

Glyphosate Rate and Application Volume Effects on Drift Reduction Nozzles and Agents.

02-51W-MN120

OBJECTIVE: Determine the influence of increasing the glyphosate rate and/or application volume to overcome any reduction in control of common waterhemp when applied with drift reduction nozzles and/or agents.

SUMMARY: The objective of this study was to evaluate the potential methods of overcoming antagonism associated with applying drift reduction agents in conjunction with Roundup UltraMax (glyphosate). Other research has shown that thickening agents designed to reduce spray drift such as hydroxypropyl guar (HPG) may reduce the overall weed control performance of the glyphosate application. However, this study did not exhibit the antagonistic effects that were anticipated which indicates reduced weed control with these combinations is not always consistent. In fact, the addition of HPG to glyphosate actually increased the level of weed control achieved with glyphosate compared to glyphosate applied alone. For example, control of giant foxtail with flat fan nozzles at the 6.5 oz/a rate alone was 81% compared to 99% for the same treatment containing HPG. Since the antagonism of glyphosate did not occur the study did not allow for a good evaluation of herbicide rate, carrier volume, and nozzle to overcome the antagonism. In general the nozzle type did not have an effect on control as much as application volume. The 10 gallon per acre application volume provided the most consistent control with glyphosate across all treatments for all weed species evaluated. Soybean yield ranged from 31 to 47 bu/A in herbicide treated plots. Plots treated with glyphosate alone applied with flat fan nozzles in 20 GPA yielded significantly less than the same treatment applied in 15 GPA. At 20 GPA, soybean yield was increased when HPG was added to glyphosate applied with flat fan nozzles. In addition, soybean yield was increased when glyphosate was applied in 20 GPA with Air Induction nozzles compared to flat fan nozzles.

HERBICIDES/ADJUVANTS/NOZZLES

ROUNDUP ULTRA MAX 3.7 SL
HPG 77.5 WG
AIR INDUCTION NOZZLES
FLAT FAN NOZZLES

WEEDS

foxtail, giant
ragweed, giant
velvetleaf
waterhemp, common

CROP

soybean

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PLANT, SOIL AND GENERAL AGRICULTURE DEPARTMENT

SOUTHERN ILLINOIS UNIVERSITY

Glyphosate Rate and Application Volume Effects on Drift Reduction Nozzles and Agents.

Project Code: 02-51W-MN120 Location: Belleville Research Center

Investigator: Bryan Young, Assistant Professor, Southern Illinois University

City State Zip Country: Belleville IL 62221 USA
 Trial Status: Final Updated: 10-29-02

Objective:

Determine the influence of increasing the glyphosate rate and/or application volume to overcome any reduction in control of common waterhemp when applied with drift reduction nozzles and/or agents.

Weed Code	Common Name	Scientific Name
1. SETFA	foxtail, giant	Setaria faberi Herrm.
2. AMATA	waterhemp, common	Amaranthus rudis Sauer
3. ABUTH	velvetleaf	Abutilon theophrasti Medicus
4. AMBTR	ragweed, giant	Ambrosia trifida L.

Crop 1:	GLXMA soybean	Variety:	Asgrow 4602 RR
Planting Method:	Seeded	Planting Date:	6-3-02
Rate:	75 lb/A	Depth:	1.0 IN
Row Spacing:	30 IN		

Plot Width, Unit:	10 FT	Plot Length, Unit:	27 FT	Reps:	4
Tillage Type:	Reduced-Till	Study Design:	Randomized complete block		
Previous Crop, Year:	ZEAMX, 2001				

Field Prep./Maintenance: N 0 LB/A, P205 50 LB/A, K20 200 LB/A

Soil Name:	Weir	% OM:	1.7	pH:	6.8	CEC:	11
Texture:	Silt loam	Fert. Level:	P1: 79 LB/A, K: 215 LB/A				

APPLICATION DESCRIPTION

A

Application Date: 7-4-02
 Time of Day: 10:00
 Application Method: Spray
 Application Timing: 6-8"W
 Applic. Placement: BROFOL
 Air Temp., Unit: 92 F
 % Relative Humidity: 50
 Wind Velocity, Unit: 3-5 MPH
 Dew Presence (Y/N): N
 Soil Moisture: BELNOR
 % Cloud Cover: 0

CROP STAGE AT EACH APPLICATION

A

Crop 1 Code, Stage: GLXMA V3
 Height, Unit: 6-8 IN

WEED STAGE AT EACH APPLICATION

A

Weed 1 Code: SETFA
 Stage(leaves): 5-7
 Height(inches): 6-16
 Density: High

Weed 2 Code: AMATA
 Stage(leaves): 6-8
 Height(inches): 4-8
 Density: Medium

Weed 4 Code: AMBTR
 Stage(leaves): 4-6
 Height(inches): 4-8
 Density: Medium

APPLICATION EQUIPMENT

A

Appl. Equipment: CO2 sprayer
Operating Pressure: 40 PSI
Nozzle Type: See note
Nozzle Size: XR 110015
Boom Length, Unit: 7.5 FT
Spray Volume, Unit: See note

NOTES:

Nozzles are flat fan and air induction, see treatment list.
Harvested Oct-24-02, (2) 30 inch rows by 24 ft.

