

Herbicide Resistance Management *in Roundup Ready Cotton for 2008*

Herbicide resistance has become a major concern in U.S. cotton production. Over the years, numerous weeds have developed resistance to several classes of herbicides, including ALS-inhibitor herbicides such as Staple and Envoke, dinitroanilines such as Prowl and Treflan, and some grass herbicides. In most situations, farmers have been able to turn to other modes of action and effectively control resistant weed species. Glyphosate resistance in several species has been documented in Georgia, North Carolina, Tennessee and Arkansas, with many more suspected. In more recent years, glyphosate resistance has been discovered in Palmer amaranth (a pigweed species) in Georgia, North Carolina, Tennessee and Arkansas. Palmer amaranth is a particularly competitive weed, and, where resistance has been found, it has the ability to significantly alter cotton production practices. In Georgia and North Carolina, multiple applications of soil residual herbicides are needed to obtain control, and, in some cases, hand hoeing will need to be employed to salvage a cotton crop.

Glyphosate resistance in Georgia and North Carolina developed after several years of over-reliance on glyphosate as the primary method of controlling weeds. Although some weed seed are dispersed on wind currents, seed from Palmer amaranth are not thought to travel very far. Therefore, the glyphosate resistance developed in Georgia and North Carolina was not a result of dispersal, but was instead "homegrown."

This situation has immediate implications for Louisiana row crop producers. The overwhelming majority of soybeans, cotton and increasingly corn are Roundup Ready. This has served as an excellent weed control tool, but also results in tremendous selection pressure on weeds

and the potential for developing resistance. Most weed control programs and production systems are built around the ability to use glyphosate over-the-top and achieve effective control. An over-reliance on glyphosate could result in a similar development of resistance problems in Louisiana, the same as in Georgia and North Carolina. It is imperative that Louisiana producers begin to think about weed resistance and implement resistance-management programs on their farms. A suspected case of glyphosate resistance in tall waterhemp (a pigweed species) is currently being investigated in Catahoula parish, Louisiana, which underscores the urgency of practicing sound resistance management in Louisiana.

The best way to delay or prevent weed resistance is through use of tillage, crop rotation and herbicides with different modes of action. Use of labeled rates of herbicides and tank mixes of herbicides with multiple modes of action would also be good weed resistance-management practices. When weeds are not adequately controlled, they should be removed by hand to prevent seed production. Monitor fields closely, and, if a resistance problem is suspected, contact your county agent, LSU AgCenter specialist and/or company rep, and alert them to the problem.

Louisiana producers have the opportunity to deal with herbicide-resistance proactively rather than reactively after its widespread occurrence. A proactive resistance-management program might cost slightly more in the short term, but can avoid huge expenses in the long term. This can only be achieved, however, by implementing a sound resistance-management program immediately. Glyphosate and Roundup Ready crops have been a tremendous benefit to Louisiana farmers, and preserving those technologies should be a high priority.



Glyphosate and ALS resistant Palmer amaranth spot in a field (left) and following Prowl + Cotoran PRE and Roundup WeatherMax + Staple POST. Photos courtesy Alan York, NCSU.

The emergence of glyphosate-resistant weeds in other states requires us to recommend the following strategies to mitigate herbicide resistance in Louisiana cotton. Therefore, the following herbicide use recommendations have been developed for Roundup Ready and Roundup Ready Flex cotton. Using multiple modes of action is a primary approach to delay herbicide resistance in weed populations. Cotton producers should incorporate herbicides with nonrelated modes of action into their weed management programs for Roundup and Roundup Ready Flex cotton to manage resistance and preserve glyphosate as an effective weed management tool.

Roundup Ready Cotton		Roundup Ready Flex Cotton	
Use at least 1 of the following, preferably 2:		Use at least 2 of the following, preferably 3:	
Preemergence	Treflan PPI, Prowl, or metolachlor followed by Cotoran I or Staple PRE or Prowl + Staple PRE, Prowl or Dual	Preemergence	Treflan PPI, Prowl, or metolachlor followed by Cotoran ¹ or Staple PRE or Prowl + Staple PRE, Prowl, or Dual ³
Postemergence	Roundup ² + Dual ³ (or Sequence ²) or Roundup ² + Staple or Envoke ⁴	Early Postemergence	Roundup + Dual ³ (Sequence) or Roundup + Staple or Envoke ⁴
Layby	MSMA + Caparol, Direx, Suprend, Valor, Layby Pro, Cobra, Goal, Aim, ET or herbicide with a residual	Mid-Postemergence	Roundup + Dual ³ (Sequence) or Staple or Envoke ⁴
		Late Postemergence	Roundup + Dual ³ or Staple or Envoke ⁴
		Post Directed	Roundup + Dual ³ , Suprend, diuron, linuron, Reflex, Caparol, MSMA, Aim, Cotoran ¹
		Layby	MSMA + Caparol, Direx, Suprend, Valor, Layby Pro, Cobra, Goal, Aim, ET or herbicide with a residual

¹ Or any generic fluometuron.

² Apply before cotton reaches 5th true leaf.

³ Or any generic metolachlor

⁴ Apply after cotton reaches 5th true leaf.

Note: Staple or Envoke applications should be limited to one per year due to concerns for ALS resistance.

Note: For most Louisiana soils, the maximum yearly use rate of metolachlor is 2.6 pt/acre.

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