IN-CROP AND FALL-APPLIED GLYPHOSATE REDUCED PURPLE NUTSEDGE DENSITY IN NO-TILL GLYPHOSATE-RESISTANT CORN AND SOYBEAN

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INTRODUCTION

Purple nutsedge (Cyperus rotundus L.) is a difficult to control weed because of prolific tuber production, ability of tuber to sprout several times, and lack of herbicides to kill dormant tubers. In the southern US, corn and soybean are harvested beginning in August. The time between harvest in August and frost provides a favorable environment for purple nutsedge to re-establish and replenish tubers, resulting in future infestations. Although, in-crop glyphosate applications provide effective purple nutsedge control, control is temporary, often partial, and new sprouts arise from tubers escaping glyphosate. Post-harvest follow-up glyphosate application can prolong purple nutsedge control and reduce tuber replenishment. Treating purple nutsedge with glyphosate at higher rate in October can enhance herbicide translocation to underground parts and reduce future infestations. Whether this strategy can help manage purple nutsedge was the focus of this three-year field study.

OBJECTIVES

To determine efficacy of in-crop and fall-applied glyphosate on purple nutsedge populations and crop yields in no-till glyphosate-resistant (GR) corn and GR soybean.

MATERIALS AND METHODS

General	Condi	tions

Location: Southern Weed Science Research Farm, Stoneville. MS. Dundee silt loam Soil: Years: 2005, 2006, 2007 Tillage: 2004 fall - Chisel plow, disk, and field cultivator. Subsequent years - no tillage Preplant: Pendimethalin to entire area Plot size: 4.06 m wide and 13.7 m long Split-plot with 3 replications Desian: Main plot: fall glyphosate application Subplot: in-crop herbicide application Corn: Planted: On raised beds, Fertilized and irrigated as needed DKC69-72RR2 Variety: Treatments: Table 1

Sovbean:

Planted: On flat seedbed, non-irrigated. AG 4603 RR /AG 4604 RR Variety: Treatments: Table 2

Data:

Purple nutsedge shoots counted in two 0.09 m² guadrats before and after in-crop berbicide application Corn and soybean yield

RESULTS

Corn and soyhean experimental area in 2004, before initiation of the study.

Purple nutsedge density 186 shoots/m²





Corn study area in April 2007 No fall- applied glyphosate, no herbicide (worst) plot is shown.

Sovhean study area in April 2007 No fall- applied glyphosate, no herbicide (worst) plot is shown.

