Plant Risk Evaluator -- PRE™
Evaluation Report

Miscanthus sinensis 'Purpurascens' -- Minnesota

2017 Farm Bill PRE Project

PRE Score: 8 -- Accept (low risk of invasiveness)
Confidence: 73 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Completed

Evaluation Date: May 1, 2017

This PDF was created on June 15, 2018

Plant Evaluated

Miscanthus sinensis 'Purpurascens'

Image by Bob's Blog (Bob Vila - Tried, True, Trustworthy Home Advise)

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Miscanthus sinensis 'Purpurascens'*) 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

It is very difficult to prove that Miscanthus sinensis 'purpurascens' is invasive by itself. Due to its self-incompatability, grown by itself, it is unlikely to produce viable seed, however if other Miscanthus species or sinensis cultivars are in close proximity, then it can cross-pollinate, set seed, and spread; but, it is highly likely that the offspring will revert to a wild-type that is phenotypically different than the cultivar. DNA studies would need to be conducted on feral stands of Miscanthus sinensis to see how the cultivars are contributing to the wild population. At this time, there is no information in the literature of purpurascen phenotypes being identified in naturalized stands. In Minnesota, Miscanthus sinensis and all of its cultivars should be watched. So far, reports of naturalized stands are limited. Dr. Mary Meyer at the Minnesota Landscape Arboretum told me that several years ago a small group of wild-type plants were removed from a wooded area close to the Ornamental Grass Collection (personal communications). The potential for invasiveness in Minnesota exists; especially with cultivars that flower earlier and on years with warmer, longer growing seasons. More sterile cultivars need to be developed.

General Information

Status: Completed
Screener: Dan Miller
Evaluation Date: May 1, 2017

Plant Information

Plant: *Miscanthus sinensis 'Purpurascens'*

If the plant is a cultivar, how does its behavior differs from its parent's?
'Purpurascens' is shorter and more compact than the species and has more reddish and orange-red foliage in late summer and fall. It is also know for earlier flower time and it's cold hardiness. Some authorities maintain that this grass is neither a cultivar for a variety of M. sinensis, but is a hybrid of unknown parentage which should be designated M. purpurescans; therefore questions on this evaluation will be answered for the cultivar 'purpurascens'.

Regional Information

Region Name: Minnesota

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: **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 that 'purpurascens' has become naturalized where it is not native; however, it has the potential to become naturalized due to its ability to produce viable seed and its potential to cross with other Miscanthus sinensis cultivars or Miscanthus species (see evaluation notes below). It should be noted that Miscanthus sinensis has naturalized in 26 states (USDA).

Reference(s):

- Madeja, G., Umek L., & Havens K. (2012). Differences in seed set and fill of cultivars of Miscanthus grown in USDA cold hardiness zone 5 and their potential for invasiveness. Journal of Environmental Horticulture. 30, 42.
- Meyer, M.H., & Tchida C.L. (1999). Miscanthus Anderss. produces viable seed in four USDA hardiness zones. Journal of Environmental Horticulture. 17, 137-140.
- Knight, T. M., Havens K., & Vitt P. (2011). Will the use of Less Fecund Cultivars Reduce the Invasiveness of Perennial Plants?. BioScience. 61, 816–822.
- United States Department of Agriculture (2017). Plants Profile for Miscanthus sinensis (Chinese silvergrass).
- Dougherty, R. F., Quinn L., Endres A., Voigt T. B., & Barney J. (2014). Natural History Survey of the Ornamental Grass Miscanthus sinensis in the Introduced Range. Invasive Plant Science and Management. 7,

2. Is the species (or cultivar or variety) noted as being naturalized in the US or world 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:

There is no evidence in the literature that 'purpurascens' is naturalized in the US or world in a similar climate; however, it has the potential to become invasive (see evaluation notes below). In the Minnesota trial (Meyer and Tchida) purpurescens produced viable seed at the Minnesota Landscape Arboretum (plant hardiness zone 4).

Reference(s):

- Madeja, G., Umek L., & Havens K. (2012). Differences in seed set and fill of cultivars of Miscanthus grown in USDA cold hardiness zone 5 and their potential for invasiveness. Journal of Environmental Horticulture. 30, 42.
- Meyer, M.H., & Tchida C.L. (1999). Miscanthus Anderss. produces viable seed in four USDA hardiness zones. Journal of Environmental Horticulture. 17, 137-140.

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3. Is the species (or cultivar or variety) noted as being invasive in the U.S. or world?

- 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 nothing in the literature specifically mentioning purpurascens as being invasive; however, it has the potential to become invasive. In the study at the Chicago Botanical Gardens, purpurascens produced a relatively large amount of seed. It should be noted that Quinn et al. (Quinn 2010) collected data from invasive Miscanthus sinensis populations in Ohio, New Jersey, North Carolina, Kentucky, and Pennsylvania, and that it's noted as being a noxious weed in the southeast and escaped cultivation in Colorado and most eastern states (DiTomaso 2007).

Reference(s):

- Madeja, G., Umek L., & Havens K. (2012). Differences in seed set and fill of cultivars of Miscanthus grown in USDA cold hardiness zone 5 and their potential for invasiveness. Journal of Environmental Horticulture. 30, 42.
- Quinn, L. D., Allen D. J., & J. Stewart R. (2010). Invasiveness potential of Miscanthus sinensis: implications for bioenergy production in the United States. GCB Bioenergy. 2, 310–320.
- DiTomaso, J. M., & Healy E. A. (2007). Weeds of California and other western states - Miscanthus. 2,

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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: **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 nothing in the literature specifically mentioning purpurascens as being invasive in a climate similar to Minnesota's.

