

## Natural Resources Conservation Service

# Palmer amaranth/Palmer pigweed (*Amaranthus palmeri*) Eradication in Native Seedings

## Illinois Agronomy Technical Note No. 24

### Background

Palmer amaranth/Palmer pigweed (*Amaranthus palmeri*) is an adaptable, invasive broadleaf weed that was first detected in Illinois in 2012. Palmer amaranth has entered the State in many ways, including contaminated cattle feed, equipment brought into the State from Palmer amaranth infested areas, and most recently contaminated seed used to seed conservation plantings. During the 2016 growing season, Palmer amaranth was found on land that was enrolled in USDA programs established to diverse native seed mixtures, such as pollinator and other wildlife plantings. Similar to other pigweed species, Palmer amaranth is a summer annual but has the ability to grow very fast and produce large numbers of seed. Palmer amaranth poses a serious threat to Illinois agronomic crops because of its competitive ability. Over the last decade, severe infestations have been experienced in Southern U.S. row crops that have caused severe yield reductions, crop failures in a few cases, and has increased weed control costs two to three fold. Rapid and diligent control efforts are required to combat this species as soon as it is detected, wherever it is detected. The following weed control guidance will provide a variety of options to control Palmer amaranth on USDA Conservation Program acres. It is important to note that conservation seedings are implemented via participation in numerous conservation programs. The Conservation Reserve Program (CRP) is administered by the Farm Services Agency (FSA). The Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program (CSP) are administered by the Natural Resources Conservation Service (NRCS). Consult the administering agency prior to taking action on enrolled Conservation Program acres.

Positive identification of the weed's presence is required before taking action as some of the options described below will negatively impact the native prairie species that were seeded. Palmer amaranth is closely related to other pigweed species commonly found in Illinois crop fields such as waterhemp, smooth pigweed, and redroot pigweed. Consequently, it is difficult to distinguish from other pigweed species in early vegetative growth stages. The most accurate way to distinguish Palmer amaranth from other closely related pigweed species is through the utilization of molecular markers. The University of Illinois Plant Clinic (<http://web.extension.illinois.edu/plantclinic/>) offers a for-fee identification service.

### Identification Guides

- Purdue Extension: Palmer amaranth Biology, Identification, and Management  
<https://www.extension.purdue.edu/extmedia/WS/WS-51-W.pdf>
- Penn State Extension: Eight Key Points to Palmer amaranth and Water hemp Identification:  
<http://extension.psu.edu/pests/weeds/palmer-amaranth/eight-key-points-to-palmer-amaranth-and-waterhemp-identification>
- University of Illinois: Guidelines for the Identification and Management of Palmer amaranth in Illinois Agronomic Crops <http://bulletin.ipm.illinois.edu/?p=1689>
- Iowa State University: Identification of the weedy pigweeds and water hems of Iowa  
<https://store.extension.iastate.edu/Product/pm1786-pdf>
- <https://store.extension.iastate.edu/Product/Palmer-amaranth-identification>
- eXtenion.org: Palmer amaranth (*Amaranthus palmeri*)  
<http://articles.extension.org/pages/65209/palmer-amaranth-amaranthus-palmeri>

## Eradication Methods

Palmer amaranth thrives in open spaces and areas of soil disturbance that lack plant competition; therefore, it is not likely to persist in **well-established** perennial plant communities. **Successful establishment and maintenance of the seeded native perennial vegetation and preventing Palmer amaranth seed production are critical for controlling this weed.** Soil disturbance with tillage should be avoided in locations where Palmer is present. It is recommended that native plantings and cropland fields which have recently been exposed to Palmer amaranth not be tilled for several years. Tillage will spread and incorporate Palmer seed into the soil which will prolong the persistence of the weed seed bank and remove desirable species that provide competition. Successful Palmer amaranth eradication will likely require a combination of treatment methods, such as hand pulling, flame weeding, and herbicide treatment along with mowing. When planning a strategy to eradicate Palmer amaranth in native seedings, consider the use of spot treatments and methods that will allow for the establishment of the desired native plants as much as possible.

