



***Plant Risk Evaluator -- PRETM
Evaluation Report***

Amaranthus palmeri -- Oregon

Cascade Pacific Resource Conservation & Development

PRE Score: 18 -- High Potential Risk

Confidence: 85 / 100

Questions answered: 20 of 20 -- Valid (80% or more questions answered)

Privacy: Public

Status: Completed

Evaluation Date: March 4, 2025

This PDF was created on August 21, 2025

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

Amaranthus palmeri



Image by Keir Morse



Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Amaranthus palmeri*) 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

Palmer amaranth (*Amaranthus palmeri*) is a rapidly spreading weed, originally native to the southwestern United States and northwestern Mexico, now established in at least 27 U.S. states and multiple countries worldwide. It thrives in warm climates, where it competes with crops and native vegetation, reducing biodiversity and impacting wildlife and pollinators. This species is highly adaptable, tolerant to drought, and produces vast quantities of seeds—up to 1 million per plant—with high viability and rapid germination. Palmer amaranth does not propagate vegetatively but can resprout from stem fragments under certain conditions. Its seeds persist in the soil seed bank for years, with significant germination occurring in the following growing seasons. Palmer amaranth's resistance to multiple herbicide modes of action makes it one of the most troublesome and economically damaging agronomic weeds in the U.S. and beyond. Management efforts focus on early detection, containment, and integrated control strategies to limit its spread and impact.

General Information

Status: Completed

Screener: Courtney Gattuso

Evaluation Date: March 4, 2025

Plant Information

Plant: *Amaranthus palmeri*

Regional Information

Region Name: Oregon



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

Answer / Justification:

Palmer amaranth (*Amaranthus palmeri*), originally native to the southwestern United States and northwestern Mexico, has become naturalized and invasive in various regions beyond its native range. In the United States, Palmer amaranth has expanded from its native southwestern regions to infest at least 27 states, including areas in the midwest and northeast. Internationally, Palmer amaranth has been reported as naturalized in several countries, including Spain, Sweden, Australia, Cyprus, India (Maharashtra), Portugal (Madeira Islands), and Romania.

Reference(s):

- United States Department of Agriculture - Animal and Plant Health Inspection Service (2020). Weed Risk Assessment for *Amaranthus palmeri* (Amaranthaceae) – Palmer's amaranth.

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



Answer / Justification:

Palmer amaranth has become naturalized in areas with temperate Mediterranean climates in the US, Europe and eastern Asia. USDA APHIS has predicted that about 81 percent of the United States is suitable for palmer amaranth based on climatic variables.

Reference(s):

- GBIF (0). *Amaranthus palmeri*.
 - United States Department of Agriculture - Animal and Plant Health Inspection Service (2020). Weed Risk Assessment for *Amaranthus palmeri* (Amaranthaceae) – Palmer's amaranth.
-

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

- Answer: **Yes**, which contributes 2 point(s) to the total PRE score.
- The *screeners* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

Palmer amaranth is recognized as an invasive species both within the United States and globally. It has rapidly expanded its range, becoming one of the most troublesome and economically damaging agronomic weeds in various crops across the country.

Reference(s):

- Center for Invasive Species and Ecosystem Health (0). Palmer amaranth (*Amaranthus palmeri* S. Wats.).
 - CABI Compendium (2019). *Amaranthus palmeri* (Palmer amaranth).
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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 point(s) to the total PRE score.
- The *screeners* has a **Very High** confidence in this answer based on the available literature.



Answer / Justification:

Palmer amaranth has become more widespread in the Pacific Northwest in recent years. In May 2024, the Oregon State Weed Board voted to list Palmer amaranth as an “A-rated” weed, targeting it for early detection and containment. It thrives in hot weather, is tolerant of drought, and responds quickly to high levels of available nutrients. It competes aggressively against warm-season crops, and is a prolific seed producer. Palmer amaranth populations have developed resistance to multiple herbicide modes of action, making chemical control increasingly challenging.

Reference(s):

- Oregon Seed Association (0). PALMER AMARANTH.
 - Center for Invasive Species and Ecosystem Health (0). Palmer amaranth (*Amaranthus palmeri* S. Wats.).
-

5. Are other species of the same genus (or closely related genera) invasive in a similar climate?

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

Answer / Justification:

The *Amaranthus* genus includes about 70 to 75 species. According to Holm et al. (1991), 36 of these species are classified as weeds, with 14 considered serious or major weeds in at least one country. Among the worst weeds globally are *Amaranthus hybridus* and *Amaranthus spinosus*. In the United States, problematic pigweed species include redroot pigweed (*A. retroflexus*), smooth pigweed (*A. hybridus*), Powell amaranth (*A. powellii*), spiny amaranth (*A. spinosus*), tumble pigweed (*A. albus*), prostrate pigweed (*A. blitoides*), and common waterhemp (*A. rudis*, also known as *A. tuberculatus*). Pigweeds are fast-growing, aggressive weeds that compete with crops and pose significant challenges for farmers.

