Plant Risk Evaluator -- PRE™
Evaluation Report

Hemerocallis 'Stella d'Oro' -- Illinois

2017 Farm Bill PRE Project

PRE Score: 7 -- Accept (low risk of invasiveness)
Confidence: 69 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Submitted

Evaluation Date: September 17, 2017

This PDF was created on June 15, 2018

Plant Evaluated

Hemerocallis 'Stella d'Oro'

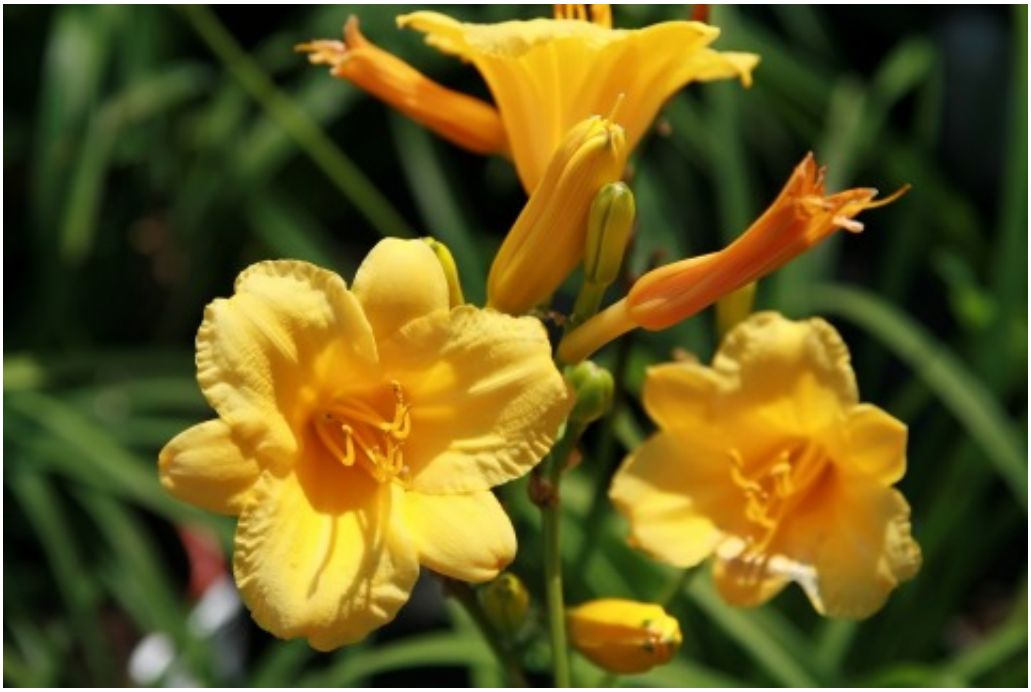

Image by David J. Stang

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Hemerocallis 'Stella d'Oro'*) 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

Hemerocallis fulva is invasive in the Midwest, however there are no reports of Hemerocallis 'Stella d'Oro' or other hybrid daylilies naturalizing. This cultivar has been widely planted for decades and has not yet produced any known naturalized populations. Hemerocallis fulva is a triploid that doesn't produce any viable seed, but spreads aggressively vegetatively. 'Stella d'Oro' on the other hand is a diploid that does produce viable seed and spreads slowly vegetatively. The seed germinates easily, but does not seem to be copious or dispersed long distances. Hemerocallis 'Stella d'Oro' therefore presents a low risk of invasiveness in Illinois.

General Information

Status: Submitted
Screener: Emily Russell
Evaluation Date: September 17, 2017

Plant Information

Plant: *Hemerocallis 'Stella d'Oro'*

If the plant is a cultivar, how does its behavior differs from its parent's?
'Stella d'Oro' forms clumps that spread slowly outward as opposed to the the aggressive vegetative growth of H. fulva. The overall habit is more compact. The flowers are yellow and repeat-blooming. This cultivar is a diploid which does produce viable seed.

Regional Information

Region Name: Illinois

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 are no reports of Hemerocallis 'Stella d'Oro' naturalizing. Though Hemerocallis fulva is invasive in the Midwest, no naturalized populations of 'Stella d'Oro' or other hybrid daylilies have been documented after decades of widespread planting.

Reference(s):

- [Anonymous] .

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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: **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 are no reports of Hemerocallis 'Stella d'Oro' naturalizing. Though Hemerocallis fulva is invasive in the Midwest, no naturalized populations of 'Stella d'Oro' or other hybrid daylilies have been documented after decades of widespread planting.

Reference(s):

- [Anonymous] .

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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 are no reports of Hemerocallis 'Stella d'Oro' naturalizing. Though Hemerocallis fulva is invasive in the Midwest, no naturalized populations of 'Stella d'Oro' or other hybrid daylilies have been documented after decades of widespread planting.

Reference(s):

- [Anonymous] .

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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 are no reports of Hemerocallis 'Stella d'Oro' naturalizing. Though Hemerocallis fulva is invasive in the Midwest, no naturalized populations of 'Stella d'Oro' or other hybrid daylilies have been documented after decades of widespread planting.

Reference(s):

- [Anonymous] .

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:

Hemerocallis fulva is invasive in the Midwest and Mid-Atlantic United States.

Reference(s):

- Midwest Invasive Plant Network (2015). Midwest Invasive Plant List.
- Rhoads, A. F., & Block T. A. (2011). Orange daylily.

