Plant Risk Evaluator -- PRE™
Evaluation Report

Senna artemisioides -- Arizona

2021 Western IPM Grant Project

PRE Score: 10 -- Low Potential Risk
Confidence: 74 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Completed

Evaluation Date: September 15, 2021

This PDF was created on September 06, 2024

This project was funded in part by the USDA National Institute of Food and Agriculture through the Western Integrated Pest Management Center, grant number 2018-70006-28881.

Plant Evaluated

Senna artemisioides

Image by Ron Vanderhoff

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Senna artemisioides*) 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 is for the species Senna artemisioides and does not differentiated the numerous subspecies described for the species. Comparative accounts for the subspecies are typically not available. They appear to be differentiated largely on leaflet characteristics without corresponding differences in form which might affect this evaluation. Two subspecies have been noted as cultivated in Arizona. The plants have been observed to establish occasionally along roads or in desert areas adjacent to landscapes where they are cultivated in southern Arizona. They do not possess mechanisms for long distance dispersal of seeds or propagules. Senna artemisioides is rated as creating a fire hazard in its natural habitat, which is a concern for the Sonoran Desert, which is not a fire-adapted ecosystem. Many introductions which support fire have become serious invasive weeds in Arizona. However these have not been shrubs such as Senna artemisioides, and they have had more potent seed dispersal abilities.

General Information

Status: Completed
Screener: Michael Chamberland
Evaluation Date: September 15, 2021

Plant Information

Plant: *Senna artemisioides*

Regional Information

Region Name: Arizona

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.

Evaluation Questions

These questions are based on an article published by PLOS One, which can be found 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** point(s) to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

These Australian natives have been observed to establish occasionally along roads or in desert areas adjacent to landscapes where they are cultivated. Senna artemisioides subsp. filifolia and Senna artemisioides subsp. petiolaris are widely grown as landscape plants in desert areas of southern and central Arizona (Johnson, 2004). Calflora (2021) lists occurrences in seven counties in the southwestern part of the state. The plant is listed for Cyprus as a a casual escapee (John, Hawkes & Walliker, 2019). It is also documented from Spain's Iberian Peninsula (Laguna, 2010), from the Canary Islands (Verloove, 2017), from Pakistan (Ajaib, et. al, 2011), and from Iraq (Al-Joboury, 2020).

Reference(s):

- Johnson, M. B. (2004). Survival and Performance of Cultivated Perennial Legume Species in Arizona. 8.
- Calflora (2021). Calflora: Senna artemisioides.
- John, E., Hawkes W. L. S., & Walliker E. J. (2019). A review of Mediterranean records of Catopsilia florella (Lepidoptera: Pieridae, Coliadinae), with notes on the spring 2019 arrival in Cyprus of this Afrotropical migrant. Phegea. 8.
- Laguna, E. (2010). Sobre la presencia de tres nuevas plantas alóctonas para la flora valenciana e ibérica. Botanica Complutensis. 7.
- Verloove, FILIP. (2017). New xenophytes from the Canary Islands (Gran Canaria and Tenerife; Spain). Acta Botanica Croatica. 76, 120–131.
- Ajaib, M., Khan Z-U-D., Butt G. Yasmeen, & Ullah N. (2011). Senna artemisioides of family Leguminosae and Mansoa alliacea of family Bignoniaceae: two new records to the Flora of Pakistan. Biologia (Lahore, Pakistan). 7.
- Al-Joboury, K. Rasheed (2020). SURVEY OF EXOTIC PLANT SPECIES IN IRAQ. Plant Archives . 2.

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** point(s) to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

GBIF shows the native range of Senna artemisioides (most of Australia) matches with occurances in the southwest United states and nearby Mexico, and also in southern Africa (GBIF, 2021).

Reference(s):

- GBIF (2021). GBIF; Senna artemisioides subsp.artemisioides .

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

- Answer: **No**, which contributes **0** point(s) to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

There are multiple reports of naturalization, chiefly in the southwest US (Johnson, 2004), (Calflora, 2021). But these records do not indicate significant economic or environmental damage.