- 1. Mowing** – Mowing will help control Palmer amaranth and other persistent weed species. Mowing a native stand of grass and forbs during the first couple of establishment years for weed control will often result in a better stand of perennial native species that will help control weed species. Be aware that Palmer has the ability to develop seed even after repeated mowings.

Mow as low as possible to prevent Palmer seed production, keeping in mind that mowing below 8” may damage the native grasses and forbs. When possible, vary mowing heights so low mowing is done in known locations of Palmer and the remaining area is cut higher so as to not damage the seeded plants. Mow Palmer plants every two to three weeks during the growing season. If plants start to develop seed heads below the mowing height, additional measures, such as hand pulling or spot spraying, will be required. Many native prairie grasses have a growth rate that peaks in mid-August. Discontinue mowing after the first week of August to maximize the competition with weeds. Monitoring for Palmer amaranth should actually increase during this time. It is also very important to thoroughly clean all equipment and mowers before leaving a contaminated field to avoid spreading it to other areas.

- 2. Hand Pulling** – Hand pull Palmer and ensure all roots are exposed and not in contact with the soil surface to prevent re-rooting. Plan how the plant material will be disposed before beginning hand pulling. Plant material without mature seeds can be left on site with little to no chance of adding to the seed bank. If seeds are present, destroy plant material by burning on site. Bagging and disposing in a way that ensures that the seed will be destroyed and not spread is another option.
- 3. Spot Herbicide Treatment** – Apply herbicide to individual plants or patches where Palmer is known to be present. In many cases herbicide application will negatively impact the seeding. Isolate treatment areas to limit impacts on non-target plants. Consider spot treatment of a pre-emergence herbicide in locations where Palmer was known to have produced seed the previous year. Apply post-emergence herbicide to individual plants or patches after emergence and well before seed production.
- 4. Flame Weeding** – Use of a device such as a tractor mounted or hand held propane burner/ flamer can be an effective spot treatment method. Flame Palmer making sure all above ground material is severely wilted or charred. In cases where adult plants were allowed to produce seed, flame the surrounding soil in an effort to heat and destroy the seed. Flaming to kill Palmer seed is most effective in the fall

shortly after seeds have fallen onto the soil surface. Caution must be taken if using this method to carefully control the fire and not allow it to spread. Ideally, use this method around the dawn and dusk hours when relative humidity is high and winds are light or after rainfall. Have supplies available to extinguish fire, such as a water pump, flapper and people to assist.

#### **5. Broadcast Herbicide Application Using Pre- Emergence or Post-emergence Broadleaf Herbicide**

This method is allowed only on acres certified to have 100 or more Palmer amaranth plants present. Broadcast broadleaf herbicide to target Palmer on the portion of acres where a known infestation exists and up to an additional 100 feet around the location or broadcast broadleaf herbicide to all acres. Although broadcasting herbicide to all acres is allowed, strategies of herbicide application that least impact the native seeding by applying only to acres where Palmer is known to exist is preferred. Using pre-emergence herbicides that target Palmer and have low risk of affecting the native prairie plants is a strategy that may best preserve the seeding. Consider broadcasting a post-emergence broadleaf herbicide after Palmer has begun to grow. Focus broadleaf post-emergence herbicide application while Palmer is small (<10 inches) and monitor the site throughout the growing season, applying herbicide when and where the plant is found to be actively growing. This method will likely not affect the seeded native grasses but will have a negative effect on the native forbs. Apply herbicide to small, actively growing weeds, well in advance of seed production.

#### **When using an option that will kill the seeded forbs, apply the following strategy:**

**Year One** - Apply herbicide to target Palmer amaranth. Interseed 1 bushel/ac of oats along with additional native grass. When using a broadleaf herbicide that will kill the forb component of a grass and forb mix, participants will be required to interseed grass at a rate that achieves 40 seeds per square foot. An example would be when 10 seeds per square foot of grass were originally seeded, then 30 seeds would need to be interseeded.