Reference(s):

- United States Department of Agriculture - Animal and Plant Health Inspection Service (2020). Weed Risk Assessment for *Amaranthus palmeri* (Amaranthaceae) – Palmer’s amaranth.
 - CABI Compendium (2019). *Amaranthus palmeri* (Palmer amaranth).
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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** point(s) to the total PRE score.
- The *screeners* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Palmer amaranth is widespread and found in many different climates across the globe. According to CABI and the Climate Matching tool, less than half (

Impact on Native Plants and Animals (Questions 7 - 10)

7. Does this plant displace native plants and dominate (overtop or smother) the plant community in areas where it has established?

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

Answer / Justification:

The rapid growth and competitive nature of Palmer amaranth allow it to outcompete other species, diminishing native plant diversity and potentially impacting wildlife and pollinators. This information was noted by the University of Arizona Cooperative Extension, which is outside of the climate match region.

Reference(s):

- CABI Compendium (2019). *Amaranthus palmeri* (Palmer amaranth).
-

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

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



Answer / Justification:

There is a lack of evidence that indicates Palmer amaranth can promote or change fire regimes. However, some sources suggest prescribed fire and propane torching can potentially kill Palmer amaranth seeds (over 1093 degrees Celsius).

Reference(s):

- Cornell College of Agriculture and Life Sciences (0). Palmer amaranth.
-

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

Answer / Justification:

Palmer amaranth (and other *Amaranthus* spp.) can accumulate high levels of nitrates and oxalates, making it toxic to livestock such as cattle, sheep, goats, and horses. It is a highly aggressive, fast-growing weed that competes with desirable pasture species, reducing forage availability and quality. It can grow more than 2 inches per day under optimal conditions, making it a formidable competitor in grazing systems. It is also reported to cause allergies in humans.

Reference(s):

- Mohseni-Moghadam, M., Kent C., & Ashigh J. (2013). Palmer Amaranth Biology and Management.
 - Cornell College of Agriculture and Life Sciences (0). Palmer amaranth.
 - CABI Compendium (2019). *Amaranthus palmeri* (Palmer amaranth).
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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** point(s) to the total PRE score.
- The *screeners* has a **Medium** confidence in this answer based on the available literature.



Answer / Justification:

There is not enough evidence that suggests that Palmer amaranth creates impenetrable thickets that hinder the movement of animals and humans.

Reference(s):

- [Anonymous] .
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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 *screeners* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

?Palmer amaranth is a dioecious annual plant that reproduces exclusively through seeds and does not propagate vegetatively. Each female plant can produce a substantial number of seeds, with estimates that surpass 600,000 seeds per plant.

Reference(s):

- CABI Compendium (2019). *Amaranthus palmeri* (Palmer amaranth).
-

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



Answer / Justification:

Palmer amaranth primarily reproduces through seed production and does not commonly spread via vegetative means. However, there is evidence that detached stem fragments can resprout and produce seeds under certain conditions. Specifically, research has shown that broken-off stems as small as 1 inch can resprout, flower, and produce seed.

Reference(s):

- Sosnoskie, L. M., Webster T. M., A. Culpepper S., & Kichler J. (2014). The Biology and Ecology of Palmer Amaranth: Implications for Control.
-

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

Answer / Justification:

Palmer amaranth commonly produces viable seeds. These seeds exhibit high initial viability, with studies indicating that over 96% of freshly produced seeds are viable. Some sources report the seeds can be viable after 12 years in the soil, although more than half of the seeds will lose viability after 18 months.

Reference(s):

- CABI Compendium (2019). *Amaranthus palmeri* (Palmer amaranth).
 - Vollmer, K. (2021). Time to Pull Palmer Amaranth. *Agronomy News*. 12(6),
 - Sosnoskie, L. M., Webster T., & Culpepper S. (2013). Palmer amaranth seed longevity. *UC Weed Science*.
-

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

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



Answer / Justification:

Each female plant can produce a substantial number of seeds, with estimates ranging from approximately 600,000 seeds per plant to as many as 1 million seeds under optimal conditions.

Reference(s):

- Vollmer, K. (2021). Time to Pull Palmer Amaranth. *Agronomy News*. 12(6),
-

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

Answer / Justification:

Palmer amaranth seeds exhibit significant germination rates in the growing season following their production, without the need for infrequent environmental triggers. Research indicates that approximately 80% of Palmer amaranth seeds lose viability within the first 12 months, suggesting that up to 20% remain viable and capable of germinating in the subsequent growing season. The seeds are known for their rapid germination, often sprouting within 1 to 2 days under favorable conditions, across a broad range of temperatures from 59°F to 105°F.

Reference(s):

- Schonbeck, D. Mark (2012). Palmer Amaranth (*Amaranthus palmeri*).
 - Loux, M. (2019). Palmer Amaranth and Waterhemp Management: It's All About the Seed.
-

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



Answer / Justification:

Palmer amaranth produces viable seeds within its first year after germination. As an annual herbaceous plant, it completes its life cycle—from germination to seed production—within a single growing season.

Reference(s):

- CABI Compendium (2019). *Amaranthus palmeri* (Palmer amaranth).
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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 *screeners* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Palmer amaranth plants that emerge in the spring or early summer mostly flower in 5 to 8 weeks, with later emerging plants flowering in 3 to 4 weeks. Plants continue to flower for 40 days after flowers begin, with some viable seeds produced as early as 2 to 3 weeks after the beginning of flowering.

