Plant Risk Evaluator -- PRE™
Evaluation Report

Agapanthus praecox ssp. minimus 'Peter Pan' -- Georgia

2017 Farm Bill PRE Project

PRE Score: 15 -- Evaluate this plant further
Confidence: 62 / 100
Questions answered: 18 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Submitted

Evaluation Date: July 2, 2017

This PDF was created on August 13, 2018

Plant Evaluated

Agapanthus praecox ssp. minimus 'Peter Pan'

Image by Seedaholic.com

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Agapanthus praecox ssp. minimus 'Peter Pan'*) 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

This evaluation was conducted mostly using parent species (Agapanthus praecox) information as the cultivar does not differ very much (not sterile nor has severely reduced reproduction). This follows the guidelines set out by PRE for conducting evaluations on cultivars. ISSUES ON RESEARCHING: However, the evaluation is confounded by the fact that there are three recognized subspecies of Agapanthus praecox (praecox, minimus, and orientalis), and it is often hard to distinguish which the reference is referring too. Lastly, there is very little information on the cultivar 'Peter Pan' past generic horticulture information delivered via seed company's websites. It is clear, however, that the parent species and the subspecies Agapanthus praecox ssp. orientalis has become naturalized outside it's native range within multiple islands in the pacific, and invasive within a few. Because of the known invasive potential of Agapanthus praecox ssp. orientalis much of the intraspecific information available is on ssp. orientalis and not ssp. minimus. OVERALL: However, overall I think the PRE evaluation scoring is fair, and the reviewer attempted to display in each question's comments section what reference was used and why, and indicate whether the information reflects the parent species, a different subspecies or the cultivar itself. The plant does contain some potential "invasive biology" such as being able to reproduce via both seed and rhizomes, and it should be considered that the native range of many subspecies of Agapanthus (Eastern cape of South Africa near Durban) are a match for the region of concern, indicating that the cultivar could exploit the conditions in Georgia if escaped. Most species are also described as generalists in terms of conditions, which make them a good competitor. What needs to be considered is how much the cultivar's fitness and fecundity is reduced by the fact it is a dwarf cultivar and how that impacts its potential for becoming invasive in Georgia. Certainly on paper it could be assumed that it may have a reduced seed number per plant as is indicated by the description of the subspecies, and out-competing via shading would not be an issue because of it's stunted growth form. However, to what extent this influences its overall invasiveness needs to be assessed in trials here in Georgia. It seems if any Agapanthus praecox is to be be considered it should be plants from the subspecies minimus, and Agapanthus praecox ssp. minimus 'Peter Pan' is surely an attractive suitable ornamental choice.

General Information

Status: Submitted
Screener: Kylie Bucalo
Evaluation Date: July 2, 2017

Plant Information

Plant: *Agapanthus praecox ssp. minimus 'Peter Pan'*

If the plant is a cultivar, how does its behavior differs from its parent's?
'Peter Pan' is a dwarf cultivar with compact flower stems and blue flowers (smaller in size and different inflorescence colour from PS) . This cultivar belongs to one of the three recognized sub species of Agapanthus praecox called ssp. minimus. According to the South African National Biodiversity Institute website, Agapanthus praecox ssp, minimus occurs in the southeastern Western Cape and Eastern Cape of Africa, is smaller than the other two sub species and starts flowering earlier. It also has fewer leaves and flowers per plant.

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

Answer / Justification:

USDA plant profile shows that Agapathus praecox (parent species) has been introduced in the US only to California. GISD reference show introductions of Agapanthus praecox (parent species) in Argentina, and throughout the pacific and pacific islands. Other references point to the spread, naturalization of Agapanthus praecox ssp. orientalis (different ssp.) in New Zealand, Australia, the British isles and the Canary Islands.

Reference(s):

- Weeds of Australia (0). Agapanthus praecox subsp. orientalis_keyserver QLD.
- Wildlife (0). FloraBase—the Western Australian Flora_ agapanthus praecox ssp. orientalis.
- USDA Plants Database (0). Plants Profile for Agapanthus praecox (African-lily).
- Global Invasive Species Database (0). Agapanthus praecox _GISD.