Reference(s):

- Johnson, M. B. (2004). Survival and Performance of Cultivated Perennial Legume Species in Arizona. 8.
- Calflora (2021). Calflora: Senna artemisioides.

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** point(s) to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

No reports were found showing significant economic or environmental damage caused by introduced Senna artemisioides. However, the plant is regarded as an undesirable rangeland weed in its native Australia (Chimera, 2010).

Reference(s):

- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .

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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** point(s) to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

The online Global Compendium of Weeds lists: Senna alata (Environmental Weed, Noxious Weed); Senna bicapsularis (Environmental Weed, Noxious Weed); Senna didymobotrya (Environmental Weed, Noxious Weed); Senna x floribunda (Environmental Weed); Senna hirsuta (Environmental Weed); Senna multiglandulosa (Environmental Weed); Senna obtusifolia (Environmental Weed, Noxious Weed); Senna occidentalis (Environmental Weed, Noxious Weed); Senna pendula (Environmental Weed, Noxious Weed); Senna septemtrionalis (Environmental Weed); Senna siamea (Environmental Weed); Senna spectabilis (Environmental Weed); Senna sulfurea (Environmental Weed); Senna surattensis (Environmental Weed); and Senna tora (Environmental Weed, Noxious Weed) as a set of naturalizing Senna species around the world which meet the higher impact categories of Environmental Weed or Noxious Weed (GCW, 2007). Of these, Senna hirsuta showed a GBIF match between the southwest US (where it is native) and a part of Australia and southern Africa. Senna occidentalis is native to the US and has a pantropical distribution. Senna didymobotrya is an African species which has naturalized in matching climates in the US and in Australia. These Senna are not as arid-adapted as Senna artemisioides and do not show a clear pattern of being invasive in a similar climate (GBIF, 2016).

Reference(s):

- GCW (2007). Global Compendium of Weeds (GCW): species index "S".
- GBIF (2016). GBIF Backbone Taxonomy.

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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** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Over half the places where Senna artemisioides grows, as mapped by GBIF, match the climate of the area of concern. GBIF does not map all the regions of naturalization indicated in the literature.

Reference(s):

- GBIF (2021). GBIF; Senna artemisioides subsp.artemisioides .

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** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is rated as not having a climbing or smothering growth habit (Chimera, 2010).

Reference(s):

- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .

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8. Is the plant noted as promoting fire and/or changing fire regimes?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is noted as a shrub which can switch between resprouter to non-resprouter life history (following fire) as it progresses from juvenile to adult growth phase (Williams & Bradstock, 2012). Senna artemisioides is rated as creating a fire hazard in its natural habitat (Chimera, 2010).

Reference(s):

- Williams, R. J., A Gill M., & Bradstock R. A. (2012). Flammable Australia: Fire Regimes, Biodiversity and Ecosystems in a Changing World.
- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .

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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** point(s) to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is rated as toxic to livestock. It is considered important weed of rangelands in northern New South Wales (Chimera, 2010).

Reference(s):

- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .

10. Does the plant produce impenetrable thickets, blocking or slowing movement of animals, livestock, or humans?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is rated as forming dense thickets. It is considered important weed of rangelands in northern New South Wales (Chimera, 2010). The plant is a large evergreen woody perennial shrub, vigorously upright and billowing to 15 feet with nearly equal spread (Martin, 2021).

Reference(s):

- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .
- Martin, C. (2021). Senna artemisioides subsp. artemisioides .

Reproductive Strategies (Questions 11 - 17)

11. Does this species (or cultivar or variety) reproduce and spread vegetatively?

- Answer: **No**, which contributes **0** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is rated as not reproducing by vegetative fragmentation (Chimera, 2010). The species has a strong ability to resprout following clipping or burning (Vesk, et al. 2004) but is not reported to spread by root suckers.

Reference(s):

- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .
- Vesk, P. A., Warton D. I., & Westoby M. (2004). Sprouting by semi-arid plants: testing a dichotomy and predictive traits. Oikos. 107, 72–89.

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** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is rated as not reproducing by vegetative fragmentation (Chimera, 2010).

Reference(s):

- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .

13. Does the species (or cultivar or variety) commonly produce viable seed?

- Answer: **Yes**, which contributes **1** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is rated as producing viable seed (Chimera, 2010). Martin (2021) reports the plant readily reseeds in the urban landscape, but also that deliberate propagation from seed is benefited by a hot water soak or acid scarification.

Reference(s):

- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .
- Martin, C. (2021). Senna artemisioides subsp. artemisioides .

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

- Answer: **No**, which contributes **0** point(s) to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is rated as not reaching prolific seed production (Chimera, 2010). However the source material cited in this PIER Assessment is no more than an inference based on the size of the pods.

Reference(s):

- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .

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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: **No**, which contributes **0** point(s) to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is regarded as having a seed dormancy. This was studied by Pound et. al (2015) as part of a dormancy-breaking survey. It was recommended that seeds of S. artemisioides be pre-treated with wet heat, for restoration programs in its native Australia. Information is not available for the percentage of seeds which germinate in the field without the treatment, so confidence is "Medium."

Reference(s):

- Pound, L. M., Ainsley P. J., Facelli J. M., Pound L. M., Ainsley P. J., & Facelli J. M. (2015). Dormancy-breaking and germination requirements for seeds of Acacia papyrocarpa, Acacia oswaldii and Senna artemisioides ssp. × coriacea, three Australian arid-zone Fabaceae species. Australian Journal of Botany. 62, 546–557.

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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** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is a woody species, rated as having a 3 year minimum generative time (Chimera, 2010).

Reference(s):

- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .

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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** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Fruit pods are unsightly and should be removed by pruning in late April to early May after flowering (Martin, 2021). This indicates a single short fruiting season in early summer.

Reference(s):

- Martin, C. (2021). Senna artemisioides subsp. artemisioides .

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** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is rated as not dispersing seeds by way of animals or birds (Chimera, 2010). Noted as unassisted dispersal (no means of external attachment to animals).

Reference(s):

- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .

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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** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is rated as not dispersing seeds over a long distance by wind or water (Chimera, 2010).

Reference(s):

- Chimera, C. (2010). Pacific Island Ecosystems at Risk (PIER) - Senna artemisioides .

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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** point(s) to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Senna artemisioides is rated as having propagules dispersed intentionally by people (presumably through the horticulture trade), but not as a seed contaminant, and not unintentionally by human activity. (Chimera, 2010).

Reference(s):

- [Anonymous] .

Total PRE Score

PRE Score: 10 -- Low Potential Risk
Confidence: 74 / 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 : Low Potential Risk
13 - 15 : Moderate Potential Risk
> 15 : High Potential Risk

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: 2021 Western IPM Grant 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:

• Michael Chamberland	March 8, 2022
• Rebecca Senior	January 4, 2022
• Jutta Burger	November 16, 2021
• Lynn Sweet	October 20, 2021

This evaluation has a total of 4 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 info@plantright.org if additional action is required to resolve open issues.

Issue ID # 7577

Date Created: November 15, 2021 - 8:43am
Date Updated: March 8, 2022 - 9:08pm

Submitted by: Jutta Burger

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q11. Does this species (or cultivar or variety) reproduce and spread vegetatively?

Issue Description

Consider adding some information here about its growth habit (e.g., that it crown sprouts readily but does not root sprout/sucker, if that is the case), and use a botanical reference to support the statement. - Jutta Burger

Issue Resolution (Screener's Response to Issue)

I've added a reference to its ability to crown sprout after damage. - Michael Chamberland

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Issue ID # 7576

Date Created: November 15, 2021 - 8:42am
Date Updated: March 8, 2022 - 9:39pm

Submitted by: Jutta Burger

Status: Fixed

Type: Suggestion
Severity: Minor
Scope: Q14. Does this plant produce copious viable seeds each year (>1000)?

Issue Description

Consider adding a botanical reference to describe fruits and number of seeds per fruit + anything else about number of flowers / plant and seed set / viability. - Jutta Burger

Issue Resolution (Screener's Response to Issue)

I was not able to find a botanical reference with numbers, counts and amounts related to fecundity. - Michael Chamberland

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Issue ID # 7575

Date Created: November 15, 2021 - 8:40am
Date Updated: March 8, 2022 - 7:41pm

Submitted by: Jutta Burger

Status: Fixed
Type: Comment
Severity: Minor
Scope: Q05. Are other species of the same genus invasive in a similar climate?