Reference(s):

- Mohler, C. L., Teasdale J. R., & DiTommaso A. (2021). *Manage Weeds On Your Farm - Palmer Amaranth*. Manage Weeds On Your Farm.
-

Dispersal (Questions 18 - 20)

18. Are the plant's propagules frequently dispersed long distance (>100 m) by mammals or birds or via domestic animals?

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



Answer / Justification:

Seeds consumed by birds can pass through their digestive systems and be excreted at different locations, retaining viability. This suggests that birds may facilitate long-distance dispersal of Palmer amaranth seeds.

Reference(s):

- Mohler, C. L., Teasdale J. R., & DiTommaso A. (2021). Manage Weeds On Your Farm - Palmer Amaranth. Manage Weeds On Your Farm.
 - CABI Compendium (2019). *Amaranthus palmeri* (Palmer amaranth).
-

19. Are the plant's propagules frequently dispersed long distance (>100 m) by wind or water?

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

Answer / Justification:

While Palmer amaranth seeds are not specifically adapted for wind dispersal, strong winds, including those from extreme weather events, can occasionally transport seeds over long distances. The seeds' minute size (1-1.2 mm in diameter) may help in long-distance dispersal during high-wind events. In contrast, their ability to float enables water to serve as a more consistent and effective means for long-distance seed dispersal.

Reference(s):

- Mohler, C. L., Teasdale J. R., & DiTommaso A. (2021). Manage Weeds On Your Farm - Palmer Amaranth. Manage Weeds On Your Farm.
 - CABI Compendium (2019). *Amaranthus palmeri* (Palmer amaranth).
-

20. Are the plant's propagules frequently dispersed via contaminated seed (agriculture or wildflower packets), equipment, vehicles, boats or clothing/shoes?

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



Answer / Justification:

Seeds can adhere to farm equipment, such as combines and tractors, and be transported to non-infested fields if machinery is not thoroughly cleaned between uses. The species has also been found in seed mixes for restoration plantings and other conservation efforts, resulting in unintended introductions into new areas. ?

Reference(s):

- United States Department of Agriculture - Animal and Plant Health Inspection Service (2020). Weed Risk Assessment for *Amaranthus palmeri* (Amaranthaceae) – Palmer's amaranth.
 - Natural Resources Conservation Service (2017). Feds warn of possible giant pigweed outbreak. Salina Journal.
-

Total PRE Score

PRE Score: 18 -- High Potential Risk

Confidence: 85 / 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: Cascade Pacific Resource Conservation & Development

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:

- | | |
|--------------------|----------------|
| • Troy Abercrombie | April 17, 2025 |
| • Nicole Valentine | March 12, 2025 |
| • Jutta Burger | March 10, 2025 |

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 info@plantright.org if additional action is required to resolve open issues.

Issue ID # 11082

Date Created: March 12, 2025 - 5:50pm

Date Updated: April 1, 2025 - 10:58am

Submitted by: Nicole Valentine

Status: Fixed

Type: Suggestion

Severity: Minor

Scope: Q07. Does this plant displace native plants and dominate the plant community in areas where it has been established?

Issue Description

Most evidence of it dominating seems to be from agriculture settings. The reference used comes from Arizona, which is outside the climate match region- it could be useful to mention this. -NV

Issue Resolution (Screener's Response to Issue)

Incorporated NV's suggestion into the written answer.

Issue ID # 11067

Date Created: March 10, 2025 - 6:08pm

Date Updated: April 1, 2025 - 11:03am

Submitted by: Jutta Burger

Status: Fixed



Type: Suggestion

Severity: Minor

Scope: Q19. Are the plant's propagules frequently dispersed long distance (>100 m) by wind or water?

Issue Description

Mention the minute size of seeds also may aid in their movement by wind. - JB

Issue Resolution (Screener's Response to Issue)

Included information about seed size from CABI.

Issue ID # 11066

Date Created: March 10, 2025 - 6:06pm

Date Updated: April 1, 2025 - 10:59am

Submitted by: Jutta Burger

Status: Fixed

Type: Suggestion

Severity: Minor

Scope: Q18. Are the plant's propagules dispersed long distance (>100 m) by mammals or birds or via domestic animals?

Issue Description

You might want to go down in confidence to medium here, since the answer is based on inference. -JB

Issue Resolution (Screener's Response to Issue)

Changed confidence level to "medium"

Issue ID # 11065



Date Created: March 10, 2025 - 6:00pm

Date Updated: April 1, 2025 - 10:55am

Submitted by: Jutta Burger

Status: Fixed

Type: Suggestion

Severity: Minor

Scope: Q03. Is the species (or cultivar or variety) noted as being invasive in the U.S. or world?

Issue Description

For a "very high" confidence, I would add another robust reference, such as its entry in CABI: <https://www.cabigitallibrary.org/doi/10.1079/cabicompendium.4649>

Issue Resolution (Screener's Response to Issue)

Added CABI as a reference to this question.



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.