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 Conditions:

Location: Southern Weed Science Research Farm, Stoneville, MS.
Soil: Dundee silt loam
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
Design: Split-plot with 3 replications
Main plot: fall glyphosate application
Subplot: in-crop herbicide application

Corn:

Planted: On raised beds, Fertilized and irrigated as needed.
Variety: DKC69-72RR2
Treatments: Table 1

Soybean:

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

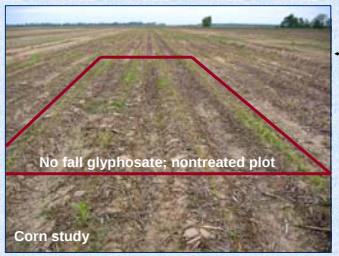
Data:

Purple nutsedge shoots counted in two 0.09 m^2 quadrats before and after in-crop herbicide application. Corn and soybean yield.

RESULTS

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

Purple nutsedge density: 186 shoots/m^2



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

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

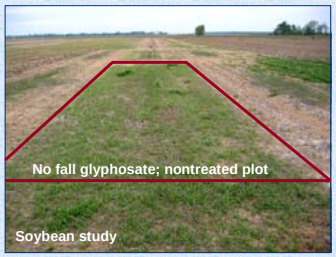


Table 1. Purple nutsedge density and yield as affected by in-crop and fall-applied glyphosate in no-till glyphosate-resistant corn at Stoneville, MS; 2005 to 2008.

Main effect			Purple nutsedge density							Corn grain yield		
			2005		2006		2007		2008			
Herbicide	Rate	Timing	April	May	April	May	April	June	May	2005	2006	2007
			shoots/m^2							kg/ha		
Fall application												
No glyphosate	-	-	173 a	83 a	157 a	92 a	91 a	94 a	117 a	10,680 a	8,580 a	8,750 a
Glyphosate	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
In-crop application												
No herbicide	-	-	186 a	157 a	233 a	282 a	228 a	288 a	307 a	9,970 a	8,300 a	8,600 a
Glyphosate Glyphosate	0.84 0.84	EPOST LPOST	185 a	81 b	70 b	22 b	25 b	<1 b	31 b	10,650 a	9,010 a	9,240 a
S-metolachlor Glyphosate Glyphosate	1.68 0.84 0.84	PRE EPOST LPOST	177 a	41 b	42 b	7 b	6 b	0 b	29 b	10,920 a	9,320 a	9,440 a
S-metolachlor Halosulfuron Halosulfuron	1.68 0.07 0.07	PRE EPOST LPOST	167 a	32 b	73 b	<1 b	7 b	0 b	5 b	10,670 a	8,480 a	9,300 a

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.

Main effect			Purple nutsedge density							Soybean yield		
			2005		2006		2007		2008			
Herbicide	Rate	Timing	May	June	May	June	May	June	May	2005	2006	2007
			shoots/m^2							kg/ha		
Fall application												
No glyphosate	-	-	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 application												
No herbicide	-	-	144 a	332 a	539 a	406 a	481 a	433 a	567 a	3,490 b	2,110 a	3,130 b
Glyphosate Glyphosate	0.84 0.84	EPOST 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 Glyphosate Glyphosate	1.68 0.84 0.84	PRE EPOST 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 Chlorimuron Chlorimuron	1.68 0.013 0.013	PRE EPOST LPOST	136 a	138 b	128 b	58 b	86 b	11 b	82 b	4,220 a	2,210 a	3,530 ab

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.