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:

Hemerocallis 'Stella d'Oro' is grown in many climates.

Reference(s):

- [Anonymous] .

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:

Though it can grow into a relatively dense groundcover, evidence is lacking that 'Stella d'Oro' dominates plant communities.

Reference(s):

- [Anonymous] .

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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:

No evidence of changing fire regimes.

Reference(s):

- [Anonymous] .

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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:

Hemerocallis is poisonous to cats, but edible to humans. It does not seem to pose a significant risk to people, animals, or grazing systems.

Reference(s):

- Peck, D. (2011). Are Daylilies toxic to cats?.

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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:

Unlikely to produce impenetrable thickets due to habit.

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:

Gardeners recommend dividing 'Stella d'Oro' every 3 to 5 years as the crown becomes congested with new growth. It is reportedly a vigorous cultivar that spreads over time, but still clump-forming in habit rather than running.

Reference(s):

- Gulia, S. K., Singh B. P., Carter J., & Griesbach R. J. (2009). Daylily: Botany, Propagation, Breeding. (Janick, J., Ed.).Horticultural Reviews. 193–220.

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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:

"In addition, small shoots may develop from buds on the inflorescence. These shoots can be easily removed and rooted into the soil to form new plants. Fully developed proliferations usually take 10 to 30 days to root well, and these plants usually flower within 12 to 15 months" 'Stella d'Oro' is listed as a cultivar that produces scape proliferations (Dunwell).

Reference(s):

- Gulia, S. K., Singh B. P., Carter J., & Griesbach R. J. (2009). Daylily: Botany, Propagation, Breeding. (Janick, J., Ed.).Horticultural Reviews. 193–220.
- Dunwell, W. C. (1996). Hemerocallis (daylily) propagation. COMBINED PROCEEDINGS-INTERNATIONAL PLANT PROPAGATORS SOCIETY.

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:

"Harvesting ‘Stella de Oro’ capsules at 35–40 days after anthesis yielded mature seeds with well developed embryo and cotyledons analyzed by X-ray images with a 92% germination in 17 days after sowing."

Reference(s):

- Kim, J. Hee, Suh J. Keun, & Lee A. Kyung (2016). Germination of Seeds as Influenced by Seed Development and Temperature Treatments. Korean Journal of Horticultural Science & Technology. 34, 830–839.

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

Answer / Justification:

The seeds per capsule found in a germination study ranged from 6 to 14. 'Stella d'Oro' can easily produce hundreds of flowers over the season, but it is unlikely that all of them will be successfully pollinated and go on to produce viable seed capsules.

Reference(s):

- Kim, J. Hee, Suh J. Keun, & Lee A. Kyung (2016). Germination of Seeds as Influenced by Seed Development and Temperature Treatments. Korean Journal of Horticultural Science & Technology. 34, 830–839.
- National Gardening Association (2015). Daylilies forum: Stella de Oro aborts seed pods - Garden.org.
- Sherri (2015). How to Keep Stella de Oro Daylilies Blooming All Season.

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

Answer / Justification:

"Harvesting ‘Stella de Oro’ capsules at 35–40 days after anthesis yielded mature seeds with well developed embryo and cotyledons analyzed by X-ray images with a 92% germination in 17 days after sowing." Many growers use cold stratification to enhance germination, which is easily provided by a typical Illinois winter.

Reference(s):

- Gulia, S. K., Singh B. P., Carter J., & Griesbach R. J. (2009). Daylily: Botany, Propagation, Breeding. (Janick, J., Ed.).Horticultural Reviews. 193–220.
- Kim, J. Hee, Suh J. Keun, & Lee A. Kyung (2016). Germination of Seeds as Influenced by Seed Development and Temperature Treatments. Korean Journal of Horticultural Science & Technology. 34, 830–839.

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:

For Hemerocallis in general: "It usually requires two years to flower from seed."

Reference(s):

- Gulia, S. K., Singh B. P., Carter J., & Griesbach R. J. (2009). Daylily: Botany, Propagation, Breeding. (Janick, J., Ed.).Horticultural Reviews. 193–220.

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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: **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:

'Stella d'Oro' is a repeat-blooming daylily which flowers from May to August.

Reference(s):

- Missouri Botanical Garden (2017). Hemerocallis 'Stella de Oro' - Plant Finder.

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:

No evidence of dispersal by animals.

Reference(s):

- [Anonymous] .

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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:

No evidence of long-distance dispersal by wind or water for 'Stella d'Oro.' For the invasive H. fulva: "Tubers can be dispersed by water along rivers and streams, especially during flood events when tubers may be dislodged from stream bank colonies and carried downstream."

Reference(s):

- Rhoads, A. F., & Block T. A. (2011). Orange daylily.

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

Answer / Justification:

No evidence of accidental dispersal by people, though dumping of yard waste is a consideration. Invasive Hemerocallis fulva has been spread by farm or landscaping equipment along roadsides and dumping of yard waste.

Reference(s):

- Rhoads, A. F., & Block T. A. (2011). Orange daylily.

Total PRE Score

PRE Score: 7 -- Accept (low risk of invasiveness)
Confidence: 69 / 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:

• Steve Worth	December 22, 2017
• Shannon McEnerney	December 14, 2017
• Richard Hawke	October 30, 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.