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

Answer / Justification:

GISD reference show introductions of Agapanthus praecox (parent species) in Argentina, and throughout the pacific and pacific island (Australia, Cook Islands, Marshall islands, New Caledonia, New Zealand) as well as Portugal, Spain, and UK . Other references point to the spread and naturalization of Agapanthus praecox ssp. orientalis (different ssp.) in New Zealand, Australia, the British isles and the Canary Islands. For Agapanthus praecox (parent species) New Zealand is a climate match for the region of concern, in particular Waikato on the northern island where this plant has become established according to GISD reference.

Reference(s):

- Global Invasive Species Database (0). Agapanthus praecox _GISD.
- Weeds of Australia (0). Agapanthus praecox subsp. orientalis_keyserver QLD.
- Wildlife (0). FloraBase—the Western Australian Flora_ agapanthus praecox ssp. orientalis.

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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:

Agapanthus praecox (the parent species) in invasive in New Zealand and Australia. Serious threat from infestations of Agapanthus praecox ssp. orientalis has occurred in the Blue mountains, Australia, a world heritage listed site where the plant was thought to have escaped ornamental plantings at the garden site located near the world famous lookout.

Reference(s):

- Weeds of Australia (0). Agapanthus praecox subsp. orientalis_keyserver QLD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD.
- Wildlife (0). FloraBase—the Western Australian Flora_ agapanthus praecox ssp. orientalis.

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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:

For Agapanthus praecox (parent species) New Zealand is a climate match for the region of concern, in particular Waikato on the northern island where this plant has become established according to GISD reference. The GISD also lists Agapanthus praecox as an invasive within New Zealand as a whole.

Reference(s):

- Weeds of Australia (0). Agapanthus praecox subsp. orientalis_keyserver QLD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD.
- Wildlife (0). FloraBase—the Western Australian Flora_ agapanthus praecox ssp. orientalis.

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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:

Could not find any evidence of this. I am not including other sub species of praecox as "other species" or "closely related genera".

Reference(s):

- [Anonymous] .

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

Answer / Justification:

Large portions of the distribution and subsequent invasion within New South Wales, Victoria and Western Australia of Agapanthus praecox (parent species) and Agapanthus praecox ssp. orientalis (different sub species) are not a match for the region of concern. Additionally most other areas where the plant has been introduced in the pacific islands are not a match except New Zealand. The natural range of some subspecies of Agapathus praecox are most likely a climate match to the region of concern, indicating that some subspecies may be suitable for the climate in Georgia. This is interesting to note because the climate matching map shows only one TINY highlighted patch for the whole of the African continent. This small highlighted area (on the eastern cape of south Africa near Durban) is very close, and could be an exact match to the native range of some subspecies of Agapanthus praecox.

Reference(s):

- Weeds of Australia (0). Agapanthus praecox subsp. orientalis_keyserver QLD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD.
- Wildlife (0). FloraBase—the Western Australian Flora_ agapanthus praecox ssp. orientalis.
- South African National Biodiversity Institute (0). Agapanthus praecox_Plantz Africa.

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

Answer / Justification:

Whilst Agapanthus praecox (parent species) can form dense clumps and pure stands that exclude native vegetation, they do not blanket/smother or grow over plants like a vine or bramble. It is able to form dense clumps through its underground rhizomatous growth. The root network is so dense it can crack driveways and road ways in urban plantings.

Reference(s):

- Weeds of Australia (0). Agapanthus praecox subsp. orientalis_keyserver QLD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD.
- Wildlife (0). FloraBase—the Western Australian Flora_ agapanthus praecox ssp. orientalis.
- Global Invasive Species Database (0). Agapanthus praecox _GISD_2.

