

# Management Guide for Palmer Amaranth (Palmer Pigweed)

**Monsanto is committed to providing the information and product recommendations necessary to minimize the risk of developing weed resistance. The information below is targeted at increasing awareness of important weeds and helping preserve glyphosate efficacy.**

## Palmer Amaranth Biology

- Palmer amaranth is an erect summer annual that may grow to six and a half feet tall or larger.
- The plant has dense, compact terminal flowers and relatively tall stems with petioles longer than the leaves.
- Palmer amaranth has vegetative characteristics often confused with other pigweed species, but the floral characteristics are very different. Its terminal panicles can reach one and a half feet long. The terminal spike is also much smoother, narrower and less spike-like than other species. The weed has male and female plants, allowing for greater genetic variability and adaptability.
- Palmer amaranth leaves have no hair, and have prominent white veins on the undersides.
- Palmer amaranth grows faster and is more competitive than any other pigweed.<sup>1</sup>
- Palmer amaranth can produce up to 1,000,000 seeds per plant.<sup>1</sup>

## Weed Environment

- ✓ Palmer amaranth is found throughout the southern United States, from southern California to Virginia.<sup>1</sup>
- ✓ Palmer amaranth is found in cultivated and fallow fields, gardens, waste ground and roadsides.<sup>2</sup>
- ✓ Glyphosate-based herbicides generally provide excellent control of Palmer amaranth. In case of multiple emergence events, additional glyphosate applications and/or use of residuals are required for effective control.
- ✓ Glyphosate-resistant Palmer amaranth has been confirmed in the Southeast U.S. Other suspected resistant populations are under investigation.<sup>2</sup>

<sup>1</sup> Paul E. Keely, Charles H. Carter, and Robert J. Thullen. Influence of Planting Date on Growth of Palmer Amaranth. *Weed Science*, Vol 35: 199 - 204.

<sup>2</sup> Heap, I. The International Survey of Herbicide Resistant Weeds. Online. Internet. November, 2006. Available [www.weedscience.com](http://www.weedscience.com)

# Management for Palmer Amaranth

## Treatment Recommendations<sup>1</sup>

*Scout fields and control weeds throughout the season. Proper application timing protects yields, ensures correct use rate for weed size and considers the impact of environmental conditions on performance.*

### Roundup Ready® Flex Cotton and Roundup Ready Cotton

- ✓ Start clean with a burndown herbicide or tillage. Tank-mix Roundup WeatherMAX with dicamba (Clarity®) or 2,4-D (consult label for plant back timing).
- ✓ A soil residual herbicide should be applied as either a preemergence (such as pendimethalin, fomesafen or flumioxazin) or early postemergence (such as metolachlor or pyriithiobac) application.
- ✓ In-crop, apply Roundup WeatherMAX® at a minimum of 22 oz/A to control emerged weeds. Spray Palmer amaranth when small (less than 4 inches).
- ✓ At lay-by, a post-directed application of Roundup WeatherMAX can be tank mixed with a residual herbicide such as diuron or Valor®.

### For areas with Palmer amaranth resistant biotypes confirmed:

- ✓ Apply a preemergence residual herbicide labeled for control of Palmer amaranth (pendimethalin + flumioxazin or fomesafen).
- ✓ In crop, tank mix Roundup WeatherMAX at 22 oz/A with metolachlor or pyriithiobac (before Palmer amaranth emergence).
- ✓ A post-directed application of Roundup WeatherMAX at 22 oz/A tank mixed with a residual such as Valor or diuron should be made to prevent additional flushes of Palmer amaranth.

### Roundup Ready Corn 2

- ✓ Start clean with a burndown herbicide or tillage. Early season weed control is critical in corn to maximize yield potential.
- ✓ Apply a preemergence residual herbicide such as Harness® Xtra, Degree Xtra®, or other residual herbicides at the recommended rate.
- ✓ Or apply a preemergence residual herbicide at the recommended rate tank mixed with Roundup WeatherMAX at a minimum of 22 oz/A in-crop before Palmer amaranth exceeds 4 inches in height.

- ✓ Follow both programs with a postemergence in-crop application of Roundup WeatherMAX at a minimum of 22 oz/A for additional Palmer amaranth flushes before they exceed 4 inches in height.
- ✓ Tank mix other herbicides such as 2,4-D or dicamba (Clarity®, Banvel® or Distinct®) with Roundup WeatherMAX if necessary for enhanced postemergence Palmer amaranth control. Observe maximum annual application rates for additional flushes.

### Roundup Ready Soybeans

- ✓ Scout fields before and after each burndown and in-crop application.
- ✓ Start clean with a burndown herbicide or tillage. Tank mix with 2,4-D for tough-to-control weeds.
- ✓ If you have dense stands of Palmer amaranth or are in a continuous Roundup Ready Soybean rotation, use a residual herbicide such as flumioxazin (Valor) or alachlor (INTRRO®).
- ✓ In-crop, apply Roundup WeatherMAX at a minimum of 22 oz/A before Palmer amaranth exceeds 6 inches in height.
- ✓ If an additional flush of Palmer amaranth occurs, observe maximum annual application rates.
- ✓ Roundup WeatherMAX may be tank mixed with other herbicides, including lactofen (Cobra®) or fomesafen (Flexstar®) if additional postemergence Palmer amaranth control is needed.

## Minimize the Risk of Weed Resistance

- **Start clean and control weeds early.**
- **Use Roundup Ready Technology as your foundation.**
- **Add other herbicides and cultural practices where appropriate as part of the Roundup Ready System.**
- **Use the right rate at the right time.**
- **Control weeds throughout the season and reduce the weed seed bank.**

## Report incidents of repeated non-performance of any Monsanto branded herbicide to your local Monsanto retailer or call 1-800-ROUNDUP.

This is not a product label. Always read and follow label directions for all products used in tank mixtures. Always predetermine the compatibility of tank mixtures by mixing small proportional quantities in advance. Monsanto has not tested all recommended tank mix product formulations for compatibility or performance.

<sup>1</sup>This fact sheet is issued to clearly describe use recommendations permitted under FIFRA Section 2(ee) as not being inconsistent with product labeling, or is issued to highlight an approved use from the product labeling. It is a violation of federal law to use any registered pesticide product in a manner inconsistent with its labeling. Read and follow all precautions and use instructions contained within the labeling. The applicable labeling for all products must be in the possession of the user at the time of application. Some recommended pesticide products are not registered in all states. Check with the product manufacturer or your dealer for products registered in your state. The distribution, sale or use of an unregistered pesticide is a violation of federal and/or state law and is strictly prohibited.

These recommendations are for all states except Texas.

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS: Roundup Ready® crops contain genes that confer tolerance to glyphosate, the active ingredient in Roundup® agricultural herbicides. Roundup agricultural herbicides will kill crops that are not tolerant to glyphosate. Harness® brands, Degree Xtra® and INTRRO® are restricted use pesticides and are not registered in all states. The distribution, sale or use of an unregistered pesticide is a violation of federal and/or state law and is strictly prohibited. Check with your local Monsanto dealer or Monsanto representative for the product registration in your state. Harness®, Degree Xtra®, INTRRO®, Roundup®, Roundup Ready®, Roundup Original MAX® and Roundup WeatherMAX® are trademarks of Monsanto Technology LLC. All other trademarks are the property of their respective owners.

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