Issue Description

Just a comment here that Senna didymobotrya was previously evaluated for CA and received a score of 15 (didn't make the "high risk" cut but was close. - Jutta Burger

Issue Resolution (Screener's Response to Issue)

Good to know. - Michael Chamberland

Issue ID # 7574

Date Created: November 15, 2021 - 7:57am
Date Updated: March 8, 2022 - 9:13pm

Submitted by: Jutta Burger

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q13. Does the species (or cultivar or variety) commonly produce viable seed?

Issue Description

The PIER assessment would probably count as “high”, not “very high” confidence. Any other botanical refs to add? - Jutta Burger

Issue Resolution (Screener's Response to Issue)

I've changed the confidence level to High. I also added a reference and viability details from Martin. - Michael Chamberland

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Issue ID # 7572

Date Created: November 15, 2021 - 7:53am
Date Updated: March 8, 2022 - 10:21pm

Submitted by: Jutta Burger

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: General Information

Issue Description

Add a summary for the evaluation that is based on salient points from answers to questions. Specify that it is the species being evaluated and which subspecies are also considered included. - Jutta Burger

Issue Resolution (Screener's Response to Issue)

A summary has been added. - Michael Chamberland

Issue ID # 7451

Date Created: October 20, 2021 - 9:44pm
Date Updated: March 8, 2022 - 9:57pm

Submitted by: Lynn Sweet

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q20. Are the plant’s propagules frequently dispersed via contaminated seed, equipment, vehicles, boats or clothing/shoes?

Issue Description

Citation not linked. I'd try to locate the original source cited in PIER since usually they are easy to find, best to do this. I appreciate your work! -- Lynn Sweet

Issue Resolution (Screener's Response to Issue)

Many of these dispersal characteristics tabulated in PIER come from an original source in a journal I am not able to access. - Michael Chamberland

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Issue ID # 7450

Date Created: October 20, 2021 - 9:40pm
Date Updated: March 8, 2022 - 9:50pm

Submitted by: Lynn Sweet

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q14. Does this plant produce copious viable seeds each year (>1000)?

Issue Description

Was there an original source cited in the PIER assessment? Best to use those instead for this and our Q16, 18 and 19, if possible. Even though this is a "no" (the philosophical default), we still want to be totally sure. PIER is good, but it is a questionnaire and sometimes their cutoffs are different than PRE, and there could be errors. I'd go ahead and cite the source they used for that (801): http://anpsa.org.au/s-art.html 2010. Australian Native Plant Society. Senna artemisioides. http://anpsa.org.au/s-art.html --Lynn

Issue Resolution (Screener's Response to Issue)

I have made some adjustments based on the source material when available. Source material was not always available. I have had particular difficulty with access to Australian journals, for which University of Arizona has a low subscription rate. - Michael Chamberland

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Issue ID # 7448

Date Created: October 20, 2021 - 9:28pm
Date Updated: March 8, 2022 - 7:46pm

Submitted by: Lynn Sweet

Status: Fixed
Type: Suggestion
Severity: Minor
Scope: Q10. Does the plant produce impenetrable thickets, blocking or slowing movement of animals, livestock, or humans?

Issue Description

It's not totally needed since you answered the question but if you can just briefly reference the growth form and size here again for the reader, that's helpful. -Lynn Sweet

Issue Resolution (Screener's Response to Issue)

I have added a reference to the plant's height and form. - Michael Chamberland

About PRE and this Plant Evaluation Report

The Plant Risk Evaluator (PRE) is an online database and platform designed to assess the risk of a plant becoming invasive in a given region.This tool offers many benefits, and we encourage you to visit the PRE website (https://pretool.org) for more information.

If you would like to learn more about PRE, please email us at info@plantright.org, requesting a PRE Account.

PRE beta funding was provided by Sustainable Conservation (https://www.suscon.org/) and a USDA Farm Bill grant. Additional funding has been provided by the Western Integrated Pest Management Center.