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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:

Agapanthus praecox ssp. orientalis (different ssp.) is noted as being "a relatively fire retardant species and may therefore have an impact on the fire regimes in invaded areas (i.e. it may reduce fire frequency and or intensity). "

Reference(s):

- Weeds of Australia (0). Agapanthus praecox subsp. orientalis_keyserver QLD.
- Wildlife (0). FloraBase—the Western Australian Flora_ agapanthus praecox ssp. orientalis.

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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:

The leaves, sap and rhizomes of A. praecox (parent species) are "highly toxic to humans and may cause ulceration of the mouth, skin rashes and burning sensations. Especially toxic to children."

Reference(s):

- Global Invasive Species Database (0). Agapanthus praecox _GISD.

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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:

Agapanthus praecox (parent species) can form dense clumps and pure stands that exclude native vegetation. Rhizomatous root growth allow for dense clumping, along with germination where plants are able to germinate in very close proximity to each other. However the plant habit does not really lend itself to forming a thicket or blocking the path of humans or animals. The plant can grow up to 1 m, but the leaves are smooth and strappy and easy to walk through and would most likely not become impenetrable. The dense clumps have many other negative effects such as crowding out natives and changing ecosystem biodiversity, but they don't necessarily impede movement. Lastly the 'peter pan' cultivar is a miniature variety. Foliage mounds are 15cm tall and 30cm wide, which again even when dense stands are formed it would not be impenetrable.

Reference(s):

- Global Invasive Species Database (0). Agapanthus praecox _GISD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD_2.
- Nobbies View Drought Tolerant Plants (0). Agapanthus praecox 'Peter Pan'_ drought tolerant plants.

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

Answer / Justification:

Clumps spread laterally through rhizomes where new individuals can occur.

Reference(s):

- Weeds of Australia (0). Agapanthus praecox subsp. orientalis_keyserver QLD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD.
- Home Design Directory Australia (0). Agapanthus praecox 'Peter Pan'_ Home DD.

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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:

Dumped garden waste containing root fragments, corms and seed are the likely cause as to why Agapanthus praecox has been such a successful invader in natural areas. Most management plans recommend that garden refuse that contains roots or corms of this plant be burned to eliminate further spread of the plant.

Reference(s):

- Weeds of Australia (0). Agapanthus praecox subsp. orientalis_keyserver QLD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD.

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

Answer / Justification:

A. praecox's (parent species) main reproduction method is via seed, though rhizomotous growth is also very common. 'Peter Pan' cultivar is not reported as a sterile cultivar, although none of the cultivar information talked about fruit development.

Reference(s):

- Nobbies View Drought Tolerant Plants (0). Agapanthus praecox 'Peter Pan'_ drought tolerant plants.
- Home Design Directory Australia (0). Agapanthus praecox 'Peter Pan'_ Home DD.
- Seedaholic.com (0). Agapanthus praecox ssp. minimus 'Peter Pan' _Seed a holic.
- Global Invasive Species Database (0). Agapanthus praecox _GISD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD_2.

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

Answer / Justification:

A. praecox (parent species) is described as being a prolific seed producer by multiple resources. Seeds are produced in a three sided capsule. A. praecox ssp. orientalis (different ssp.) is detailed to have 20-100 seed per fruit, and is noted as releasing "numerous tiny seed". Should be noted that the 'peter pan' cultivar belongs to the ssp. minimus, of which is described as differing from the other two ssp. by having "fewer leaves per plant (up to 10) and there are fewer flowers in the inflorescence". Whether this affects fruit yield and seed number is not discussed, and whether this trait is present in the 'peter pan' cultivar is not known either.

Reference(s):

- Weeds of Australia (0). Agapanthus praecox subsp. orientalis_keyserver QLD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD_2.
- South African National Biodiversity Institute (0). Agapanthus praecox_Plantz Africa.

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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:

Leave blank. Only germination information given was for commercially bought seed.

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 / Justification:

Leave blank. no information found.

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:

Agapanthus praecox ssp. mimimus 'Peter Pan' flowers July-September

Reference(s):

- Seedaholic.com (0). Agapanthus praecox ssp. minimus 'Peter Pan' _Seed a holic.