If needed, seed temporary cover following guidance in the Conservation Cover (327) Job Sheet until any herbicide carryover effects are gone. Native grasses must be seeded using methods and during dates according to the Conservation Cover (327) Job Sheet. Allow oats to grow and mow prior to seed maturity. Continue to mow to foster the establishment of the native grass.

**Year Two** – Continue to provide weed control with herbicide application and mow to establish the native grass.

**Year Three** – Focus spot treatment herbicide application at early growth stages of Palmer amaranth and do not mow unless necessary.

- 6. Broadcast Non-Selective Herbicide**– This method is recommended only for acres certified to have 100 or more Palmer amaranth plants present. See Program specific guidance for certification procedures. Caution should be taken when using non-selective herbicide. Killing the seeded plants will remove competition and may create an environment that allows Palmer amaranth and other weed species to proliferate. Apply non-selective herbicide to a portion or all of the CRP acres. Apply herbicide well in advance of seed production. When using non-selective herbicides that will kill all vegetation, participants will be required to reseed and establish the contracted cover type. If the non-selective herbicide of choice is glyphosate resistant Palmer amaranth plants will not be controlled by this method

**When using this option apply the following strategy:**

**Year One** - Apply non-selective herbicide.

If needed seed temporary cover following guidance in the Conservation Cover (327) Job Sheet until any herbicide residual effects are gone. Re-seed contracted cover type following original seeding plan. Conduct new seeding according to guidance in the Conservation Cover (327) Job Sheet.

**Year Two** – Continue to provide weed control using spot treatments if Palmer is detected. Mow to establish the seeding.

**Year Three** – Focus spot treatment herbicide application at early growth stages of Palmer amaranth and do not mow unless necessary.

**7. Termination** – Program termination of a part or all of the contracted acres may be an option according to program policy. Returning land that has been infested with Palmer to row crop production poses a risk that conditions favoring Palmer may be created. Visit your USDA Service Center if you have questions about the termination process for USDA Program contracts.

**Monitoring**

Frequently monitor areas where control measures have been taken to determine if regrowth or new emergence of Palmer has occurred on the site. Use follow-up treatments to control any surviving or new Palmer.

**Controlling the Spread of Palmer amaranth**

Taking extra effort to control the spread of Palmer amaranth will be very important. Time control methods and use techniques that ensure Palmer will not produce seed. Clean your boots, shoes and pants with a stiff brush and or scraper before leaving the site. Avoid driving a vehicle (truck, ATV or UTV) through fields infested with Palmer. Clean equipment such a tractors, mowers and vehicles of all soil, seeds and plant material before leaving the site. Make a plan of how to clean equipment before bringing equipment on site.

**For acreage enrolled in the Conservation Reserve Program (CRP)**

**Establishment:** If required in the conservation plan to establish the approved cover, CRP participants may spray or mow the acreage under contract at any time until a final status review has been completed by NRCS or the participant has certified practice completion.

**Maintenance:** Following practice establishment, periodic mowing and mowing for cosmetic purposes is prohibited at all times. Annual mowing of CRP for general weed control is prohibited. However, CRP participants are permitted to:

- Mow CRP cover, not to exceed 20 percent of the total CRP acres in a field, if the activity is included in the conservation plan and it is conducted outside the primary nesting season (April 15 - August 1).
- Spot treat CRP acres outside the primary nesting season at any time.
- Spot treat CRP acres during primary nesting season if the FSA County Committee approves the activity prior to completion and the activity is included in the conservation plan.

**Before applying herbicide in a broadcast method, the presence of 100 or more Palmer plants must be verified in writing and signed by the CRP participant and one other person qualified to make the weed identification such as a Certified Crop Advisor or USDA/SWCD/Extension personnel.**

The FSA county committee must review and approve the written certification and Conservation Plan of Operations (CPO) before broadcast herbicide methods are used. *In cases where broadcast herbicide treatments were used to control Palmer amaranth, the native seeding should be evaluated after Year 3. If control measures changed the vegetative community so the CRP practice under contract will no longer meet the seeding requirements in the Conservation Plan, a Conservation Plan Modification may be needed, followed by a CRP Contract Modification.*

