Plant Risk Evaluator -- PRE™
Evaluation Report

Festuca arundinacea -- Georgia

2017 Farm Bill PRE Project

PRE Score: 18 -- Reject (high risk of invasiveness)
Confidence: 64 / 100
Questions answered: 18 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Submitted

Evaluation Date: October 18, 2017

This PDF was created on August 13, 2018

Plant Evaluated

Festuca arundinacea

Image by Forest & Kim Starr

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Festuca arundinacea*) 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

Festuca arundinacea, commonly known as tall fescue or Kentucky 13 (with endophyte), is a clumping grass commonly used in agriculture (supporting beef cows) and is widely used as turf in lawns and in sport fields. Tall fescue is a long-living, cool season perennial grass known to have a high growth rate, drought tolerance, and resilience to herbivory. F. arundinacea that have an endophytic relationship tend to be more resilient to environmental conditions, and thus are favored by many farmers. As a popular agricultural and lawn grass, the possibility for tall fescue to spread into areas outside of where it is grown are very high. Yet, the plant itself tends to have a slow lateral spread, so it is not of great concern in many areas.

General Information

Status: Submitted
Screener: Lila Uzzell
Evaluation Date: October 18, 2017

Plant Information

Plant: *Festuca arundinacea*

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:

Literary references show that Festuca arundinacea have grown in areas outside of its cultivation. "Tall fescue invades a variety of open habitats including fields, forest margins, roadsides, forest openings and savannas".

Reference(s):

- Center for Invasive Species and Ecosystem Health (2017). tall fescue, Festuca arundinacea N/A Cyperales: Poaceae.

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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:

CADI states that Festuca arundinacea "is now widely naturalized in the temperate regions of southern Australia (eastern New South Wales, the ACT, Victoria, Tasmania, many parts of South Australia and south-western Western Australia). It is also found occasionally naturalized in the southern parts of the Northern Territory and south-eastern Queensland (Queensland Government, 2016). Comparisons between maps from the PRE Climate Match tool, CADI, and GBIF shows that this species is found in the similar climate regions of SE United States, E China, and SE Australia.

Reference(s):

- Watling, G. (2017). Festuca arundinacea (tall fescue).
- GBIF.org (2017). Festuca arundinacea Schreb..

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

Answer / Justification:

The Global Compendium of Weeds lists tall fescue as invasive in Alaska, Uruguay, Argentina, Costa Rica, Russia, Japan, and throughout the Mediterranean. Sources such as the USDA (https://plants.usda.gov/plantguide/pdf/pg_loar10.pdf) state that it MAY become invasive in some regions if not properly managed. The Georgia EPPC has this species listed as a category 3- that it is an "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):

- Georgia Invasive Species Task Force (2017). List of Non-native Invasive Plants in Georgia - Georgia Invasive Species Task Force.
- Randall, R. (2012). A Global Compendium of Weeds. 2nd Edition..

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

Answer / Justification:

The Global Compendium of Weeds lists tall fescue as being invasive within Uruguay, Argentina, Mediterranean Europe, and Japan. In matching the PRE Climate Map to the GBIF map, the areas in which tall fescue is found in these countries matches that of our climate.

Reference(s):

- GBIF.org (2017). Festuca arundinacea Schreb..

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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:

Though there are species within the same genus that are listed as invasive (F. ovina, F. pratensis, F. rubra, and F. trachyphylla), none are invasive to areas within Georgia's climate.

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

Answer / Justification:

Referencing the PRE Climate Matching map with GBIF, F. arundinacea is found in >50% of the climates matching Georgia's region. F. arundinacea is found in all of the similar climates excluding Eastern China.

Reference(s):

- GBIF.org (2017). Festuca arundinacea Schreb..

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:

This species is known to compete with and displace native grasses in areas it is cultivated (https://plants.usda.gov/plantguide/pdf/pg_loar10.pdf)

Reference(s):

- Center for Invasive Species and Ecosystem Health (2017). tall fescue, Festuca arundinacea N/A Cyperales: Poaceae.

