UF IFAS Extension UNIVERSITY of FLORIDA

UF/IFAS PEER REVIEWED SS-AGR-336

Amaranthus palmeri—Palmer Amaranth[1]

Sergio Morichetti, Jason Ferrell, and Pratap Devkota[2]

Introduction

Palmer amaranth is a rapidly growing C4 summer annual weed that can grow up to 2.5 inches per day and can attain 10 feet in height (Figure 1). It is part of the group known commonly as "pigweeds." Palmer amaranth is a dioecious plant (plants are either male only or female only) that produces an enormous amount of seed. Some plants are capable of producing more than 500,000 seeds. Palmer amaranth has become one of the most troublesome weeds in the southeastern US due to its vigorous growth rate, high seed production, and development of resistance to herbicides from multiple modes of action.

Palmer amaranth populations have developed resistance to the Photosystem II inhibitors (atrazine, diuron, etc.), dinitroanilines (pendimethalin, trifluralin, etc.), ALS inhibitors (imidazolinones, sulfonylureas, etc.), glycines (glyphosate), HPPD inhibitor (bleacher) herbicides (mesotrione, tembotrione, etc.), PPO inhibitors (fomesafen), synthetic auxins/growth regulators (2,4-D), and very long-chain fatty acid inhibitors (*S*-metolachlor). No current populations of Palmer amaranth contain plants resistant to all these herbicides, but some populations have plants resistant to five out of eight herbicide modes of action listed above. With enough time and improper management, Palmer amaranth can become resistant to any herbicide that is repeatedly used.

Figure 1. Palmer amaranth in Suwannee County, FL.
Credits: UF/IFAS

Palmer amaranth has spread in multiple counties in Florida. This publication illustrates characteristics of this weed to assist in accurate identification, proper management, and development of effective control strategies. Likewise, proper identification assists in timely detection of populations developing resistance.

1. This document is SS-AGR-336, one of a series of the Agronomy Department, UF/IFAS Extension. Original publication date August 2010. Revised April 2020. Visit the EDIS website at https://edis.ifas.ufl.edu for the currently supported version of this publication.

2. Sergio Morichetti, former graduate assistant; Jason Ferrell, professor, Agronomy Department; and Pratap Devkota, assistant professor, Agronomy Department, UF/IFAS West Florida Research and Education Center; UF/IFAS Extension, Gainesville, FL 32611. Original written by Sergio Morichetti; revised by Pratap Devkota.

Seedling

Hypocotyls (portions of the stem below the cotyledons) are smooth or slightly hairy. Cotyledons are narrow and green to reddish on the upper surface, and reddish underneath (Figure 2). The first true leaves are alternate and ovate (Figure 3).

Figure 2. Palmer amaranth seedlings with reddish color in the lower surface of cotyledons.

Figure 3. First true leaves are roughly oval and have a slight notch or indentation at the end.
Credits: Pratap Devkota, UF/IFAS

Leaves

Leaves continue to be roughly oval with petioles longer than the leaf blade for the leaves towards the lower stem. A leaf petiole test can be done to determine if the leaf petiole is longer than the leaf blade, which confirms the Palmer amaranth (Figure 4). The leaves are hairless with prominent white veins on the underside (Figure 5). Older leaves may have watermarks (white or red V-shaped variegation) (Figure 6).

Figure 4. Leaf petiole test (i.e., bending petiole at the base to see if it is longer than the leaf blade) confirms Palmer amaranth.
Credits: Pratap Devkota, UF/IFAS

Figure 5. Palmer amaranth leaf with white veins and petiole longer than the leaf.

Figure 6. Watermarks on Palmer amaranth leaf, which may occur on every plant across the field.

Stems

Palmer amaranth has one central stem from which several branches arise (Figure 7). The stem is waxy and smooth.

Figure 7. Smooth, waxy, and hairless stem of Palmer amaranth.
Credits: Pratap Devkota, UF/IFAS

Roots

The plant has a well-developed taproot system that may be reddish in color (Figure 8).

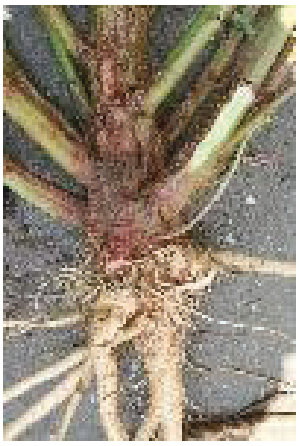

Figure 8. Lateral root branches arise from the main taproot system. Note the vigorous root system.

Flower

The flowers are terminal spikes that can grow to lengths of almost 2 feet. Plants have either all female flowers or all male; both types never occur on the same plant (Figure 9). Male flowers are soft and will often release pollen if shaken (Figures 10 and 11). Female flowers are prickly to the touch because of their stiff bracts (Figures 12 and 13). It is important to know the female flower from the male in case a population proves to be resistant to herbicide and requires hand weeding. If such a situation arises, then at least the female plants should be removed by hand pulling.

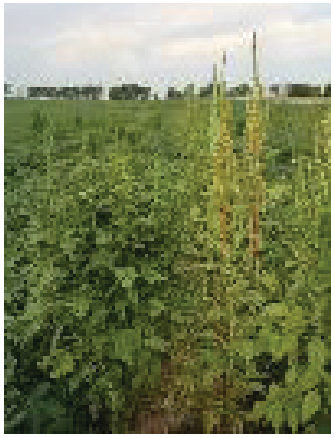

Figure 9. Female plant (left) and male plant (right).

Figure 10. Male inflorescence.
Credits: Pratap Devkota, UF/IFAS

Figure 11. Soft male inflorescence.

Figure 12. Female inflorescence.
Credits: Pratap Devkota, UF/IFAS

Figure 13. Prickly bracts in the female inflorescence.

Figure 14. Levy County field infested with ALS-resistant Palmer amaranth.

Key Characteristics that Differentiate Palmer Amaranth from Other Pigweeds

- Petioles towards the lower stem that are longer than the leaf blade
- Long terminal inflorescences
- Prominent white veins on the lower surface of the leaf
- Hairless leaves
- Faster growth compared to other pigweeds

If Palmer amaranth in your field survives a glyphosate or ALS herbicide (Cadre, Pursuit, etc.) application, you must hand-weed as quickly as possible to remove the female plants. Target the female plants first, because they produce the seeds. Each female plant can produce 500,000 seeds. Even if only a few plants survive one year, there will be thousands the following year. Palmer amaranth is among the most difficult-to-manage weeds that we have encountered, but it is not impossible to contain. Scout your fields and watch your weed control program closely so you can develop an effective program before the population gets out of control. Proper identification, scouting, and diligence with the weed control programs are key to control of this weed.