of the United States (0). golden bamboo: Phyllostachys aurea (Cyperales: Poaceae): Invasive Plant Atlas of the United States.
- Gucker, C. L. (2009). Phyllostachys aurea.
- TexasInvasives.org (0). Texas Invasives Phyllostachys aurea.

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

Answer / Justification:

No information was found on number of seeds produced.

Reference(s):

- [Anonymous] .

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

Answer / Justification:

"Germination usually takes place fairly quickly so long as the seed is of good quality, though it can take 3 - 6 months." " Seeds produced by golden bamboo germinate once mature and moist. While dry seeds may sit dormant for several months, it is thought that viability is lost over time and that golden bamboo seeds lack any long-term dormancy."

Reference(s):

- Gucker, C. L. (2009). Phyllostachys aurea.
- Plants for a Future (0). Phyllostachys aurea Golden Bamboo, Fishpole Bamboo PFAF Plant Database.

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

Answer / Justification:

"Young shoots appear in spring (April in China); they grow rapidly, reaching full height within 1 month, after which the branches and leaves develop before the summer starts. A culm matures in 3—5 years." It is not clear as what age the plant is capable of flowering since flowering is so infrequent.

Reference(s):

- Pacific Island Ecosystems at Risk (PIER) (0). Phyllostachys aurea (PIER species info).

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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?

Reference(s):

- [Anonymous] .

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.

Answer / Justification:

There is no evidence of this.

Reference(s):

- Pacific Island Ecosystems at Risk (PIER) (0). Phyllostachys aurea (PIER species info).

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

Answer / Justification:

"There is also a high risk potential for naturalization through improper rhizome disposal, and rhizome dispersal by water. Documentation shows infestations are spreading offsite without the aid of human cultivation by water." "Cases of spread by water have been documented in Connecticut and there is the potential for rhizome fragments to be washed downstream along riparian corridors."

Reference(s):

- CABI (0). Phyllostachys aurea (golden bamboo) - cabi.

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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:

"The spread of P. aurea along roadsides by plows moving rhizomes has been documented. Observation has shown loose rhizome fragments and rhizomes growing up along roadsides where plows could potentially transport the rhizome spreading the bamboo. Improper disposal of the rhizomes is common, causing new bamboo infestations to start. Spread can occur from improper dumping of yard waste into natural areas."

Reference(s):

- CABI (0). Phyllostachys aurea (golden bamboo) - cabi.

Total PRE Score

PRE Score: 18 -- Reject (high risk of invasiveness)
Confidence: 76 / 100
Questions answered: 18 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
• Trey Wyatt	November 1, 2017
• Steve Moore	October 4, 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.

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.