

Guidelines for the Identification and Management of Palmer Amaranth in Illinois Agronomic Crops

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Palmer amaranth (*Amaranthus palmeri*) is a summer annual broadleaf weed species closely related to other pigweed species (waterhemp, smooth, redroot) common in Illinois agronomic cropping systems. Palmer amaranth is not native to Illinois; it evolved in deserts of the southwestern United States, including areas of the Sonoran Desert. Genotypic and phenotypic adaptability have allowed Palmer amaranth to expand its distribution beyond desert habitats, and colonize the vastly different agricultural landscapes across much of the eastern half of the United States, including Illinois.

Research has demonstrated that Palmer amaranth has a higher growth rate and is more competitive than other pigweed species. Growth rates approaching 3 inches per day and yield losses of 78% (soybean) and 91% (corn) attributed to Palmer amaranth interference have been reported in the scientific literature. Female Palmer amaranth plants typically produce a similar number of seeds as female waterhemp plants.

Early and accurate identification of Palmer amaranth plants, coupled with an integrated management program, are essential to reduce the potential for crop yield loss due to interference of Palmer amaranth.



Figure 1. Palmer amaranth (left) and waterhemp (right) seedling plants. Note the more rounded (ovate) true leaves of Palmer amaranth compared with the more tapered (lanceolate) leaves of waterhemp.



Figure 2. Leaves of Palmer amaranth sometimes have white or purple chevrons.

Identification

Immature plants

The cotyledon leaves of Palmer amaranth are relatively long compared with other *Amaranthus* species. Like all weedy *Amaranthus* species in Illinois, the true leaves (those produced after the cotyledon leaves) of Palmer amaranth have a small notch in the tip. The stems and leaves have no or few hairs and the stems feel smooth to the touch. Leaves are alternate on the stem and are generally ovate or egg-shaped (Figure 1) with prominent white veins on the underside. As plants become older, they often assume a poinsettia-like appearance and sometimes have a white or purple chevron on the leaves (Figure 2). Leaves are attached to the stem by petioles that are usually as long, or longer than, the leaf.

Mature plants

Palmer amaranth plants are either male or female; male plants produce only pollen while female plants produce only seed. The terminal inflorescence of male and female plants is generally unbranched and very long (Figure 3). Female Palmer amaranth plants have a long terminal inflorescence (10 to 24 inches) with flowers containing 5 spatulate-shaped tepals. The tepals are about twice the length of the seed, and the seed capsule (utricle) breaks into 2 regular sections when fractured. Grabbing the inflorescence of a mature female Palmer amaranth plant with your bare hand is not recommended as the bracts are very stiff and sharp. Palmer amaranth is an aggressively growing species which often reaches 6 to 8 feet tall (Figure 4). Figure 5 provides a pictorial comparison of Palmer amaranth and waterhemp.

Management Guidelines

Field scouting should occur throughout the growing season to identify Palmer amaranth plants.





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Figure 3. Inflorescences of male (left) and female (right) Palmer amaranth plants.



Figure 4. Mature Palmer amaranth in soybean (photo courtesy of Robert Bellm).

- 1) If you discover a plant that you think may be Palmer amaranth, you can verify its identity by sending a leaf tissue sample to the University of Illinois (please find a sampling protocol at: <http://bulletin.ipm.illinois.edu/?p=923>) for identification using molecular biology techniques.
- 2) Plants confirmed or suspected of being Palmer amaranth should be physically removed from the field *prior* to flowering. Do not rely on herbicides for control. Physical removal can include hoeing or hand-pulling plants from the soil. If hoeing is used, be sure to sever the plant stem at or below the soil surface to reduce the potential for regrowth, and remove plants from the field as they will re-root from stem fragments.
- 3) If Palmer amaranth plants are not identified until after brown-to-black colored seeds are present on female plants, we suggest leaving the plants undisturbed in order to avoid inadvertently spreading seed.
- 4) Mark or flag areas where Palmer amaranth plants produced seed. These areas should be intensively scouted the following season and an aggressive Palmer amaranth management plan implemented to prevent future seed production.
- 5) **Do not** mechanically harvest mature Palmer amaranth plants. Physically remove the plants prior to harvest and either leave the plants in the field or place in a sturdy garden bag and remove the plants from the field. Bury or burn the bags in a burn barrel as soon as possible.
- 6) Fields in which Palmer amaranth seeds were produced should NOT be tilled during the fall or following spring. Leaving the seeds near the soil surface increases the opportunities for seed predation by various granivores.
- 7) Herbicides that control waterhemp also control Palmer amaranth. An integrated herbicide program should include soil-residual herbicides applied at full recommended use rates of within two weeks of planting and followed by postemergence herbicides applied before Palmer amaranth plants exceed 3 inches tall.

Palmer Amaranth	Palmer	Waterhemp	Waterhemp	
	Young leaves:			
	Notched	Yes		Yes
	Shape	Rounded	Lanceolate	
	Older leaves:			
	Petiole	Longer than blade		Shorter than blade
	Markings	"V" variegation		None
	Pubescence:	No	No	
	Inflorescence:	Feet	Inches	







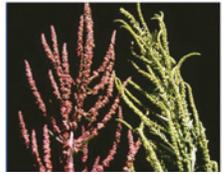




Figure 5. Comparison of Palmer amaranth (left) and waterhemp (right).