Reference(s):

- [Anonymous] .

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

Answer / Justification:

Miscanthus sacchariflorus is noted as being invasive in Minnesota.

Reference(s):

- Minnesota Department of Natural Resources (2017). Invasive Terrestrial Species - Amur Silver Grass.
- Schnitzler, A., & Essl F. (2015). From horticulture and biofuel to invasion: the spread of Miscanthus taxa in the USA and Europe. Weed Research. 55, 221–225.

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

Answer / Justification:

This cultivar is widely-distributed throughout plant hardiness zones 5 - 9 in the United States. It should be noted that the invasive parent Miscanthus sinensis can tolerate a broad range of climatic conditions, light availability, and nutrient availability in the eastern United States, suggesting risk of further invasion beyond current distribution (Dougherty).

Reference(s):

- Dougherty, R. F., Quinn L., Endres A., Voigt T. B., & Barney J. (2014). Natural History Survey of the Ornamental Grass Miscanthus sinensis in the Introduced Range. Invasive Plant Science and Management. 7,

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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: **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:

There is no evidence in the literature that purpurascens will displace and dominate the plant community (see evaluation notes below). It should be noted that M. sinenensis currently tends to establish in low-value areas such as roadsides and forest edges.

Reference(s):

- Dougherty, R. F., Quinn L., Endres A., Voigt T. B., & Barney J. (2014). Natural History Survey of the Ornamental Grass Miscanthus sinensis in the Introduced Range. Invasive Plant Science and Management. 7,

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

Answer / Justification:

Miscanthus sinensis is noted for promoting fire in areas where it is established. There is no reason to believe that 'purpurascens' is different form the species in its response to fire.

Reference(s):

- Waggy, M. A. (2011). Miscanthus sinensis. In: Fire Effects Information System.

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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:

Miscanthus sinensis is palatable for livestock and there are no reports in the literature of health risks 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: **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:

Reports of Miscanthus sinensis creating impenetrable thickets blocking human or animal movement were not found in the literature.

Reference(s):

- [Anonymous] .

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:

Miscanthus sinensis regenerates by sprouting from the rhizomes and tillering

Reference(s):

- Waggy, M. A. (2011). Miscanthus sinensis. In: Fire Effects Information System.

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

Answer / Justification:

Fragmentation is not common. Seed production is the common method of reproduction for this plant.

Reference(s):

- Waggy, M. A. (2011). Miscanthus sinensis. In: Fire Effects Information System.

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

Answer / Justification:

Fecundity studies in Minnesota and in Illinois show that Miscanthus sinensis 'purpurascens' produces viable seed.

Reference(s):

- Madeja, G., Umek L., & Havens K. (2012). Differences in seed set and fill of cultivars of Miscanthus grown in USDA cold hardiness zone 5 and their potential for invasiveness. Journal of Environmental Horticulture. 30, 42.
- Meyer, M.H., & Tchida C.L. (1999). Miscanthus Anderss. produces viable seed in four USDA hardiness zones. Journal of Environmental Horticulture. 17, 137-140.

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

Answer / Justification:

In the Illinois study (Madeja, Umek, and Havens), in 2010 'purpurascens' produced a mean of 24,957 filled seeds/plant.

Reference(s):

- Madeja, G., Umek L., & Havens K. (2012). Differences in seed set and fill of cultivars of Miscanthus grown in USDA cold hardiness zone 5 and their potential for invasiveness. Journal of Environmental Horticulture. 30, 42.

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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: **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:

Meyer and Tchida harvested seed and tested germination for purpurascens and had 60% germination in their 1997 trial for USDA zone 4 plants.

Reference(s):

- Meyer, M.H., & Tchida C.L. (1999). Miscanthus Anderss. produces viable seed in four USDA hardiness zones. Journal of Environmental Horticulture. 17, 137-140.

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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:

The juvenille period is relatively short.

Reference(s):

- [Anonymous] .

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

Answer / Justification:

There is no indication that the flowering period of Miscanthus sinensis is > 3 months. In its native range it flowers in a two month period.

Reference(s):

- Waggy, M. A. (2011). Miscanthus sinensis. In: Fire Effects Information System.

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 in the literature that seeds of Miscanthus sinensis are frequently dispersed this way.

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

Answer / Justification:

Miscanthus sinensis seeds are primarily dispersed by wind. The study by Quinn et al. showed that some seeds were captured 300 and 400 meters from their source.

Reference(s):

- Dougherty, R. F., Quinn L., Endres A., Voigt T. B., & Barney J. (2014). Natural History Survey of the Ornamental Grass Miscanthus sinensis in the Introduced Range. Invasive Plant Science and Management. 7,
- Quinn, L. D., Matlaga D. P., J. Stewart R., & Davis A. S. (2011). Empirical Evidence of Long-Distance Dispersal in Miscanthus sinensis and Miscanthus × giganteus. Invasive Plant Science and Management. 4, 142–150.

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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 is no information in the literature that the plant's propagules are frequently transported this way.

Reference(s):

- [Anonymous] .

Total PRE Score

PRE Score: 8 -- Accept (low risk of invasiveness)
Confidence: 73 / 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:

• Tom Buechel	November 9, 2017
• Mary Hockenberry Meyer	August 30, 2017

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.