2008.				Self-Self-Self-Self-Self-Self-Self-Self-				Sector Sector	Sector Sector		
				Purple r	nutsedge de	nsity					
Main effect		2005		2006		2007		2008	Corn grain yield		
Rate	Timing	April	May	April	May	April	June	May	2005	2006	2007
				s	shoots/m ²					kg/ha	
-	- H.	173 a	83 a	157 a	92 a	91 a	94 a	117 a	10,680 a	8,580 a	8,750 a
1.68	October	185 a	73 a	52 b	64 a	43 b	51 b	70 b	10,430 a	8,970 a	9,540 a
ion	Name	Carry Collin	Sec. Con	Second and	Section 2	A. Starty	and and a	Martin	North Cold	and and	and the second
-	1	186 a	157 a	233 a	282 a	228 a	288 a	307 a	9,970 a	8,300 a	8,600 a
0.84	EPOST		The second	De la composición de		П				T	
0.84	LPOST	185 a	81 b	70 b	22 b	25 b	<1 b	31 b	10,650 a	9,010 a	9,240 a
1.68	PRE	Strate State		all general se	10000						
0.84	EPOST							Contraction of the			
0.84	LPOST	177 a	41 b	42 b	7 b	6 b	0 b	29 b	10,920 a	9,320 a	9,440
1.68	PRE	an and the states			and the second			Service of the			
0.07	EPOST							a ser and			
0.07	LPOST	167 a	32 b	73 b	<1 b	7 b	0 b	5 b	10,670 a	8,480 a	9,300
	n effect Rate - 1.68 ion - 0.84 0.84 0.84 0.84 0.84 0.84 0.84 0.84	n effect Rate Timing 1.68 October ion 0.84 EPOST 0.84 LPOST 1.68 PRE 0.84 LPOST 1.68 PRE 0.84 LPOST 1.68 PRE 0.84 EPOST 0	n effect 2005 Rate Timing April	n effect 2005 Rate Timing April May 173 a 83 a 1.68 October 185 a 73 a ion 186 a 157 a 0.84 EPOST 0	Purple i n effect 2005 2000 Rate Timing April May April S - - 173 a 83 a 157 a S - - 173 a 83 a 157 a S - - 185 a 73 a 52 b S ion - 186 a 157 a 233 a 0.84 EPOST 0.84 EPOST 0.84 57 b 70 b 1.68 70 b 1.68 70 b 1.68 70 b 1.68 PRE 0.84 EPOST 0.87 177 a 41 b 42 b 1.68 PRE 0.97 EPOST 0.97 EPOST 0.9	Purple nutsedge der n effect 2005 2006 Rate Timing April May April May - - 173 a 83 a 157 a 92 a - - 173 a 83 a 157 a 92 a 1.68 October 185 a 73 a 52 b 64 a ion - 186 a 157 a 233 a 282 a 0.84 EPOST 185 a 81 b 70 b 22 b 1.68 PRE EPOST - - 186 a 157 a 23 a 282 a 0.84 EPOST 185 a 81 b 70 b 22 b - 1.68 PRE - <td< td=""><td>Purple nutsedge density n effect 2005 2006 200 Rate Timing April May April May April April - - 173 a 83 a 157 a 92 a 91 a 1.68 October 185 a 73 a 52 b 64 a 43 b ion - 186 a 157 a 233 a 282 a 228 a 0.84 EPOST 185 a 81 b 70 b 22 b 25 b 1.68 PRE EPOST 6 b 6 b 6 b 0.84 LPOST 177 a 41 b 42 b 7 b 6 b 1.68 PRE EPOST 6 b 6 b 6 b 6 b</td><td>Purple nutsedge density n effect 2005 2007 April April June Rate Timing April May April May April June Shoots/m² - - 173 a 83 a 157 a 92 a 91 a 94 a 1.68 October 185 a 73 a 52 b 64 a 43 b 51 b ion - 186 a 157 a 233 a 282 a 228 a 288 a 0.84 EPOST 185 a 81 b 70 b 22 b 25 b <1 b</td> 0.84 EPOST 185 a 81 b 70 b 22 b 25 b <1 b</td<>	Purple nutsedge density n effect 2005 2006 200 Rate Timing April May April May April April - - 173 a 83 a 157 a 92 a 91 a 1.68 October 185 a 73 a 52 b 64 a 43 b ion - 186 a 157 a 233 a 282 a 228 a 0.84 EPOST 185 a 81 b 70 b 22 b 25 b 1.68 PRE EPOST 6 b 6 b 6 b 0.84 LPOST 177 a 41 b 42 b 7 b 6 b 1.68 PRE EPOST 6 b 6 b 6 b 6 b	Purple nutsedge density n effect 2005 2007 April April June Rate Timing April May April May April June Shoots/m ² - - 173 a 83 a 157 a 92 a 91 a 94 a 1.68 October 185 a 73 a 52 b 64 a 43 b 51 b ion - 186 a 157 a 233 a 282 a 228 a 288 a 0.84 EPOST 185 a 81 b 70 b 22 b 25 b <1 b	Purple nutsedge density n effect 2005 2007 2008 Rate Timing April May April May April June May - - 173 a 83 a 157 a 92 a 91 a 94 a 117 a 1.68 October 185 a 73 a 52 b 64 a 43 b 51 b 70 b ion - 186 a 157 a 233 a 282 a 228 a 288 a 307 a 0.84 EPOST 185 a 81 b 70 b 22 b 25 b <1 b	Purple nutsedge density Co Rate Timing April May April May April June May 2005 Co - 173 a 83 a 157 a 92 a 91 a 94 a 117 a 10,680 a 1.68 October 185 a 73 a 52 b 64 a 43 b 51 b 70 b 10,430 a ion -	Purple nutsedge density Corn grain yie Rate Timing April May April May April June May 2005 2006 Rate Timing April May April May April June May 2005 2006 - 173 a 83 a 157 a 92 a 91 a 94 a 117 a 10,680 a 8,580 a 1.68 October 185 a 73 a 52 b 64 a 43 b 51 b 70 b 10,430 a 8,970 a ion - - 186 a 157 a 233 a 282 a 228 a 288 a 307 a 9,970 a 8,300 a 0.84 EPOST 185 a 81 b 70 b 22 b 25 b <1 b

Table 1. Purple nutsedge density and yield as affected by in-crop and fall-applied glyphosate in no-till glyphosate-resistant corn at Stoneville, MS;

Note: Purple nutsedge density before (April) and after (May) in-crop applications

Abbreviations: EPOST, early postemergence; LPOST, late postemergence; PRE, preemergence.