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:

no. seeds are dispersed by wind or water.

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

Answer / Justification:

Seeds are dispersed by wind or water. Agapanthus praecox ssp. orientalis seeds are described as flattened and containing a wing like projection which aids wind dispersal.

Reference(s):

- Weeds of Australia (0). Agapanthus praecox subsp. orientalis_keyserver QLD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD.
- Global Invasive Species Database (0). Agapanthus praecox _GISD_2.

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

Answer / Justification:

Multiple resources suggest garden waste and contaminated soil dumped in natural areas by humans contributes to the spread of A.praecox (parent species). However i feel this is able to be addressed in Q12, and does not warrant a YES to this question given parameters listed in Q information

Reference(s):

- [Anonymous] .

Total PRE Score

PRE Score: 15 -- Evaluate this plant further
Confidence: 62 / 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:

• John "Doc" Ruter	February 2, 2018
• Brian Jernigan	November 21, 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.

Issue ID # 6283

Date Created: January 10, 2018 - 6:06am
Date Updated: February 16, 2018 - 11:10am

Submitted by: John "Doc" Ruter

Status: Fixed
Type: Comment
Severity: Major
Scope: Evaluation as a whole

Issue Description

I have been breeding Agapanthus in Georgia for 10 years and have never seen a wild seedling, even in my research plots where they were irrigated and fertilized. This cultivar does produce viable seeds and I have grown it in my garden in Tifton and Athens with no reseeding. This evergreen species is not cold hardy in north Georgia and should only be used in zone 8b without protection. It does have problems in other parts of the world but to call it an invasive species in Georgia is not justified. More discussion is needed on this one.

Issue Resolution (Screener's Response to Issue)

This evaluation was not changed. Response to the issues of the evalution have been documented in emails and PRE publications, and evaluation author appreciates feedback and experienced knowledge.

Issue ID # 6176

Date Created: December 21, 2017 - 3:21am
Date Updated: February 16, 2018 - 11:10am

Submitted by: Professor Allan Armitage

Status: Fixed
Type: Suggestion
Severity: Major
Scope: Evaluation as a whole

Issue Description

As a whole, the evaluation is fine. However, based on my travels and observations, I have never seen this plant, let alone the cultivar, become invasive in the USA and definitely not in Georrgia. Perhaps sightings of escaped species have been noted in CA or occassionally the Gulf States, but I cannot see the species as invasive. Having said that, I absolutely see no need for the cultivar 'Peter Pan' to fall under the category of "needing more study" in Georgia.

Issue Resolution (Screener's Response to Issue)

This evaluation was not changed. Response to the issues of the evalution have been documented in emails and PRE publications, and evaluation author appreciates feedback and experienced knowledge.

Issue ID # 5991

Date Created: November 28, 2017 - 1:29pm
Date Updated: February 16, 2018 - 11:09am

Submitted by: Professor Allan Armitage

Status: Fixed
Type: Suggestion
Severity: Major
Scope: Q03. Is the species (or cultivar or variety) noted as being invasive in the U.S. or world?

Issue Description

I have no reason to suggest that this cutivar is invasive.

Issue Resolution (Screener's Response to Issue)

This evaluation was not changed. Response to the issues of the evalution have been documented in emails and PRE publications, and evaluation author appreciates feedback and experienced knowledge.

Issue ID # 5903

Date Created: November 21, 2017 - 5:53am
Date Updated: February 16, 2018 - 11:11am

Submitted by: Brian Jernigan

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q02. Is the species (or cultivar or variety) noted as being naturalized elsewhere in the US or world in a similar climate?

Issue Description

How do you take into consideration that the plant is not hardy above Zone 8, so half of Georgia would not have a suitable climate?

Issue Resolution (Screener's Response to Issue)

This evaluation was not changed. Response to the issues of the evalution have been documented in emails and PRE publications, and evaluation author appreciates feedback and experienced knowledge.

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.