

CONTROLLING GLYPHOSATE-RESISTANT PALMER AMARANTH IN LIBERTY LINK COTTON

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Introduction

With the 2005 confirmation of glyphosate-resistant Palmer amaranth in Georgia, new management strategies must be implemented to prevent this weed from causing significant economic hardships on Georgia cotton producers. One possible management program includes the use of Liberty Link Cotton cultivars. With this genetically modified crop being commercially available, cotton producers have a tool (Ignite 280) that may be used as an over-the-top postemergence (POST) application capable of controlling small Palmer amaranth.

Materials and Methods

A study was conducted in Macon Co., Georgia in 2006 to evaluate Liberty Link weed control systems for the management of glyphosate-resistant Palmer amaranth. The site had a loamy sand with 2% organic matter and pH of 6.3. Liberty Link 988 BRR cotton was hill dropped on May 1st, 2006 with 2 seeds per 8 inch of row on 36 inch row spacing. Plots were 4 rows by 25 ft long and were prepared with conventional tillage practices. Treatments were organized into a randomized complete block design with four replications. All treatments included a layby application of MSMA (2.7 pt/A) + Direx (2 pt/A) + NIS (0.25% v/v) with individual treatment information being shown in Table 1. PRE applications were made on the day of planting, while POST 1, POST 2, and POST 3 applications were made on May 28th, June 1st, and June 29th to 3- to 4-, 4- to 5-, and 11-lf cotton, respectively. Layby applications were made to 14-lf cotton on July 13th. At the time of application, Palmer amaranth was not emerged, 2.5, 5, up to 10, and up to 20 inches for the PRE, POST 1, POST 2, POST 3, and layby applications, respectively.

Results and Discussion

Ignite 280 at 29 oz/A applied sequentially to 3- to 4-lf and 11-lf cotton followed by (fb) the layby controlled 2 inch Palmer amaranth 74% late in the season with seed cotton yield of 681 lbs/A (Table 1). Delaying the 3- to 4-lf application of Ignite by 3 days allowed the Palmer amaranth to increase in size to 5 inches resulting in 0% control and cotton that was unable to be harvested.

The addition of Prowl H₂O PRE to the Ignite POST program beginning with 3- to 4-lf cotton, increased Palmer amaranth control to 89% and seed cotton yield to 1256 lbs/A (Table 1). Similar results were observed for control (88%) and seed cotton yield (1283 lbs/A) when the second application of Ignite was replaced with the addition of Dual Magnum to the initial Ignite application applied to 3- to 4-lf cotton.

Prowl H₂O PRE fb Ignite POST at 23 or 29 oz/A applied to 2 inch Palmer amaranth fb the layby provided 75 to 77% control with seed cotton yield of 904 to 913 lbs/A (Table 1). Prowl H₂O PRE fb Ignite at 23 oz/A plus Staple LX at 1.7 oz/A POST and the layby

provided 76% control with seed cotton yield of 915 lbs/A. The addition of Staple LX did not improve control which may be a result of this Palmer amaranth population not being susceptible to ALS-herbicides.

The addition of Reflex at 1 pt/A or Cotoran at 2.5 pt/A to Prowl H₂O PRE fb Ignite POST and the layby increased Palmer amaranth control to 94% and seed cotton yield to at least 1196 lbs/A (Table 1). There was no benefit observed to Palmer amaranth control or seed cotton yield with the addition of Staple LX or Dual Magnum to these programs.

Conclusions

Our results suggest that Liberty Link weed management systems can be effective in controlling glyphosate-resistant Palmer amaranth, however, success of these programs hinge on the timely application of Ignite to Palmer amaranth that is 2 inches or less in height. A successful program must include a yellow herbicide plus an additional at-plant residual herbicide (i.e. Reflex, Cotoran, or Direx) PRE fb by two applications of Ignite POST or Ignite plus Dual Magnum POST fb an effective layby such as MSMA plus Direx, Valor, Layby Pro, or Suprend. Staple can also be added to the POST Ignite application in sites that do not contain ALS-resistance.

Table 1. Palmer amaranth control and seed cotton yield with Liberty Link weed management systems.

	Herbicide treatment ^a				Palmer control ^{bc} %	Seed cotton yield lbs/A
	PRE	POST 1	POST 2	POST 3		
		3 to 4-leaf cotton	4 to 5-leaf cotton	11-leaf cotton		
1		Ignite 280 (29 oz)		Ignite 280 (29 oz)	74 d	681 b
2			Ignite 280 (29 oz)	Ignite 280 (29 oz)	0 e	0 c
3	Prowl H ₂ O	Ignite 280 (23 oz)		Ignite 280 (23 oz)	89 bc	1256 a
4	Prowl H ₂ O	Ignite 280 (23 oz) Dual Magnum			88 c	1283 a
5	Prowl H ₂ O	Ignite 280 (23 oz)			77 d	904 b
6	Prowl H ₂ O	Ignite 280 (29 oz)			75 d	913 b
7	Prowl H ₂ O	Ignite 280 (23 oz) Staple LX			76 d	915 b
8	Prowl H ₂ O	Ignite 280 (23 oz) Reflex			95 abc	1196 a
9	Prowl H ₂ O	Ignite 280 (23 oz) Reflex Staple LX			98 ab	1267 a
10	Prowl H ₂ O	Ignite 280 (23 oz) Reflex Dual Magnum			98 ab	1269 a
11	Prowl H ₂ O	Ignite 280 (23 oz) Cotoran			99 a	1231 a
12	Prowl H ₂ O	Ignite 280 (23 oz) Cotoran Staple LX			98 ab	1314 a
13	Prowl H ₂ O	Ignite 280 (23 oz) Cotoran Dual Magnum			94 abc	1303 a

^a Cotoran = 2.5 pt/A, Dual Magnum = 1 pt/A, Ignite 280 = 23 or 29 fl oz/A, Prowl H₂O = 2 pt/A, Reflex = 1 pt/A, Staple LX = 1.7 fl oz/A. Treatments included a layby application of MSMA (2.7 pt/A) + Direx (2 pt/A) + NIS (0.25% v/v).

^b Visual ratings 30 days before harvest on a 0 to 100 scale where 0 = no weed control and 100 = weed death.

^c Values within a column with a common letter are similar based on statistical analysis by Fisher's protected LSD.