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

Answer / Justification:

There is no evidence of tall fescue promoting fire. Though CABI does mention that it may benefit from or tolerate fire.

Reference(s):

- Watling, G. (2017). Festuca arundinacea (tall fescue).

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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:

tall fescue is known to interact with an endophytic fungus. The presence of tall fescue and its interaction with the endophyte are harmful to soil organisms, insects, plants, birds, and mammals--even livestock. (https://plants.usda.gov/plantguide/pdf/pg_loar10.pdf). There is no evidence that tall fescue is a health risk to humans.

Reference(s):

- Center for Invasive Species and Ecosystem Health (2017). tall fescue, Festuca arundinacea N/A Cyperales: Poaceae.

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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:

Tall fescue is a clumping grass, and does not produce impenetrable thickets.

Reference(s):

- Center for Invasive Species and Ecosystem Health (2017). tall fescue, Festuca arundinacea N/A Cyperales: Poaceae.
- Missouri Botanical Garden (2017). Festuca arundinacea (mix) - Plant Finder.

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:

F. arundinacea spreads mainly through rhizomes.

Reference(s):

- Center for Invasive Species and Ecosystem Health (2017). tall fescue, Festuca arundinacea N/A Cyperales: Poaceae.
- Watling, G. (2017). Festuca arundinacea (tall fescue).

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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: **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:

I cannot find literature on this, but assume no since grasses typically spread through rhizomes and seed. If a rhizome is detached, there is a chance of this species spreading, but the chances are low. CABI describes that this species may propagate by rhizoids, but would not allow the plant to spread over long distances.

Reference(s):

- Watling, G. (2017). Festuca arundinacea (tall fescue).

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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:

Tall fescus is know to have "good seedling vigor" followed by rapid germination rates. https://plants.usda.gov/plantguide/pdf/pg_loar10.pdf

Reference(s):

- [Anonymous] .

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

Answer / Justification:

There is no specific information regarding viable seeds per year. Based on F. arundinacea biological characteristics, it has "tall flowering culms with long panicles, long and wide upper culm leaves, and many spikelets"-- I would assume this plant produces >1000 seeds.

Reference(s):

- Watling, G. (2017). Festuca arundinacea (tall fescue).

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

Answer / Justification:

Plants can flower within their first year of growth.

Reference(s):

- Gibson, D.. J., & Newman J.. A. (2001). Festuca arundinacea Schreber (F. elatior L. ssp. arundinacea (Schreber) Hackel). Journal of Ecology. 89, 304–324.

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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 / Justification:

lack of information.

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: **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:

F. arundinacea have an awn surrounding their seeds that facilitate animal dispersal. Viable seeds are typically transported through horse dung. The dispersal distance is not available.

Reference(s):

- Gibson, D.. J., & Newman J.. A. (2001). Festuca arundinacea Schreber (F. elatior L. ssp. arundinacea (Schreber) Hackel). Journal of Ecology. 89, 304–324.

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

Answer / Justification:

Seed propagules are typically dispersed via mammals. The seed's shape is wide and long, without any hairs or extra appendages (other than an awn) that are indicative of wind or water seed dispersal. However, wind is the the primary method used for pollination in tall fescue.

Reference(s):

- Gibson, D.. J., & Newman J.. A. (2001). Festuca arundinacea Schreber (F. elatior L. ssp. arundinacea (Schreber) Hackel). Journal of Ecology. 89, 304–324.
- Randall, R. (2012). A Global Compendium of Weeds. 2nd Edition..

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

Answer / Justification:

Tall fescue is often intentionally planted in agricultural practices to feed livestock. It is also widely used as turf for lawns, parks, and sport fields.

Reference(s):

- Watling, G. (2017). Festuca arundinacea (tall fescue).

Total PRE Score

PRE Score: 18 -- Reject (high risk of invasiveness)
Confidence: 64 / 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:

• Karan Rawlins	February 22, 2018
• Timothy Daly	January 2, 2018

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.

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.