



## MANAGING HERBICIDE-RESISTANT [HR] PALMER AMARANTH

Palmer amaranth [pigweed] is the bellwether or index weed for herbicide-resistance. [Biotypes that are resistant to numerous herbicide Modes of Action \[MOA\]](#) have been identified. Glyphosate-resistant [GR] Palmer amaranth is of particular concern, and is found throughout the soybean production region of the U.S.

Palmer pigweed's rapid growth and its aggressive competition make it a formidable weed pest in Midsouth crops. Also, it is an extremely prolific seed producer, and this, along with its germination throughout the growing season, further enhance its place as the most problematic weed in crop production.

GR Palmer amaranth has created a conundrum for producers. Using glyphosate for weed control in GR soybean has been and continues to be a preferred management tool, but the advent of GR weeds such as Palmer amaranth has reduced its utility. So even though glyphosate is still an effective herbicide for weed management in GR soybeans, its use must be on a selective basis and in coordination with other herbicides with different MOA's to either prevent or delay the selection for other GR weeds resulting from its overuse.

This problem must be managed if profitable soybean production is to continue. Control options involving herbicides depend on using 1) older non-glyphosate herbicides, 2) residual herbicides, 3) premixes of non-glyphosate herbicides, 4) premixes of non-glyphosate herbicides and glyphosate, 5) Liberty herbicide on LibertyLink soybean varieties, and 6) 2,4-D herbicide on tolerant soybean varieties.

The below sources provide best management practices for control of herbicide-resistant [HR] pigweed in varieties with Roundup Ready, Liberty Link, Xtend, and Enlist herbicide trait technologies, and conventional soybean varieties.

- [“Managing Herbicide-Resistant Palmer Amaranth in Soybean”](#), by Dr. Eric Prostko, Univ. of Georgia
- [“Prevention and Control of Glyphosate-Resistant Pigweed in Soybean”](#), by Drs. Scott and Smith,

Univ. of Arkansas

- [“Palmer Amaranth Control in Soybeans”](#), by Drs. Everman and York, North Carolina State Univ.
- [“Palmer Amaranth Management Strategies In Xtend Soybean”](#) and [“Controlling Multiple-Resistant Palmer Amaranth”](#), by Dr. Larry Steckel, Univ. of Tenn.
- [“Managing PPO-Resistant Palmer Amaranth in Miss. Soybean”](#) by Drs. Bond, Reynolds, and Irby, Miss. State Univ.
- [“Programs for Managing Herbicide-Resistant Palmer Amaranth in Miss. Soybean”](#) by Drs. Bond, Irby, and Reynolds, Miss. State Univ.
- [“Multiple herbicide-resistant Palmer amaranth and waterhemp in Michigan: Keys to management in soybean”](#), by Dr. Christy Sprague, Mich. State Univ.
- [“Distribution and Management of Herbicide-Resistant Palmer Amaranth in Arkansas”](#), by Butts, Barber, and Norsworthy, Univ. of Arkansas.

The article titled [“Palmer Amaranth Management in Soybeans”](#) from USB provides information about controlling this problematic weed, but its publication date was before the loss of dicamba as a POST soybean herbicide. The [Miss. Crop Situation](#), [Arkansas Row Crops](#), and [UTCrops News](#) sites should be checked regularly for updates regarding this constantly evolving situation with Palmer amaranth. Also, the [Arkansas Weed Control Guide \[MP44, pp. 18-20\]](#) has up-to-date information about managing HR weeds.

From the above sources, the following tenets apply to management systems for control of HR pigweed.

- Rotate herbicide chemistry as much as possible. Use the Group numbers shown on herbicide labels to determine the [MOA](#) of herbicides and herbicide components of premixes. Rotation of varieties that are tolerant to glyphosate, Liberty, 2,4-D, and conventional herbicides will delay the onset of HR weeds if not already present, or will help manage populations of HR weeds that are present.
- Rotate crops where possible. Including corn in a crop rotation with soybeans is an advantage since



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an atrazine [MOA Group 5]-based weed control program used for corn is an effective tool for controlling pigweed.

- A residual herbicide should be part of any weed management program for HR pigweed in all herbicide-tolerant trait systems—i.e. Roundup Ready, Liberty Link, Xtend, Enlist, and Conventional soybeans. This reduces the pressure on POST-only management.
- Herbicide combinations—i.e. tank mixes or premixes—that contain at least two MOA's provide the most consistent and effective control of pigweed.
- POST-applied herbicides that include a component that has residual activity on Palmer amaranth will enhance in-season control of the weed.
- Palmer amaranth should be treated with POST herbicides when the weed height is no more than 3 in.
- Midsouth soybean growers should assume that all Palmer pigweed is now resistant to glyphosate, and react accordingly in planning a herbicide weed control program.
- POST applications of herbicide mixes that include glyphosate should be applied to weeds at the recommended time/size for the non-glyphosate herbicide in the mix since that is the component that will control the GR pigweed.
- Contact POST herbicides that are applied to kill pigweed should be applied using flat-fan or twin-jet nozzles in a spray volume of at least 15 gal./acre to ensure adequate spray coverage.
- Management tenets for control of pigweed in LibertyLink soybean varieties are basically the same as those for Roundup Ready soybeans with the following exceptions: Liberty herbicide is used instead of glyphosate.
- Do not overuse Liberty since this will increase selection pressure for resistance to this herbicide—i.e. do not depend entirely on Liberty for weed control. Do not exceed two applications of Liberty per year, do not use reduced rates, and treat weeds when they are small. Apply residual herbicides preplant, PRE, or POST as part of the total weed management program with LibertyLink soybean varieties to prevent possible resistance development to the Liberty class of chemistry.

- A residual Group 15 herbicide should be tank-mixed with a POST herbicide application.
- In a soybean-corn rotation, producers should be mindful that Palmer pigweed can produce a crop of seed after corn harvest, and act accordingly by physically removing those plants.
- Several herbicide premixes [e.g. Authority MTZ, Boundary, and Canopy] contain Metribuzin. Click [here](#) to check varieties for tolerance to this herbicide component.
- For estimated levels of weed control normally expected with the recommended herbicides, see [Weed Control Guides from the Midsouth states](#).

**There is no economic threshold for pigweed management; thus, near-zero tolerance is required each year. Mechanical and/or hand removal of pigweed escapes should be done immediately to prevent pollen and/or seed production.**

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