Means within a column for each main effect followed by same letter are not significantly different at the 5% level as determined by Fisher's LSD test.

Table 2. Purple nutsedge density and yield as affected by in-crop and fall-applied glyphosate in no-till glyphosate-resistant soybean, Stoneville, MS; 2005-2008

		1.1.1.1.1.1	1975 - P. P.	1. 1. 1. 1.	Purple	e nutsedge d	ensity					
Main effect		2005		2006		2007		2008	Soybean yield			
Herbicide	Rate	Timing	May	June	May	June	May	June	May	2005	2006	2007
and the second	Ser Carlo	and the factor	shoots/m ²							kg/ha		
Fall application												
No glyphosate		1.	127 a	141 a	322 a	169 a	215 a	156 a	244 a	4,000 a	1,970 b	3,310 b
Glyphosate	1.68	October	145 a	154 a	55 b	65 b	78 a	66 b	83 b	4,250 a	2,640 a	3,900 a
In-crop applicat	ion											
No herbicide	1	- 19 - 19 - 19 - 19 - 19 - 19 - 19 - 19	144 a	332 a	539 a	406 a	481 a	433 a	567 a	3,490 b	2,110 a	3,130 b
Glyphosate	0.84	EPOST	an Astronom		States and	A start start of			A MAR Mark		STATES N	
Glyphosate	0.84	LPOST	126 a	63 b	36 b	2 b	5 b	0 b	2 b	4,480 a	2,580 a	3,830 a
S-metolachlor	1.68	PRE				States and						
Glyphosate	0.84	EPOST								De la Cartera		
Glyphosate	0.84	LPOST	138 a	57 b	51 b	<1 b	14 b	0 b	4 b	4,300 a	2,320 a	3,930 a
S-metolachlor	1.68	PRE	No. of the second	Carrow Carlo	and the second	A Contraction	n and an an	State of the second	A Martin	A second	New	Sec. 20
Chlorimuron	0.013	EPOST										
Chlorimuron	0.013	LPOST	136 a	138 b	128 b	58 b	86 b	11 b	82 b	4.220 a	2.210 a	3,530 al

Note: Purple nutsedge density before (May) and after (June) in-crop applications.

Abbreviations: EPOST, early postemergence; LPOST, late postemergence; PRE, preemergence. Means within a column for each main effect followed by same letter are not significantly different at the 5% level as determined by Fisher's LSD test.

CONCLUSIONS

- 1. In GR corn, glyphosate applied in the fall reduced purple nutsedge density by 40 to 67% compared to no glyphosate during three years.
- 2. In GR corn, glyphosate applied in-crop reduced purple nutsedge density by 48% in 2005, 92% in 2006, and 100% in 2007 compared with no herbicide.
- 3. GR corn yields were not affected by either in-crop or fall-applied glyphosate.
- 4. In GR soybean, glyphosate applied in the fall reduced purple nutsedge density by 64 to 83% compared to no glyphosate during three years.
- 5. Glyphosate applied in-crop in GR soybean reduced purple nutsedge density by 81% in 2005, 100% in 2006, and 100% in 2007 compared with no herbicide.
- 6. GR soybean yields were similar in 2005, but yields were 34 and 18% higher in 2006 and 2007. respectively, following fall-applied glyphosate compared to no glyphosate. GR soybean yields were higher with glyphosate applied in-crop compared with no herbicide in one of three years.
- 7. These results indicate that purple nutsedge density could be reduced with glyphosate applied in-crop in GR corn and GR soybean. Fall-applied glyphosate was effective in preventing re-establishment of purple nutsedge following harvest of crops and could be an effective purple nutsedge control strategy regardless of GR trait.



