USDA
United States Department of Agriculture

Natural Resources Conservation Service Des Moines, Iowa

# AGRONOMY TECHNICAL NOTE 40

## Eradicating Palmer amaranth on Tallgrass Prairie Restorations

### Background

Palmer amaranth (Amaranthus palmeri) is an adaptable and invasive weed that was first detected in Iowa in 2013. During the 2016 growing season, Palmer amaranth was found on some land that is enrolled in USDA programs such as the Conservation Reserve Program (CRP), and was seeded to native prairie, such as pollinator and wildlife plantings.

Palmer amaranth (Palmer) is considered a serious pest that poses a potential threat to annual crops in Iowa. The following pest control guidance will provide a variety of options to control Palmer, and will not violate USDA conservation program policy. In addition to control methods as described in this document, seek guidance from NRCS field office staff, ISU Extension Agronomists or a Certified Crop Advisor to assist with your specific situation.

It is required to positively identify that this weed is present before taking action. Some of the options to control Palmer will negatively impact the native prairie plants that were seeded. Palmer is a species of pigweed closely related to common waterhemp, smooth pigweed and redroot pigweed. This relation makes it easy to misidentify Palmer because of its resemblance to the other three. As a summer annual, Palmer will likely begin growing in mid-May and develop seed in 60 days. Palmer has the ability to grow very fast and develop high numbers of seed. **Killing the plants before seed development is critical for eradication.**

Iowa State University Extension has developed identification guides and information on Palmer that can be found on their website at https://store.extension.iastate.edu/Product/Palmer-amaranth-identification.

### Eradication Methods

Palmer is an annual broadleaf plant that likely will not persist in a well-established perennial plant community, such as native prairie. **Nurturing establishment of the native perennial vegetation that was seeded is the first line of defense to control this weed and the preferred method to control Palmer in all cases.** When planning a strategy to eradicate Palmer in prairie restorations, first consider the use of spot treatments and methods that will establish and maintain as much of the seeded prairie plants as possible.

Palmer thrives in open spaces and areas of soil disturbance that lack plant competition. Soil disturbance with tillage should be avoided in locations where Palmer is present. It is recommended that prairie plantings and cropland fields which have recently been exposed to Palmer amaranth not be tilled for several years. Tillage will likely create a habitat beneficial to Palmer as well as spread and incorporate any Palmer seed into the soil which may prolong the persistence of the weed.

The Herbaceous Weed Control (315) conservation practice is included in all conservation plans for CRP. If you are a CRP participant, refer to the Iowa NRCS Herbaceous Weed Control Job Sheet and conservation plan document that was provided before the start of the CRP contract. Methods described in the Herbaceous Weed Control Job Sheet will least impact the seeding and when done correctly will provide control of Palmer while also establishing the native plants.

The best results are often achieved by using a combination of treatment methods, such as hand pulling, flame weeding and spot herbicide treatment along with mowing.

During the first three years of a CRP contract, mowing and spot treatments may be done at any time of the year and will not require approval from the FSA County Committee or a modification to the contract or conservation plan. After Year 3, spot treatments will only need to be approved by the FSA County Committee when planned to be done during the primary nesting season (May 15 – August 1). Broadcast herbicide methods are only available on CRP contracted acres that have been certified to have more than 100 Palmer amaranth plants present per contract area. **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.** The FSA county committee must review and approve the written certification before broadcast herbicide methods are used.

In cases where broadcast herbicide treatments were used to control Palmer, NRCS will make a field inspection to evaluate the CRP seeding 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.

If herbicides are used, follow label rates, directions and manufacturer recommendations. See ISU Extension Publication "Herbicide Options for Palmer amaranth in CRP" for specific guidance on herbicide use.

1. **Mowing** – Mowing will help control Palmer and improve the native stand of grass and forbs. The outcome will be a better stand of perennial native species and control of Palmer and other persistent weed species. Be aware that Palmer has the ability to develop seed, even in a mowed condition.

   Mow as short as possible to prevent Palmer seed development, 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 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. Monitoring should actually increase during this time. This management change in August will allow the prairie planting to thrive and out-compete any Palmer.

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 devise 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 only available on CRP contract 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 prairie seeding by applying only to acres where Palmer is known to exist is preferred.

   Use of 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 a broadleaf herbicide that will kill the forb component of a CRP contracted 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.

   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. 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. See attached seeding plan.
» **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 only available on CRP contract acres certified to have 100 or more Palmer amaranth plants present.

   Caution should be taken when using non-selective herbicide. Killing the seeded plants will remove competition and may create an environment that benefits Palmer.

   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.

   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 and do not mow unless necessary.

7. **Termination** – Termination of a part or all of the CRP contract acres is an option according to CRP 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 FSA field office if you have questions about the termination process for CRP 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 infected 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.

Visit your local USDA Service Center if Palmer amaranth is found in prairie restorations that are supported by USDA conservation programs, such as CRP, the Environmental Quality Incentives Program (EQIP), or the Conservation Stewardship Program (CSP). Field Office personnel will assist you with your conservation program questions and help plan your options to eradicate Palmer in your prairie seeding.