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Weed Code												SETFA	SETFA	SETFA	AMATA	AMATA	AMATA	ABUTH	ABUTH	ABUTH			
Crop Code												GLXMA	GLXMA	GLXMA									
Rating Data Type												Yield	Injury	Injury	Control	Control	Plants	Control	Control	Plants	Control	Control	Plants
Rating Unit												bu/A	Percent	Percent	Percent	Percent	1.0 m2	Percent	Percent	1.0 m2	Percent	Percent	1.0 m2
Rating Date												10-24-02	7-18-02	8-1-02	7-18-02	8-1-02	7-25-02	7-18-02	8-1-02	7-25-02	7-18-02	8-1-02	7-25-02
Trt-Eval Interval												14 DA-A	28 DA-A	8 DA-A	14 DA-A	28 DA-A	21 DA-A	14 DA-A	28 DA-A	21 DA-A			
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Unit	Prod Rate	Prod Unit	Grow Stg	Appl Code	Spray Volume													
1	NONTREATED										16	0	0	0	0	205.0	0	0	83.0	0	0	9.5	
2	FLAT FAN NOZZLES										34	0	0	79	81	28.0	78	78	86.0	68	56	14.0	
2	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A	10												
3	FLAT FAN NOZZLES										41	0	0	97	99	9.5	86	79	74.0	80	66	9.5	
3	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A	10												
3	HPG	77.5	WG	8.0	OZ A/100 GAL	10.3	OZ/100 GAL	6-8"	W	A	10												
4	FLAT FAN NOZZLES										45	0	0	99	99	6.0	88	84	63.0	78	66	7.0	
4	ROUNDUP ULTRA MAX	3.7	SL	0.282	LB AE/A	9.8	OZ/A	6-8"	W	A	10												
5	FLAT FAN NOZZLES										47	0	0	99	99	4.0	91	88	62.5	84	69	5.0	
5	ROUNDUP ULTRA MAX	3.7	SL	0.282	LB AE/A	9.8	OZ/A	6-8"	W	A	10												
5	HPG	77.5	WG	8.0	OZ A/100 GAL	10.3	OZ/100 GAL	6-8"	W	A	10												
6	AIR INDUCTION NOZZLES										47	0	0	98	96	14.5	86	81	81.0	79	65	10.5	
6	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A	10												
7	AIR INDUCTION NOZZLES										42	0	0	99	96	6.5	83	78	64.5	80	66	7.5	
7	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A	10												
7	HPG	77.5	WG	8.0	OZ A/100 GAL	10.3	OZ/100 GAL	6-8"	W	A	10												
8	AIR INDUCTION NOZZLES										47	0	0	99	97	6.5	91	85	49.0	81	64	7.0	
8	ROUNDUP ULTRA MAX	3.7	SL	0.282	LB AE/A	9.8	OZ/A	6-8"	W	A	10												
9	AIR INDUCTION NOZZLES										46	0	0	99	98	7.5	88	87	66.5	85	75	5.0	
9	ROUNDUP ULTRA MAX	3.7	SL	0.282	LB AE/A	9.8	OZ/A	6-8"	W	A	10												
9	HPG	77.5	WG	8.0	OZ A/100 GAL	10.3	OZ/100 GAL	6-8"	W	A	10												
10	FLAT FAN NOZZLES										41	0	0	83	81	16.0	78	74	56.0	73	56	9.5	
10	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A	15												
11	FLAT FAN NOZZLES										40	0	0	96	97	6.5	84	82	90.5	76	60	11.0	
11	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A	15												
11	HPG	77.5	WG	8.0	OZ A/100 GAL	10.3	OZ/100 GAL	6-8"	W	A	15												
12	AIR INDUCTION NOZZLES										42	0	0	85	84	10.0	69	64	78.0	66	51	7.0	
12	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A	15												
13	AIR INDUCTION NOZZLES										36	0	0	83	83	12.5	70	67	78.5	71	58	8.0	
13	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A	15												
13	HPG	77.5	WG	8.0	OZ A/100 GAL	10.3	OZ/100 GAL	6-8"	W	A	15												
14	FLAT FAN NOZZLES										31	0	0	75	76	30.0	75	69	70.0	66	49	8.0	
14	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A	20												
15	FLAT FAN NOZZLES										42	0	0	92	95	13.5	69	65	48.0	55	45	7.5	
15	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A	20												
15	HPG	77.5	WG	8.0	OZ A/100 GAL	10.3	OZ/100 GAL	6-8"	W	A	20												
16	AIR INDUCTION NOZZLES										44	0	0	96	99	19.0	83	81	74.5	73	55	9.0	
16	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A	20												

Weed Code										SETFA	SETFA	SETFA	AMATA	AMATA	AMATA	ABUTH	ABUTH	ABUTH				
Crop Code										GLXMA	GLXMA	GLXMA										
Rating Data Type										Yield	Injury	Injury	Control	Control	Plants	Control	Control	Plants				
Rating Unit										bu/A	Percent	Percent	Percent	Percent	1.0 m2	Percent	Percent	1.0 m2				
Rating Date										10-24-02	7-18-02	8-1-02	7-18-02	8-1-02	7-25-02	7-18-02	8-1-02	7-25-02				
Trt-Eval Interval										14 DA-A	28 DA-A	14 DA-A	28 DA-A	21 DA-A	14 DA-A	28 DA-A	21 DA-A	14 DA-A				
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Unit	Prod Rate	Prod Unit	Grow Stg	Appl Code	Spray Volume												
17	AIR INDUCTION NOZZLES										45	0	0	89	92	15.5	82	78	69.5	76	63	9.5
17	ROUNDUP ULTRA MAX	3.7	SL	0.188	LB AE/A	6.5	OZ/A	6-8"	W	A												
17	HPG	77.5	WG	8.0	OZ A/100 GAL	10.3	OZ/100 GAL	6-8"	W	A												
18	NONTREATED										17	0	0	0	0	297.0	0	0	81.0	0	0	13.0
	LSD (P= .05)										9.4	0.0	0.0	4.4	6.9	44.06	8.6	11.9	33.89	9.6	13.0	8.80
	Replicate F										2.104	0.000	0.000	4.073	4.124	0.189	0.617	1.404	2.720	6.181	11.246	4.100
	Replicate Prob(F)										0.1112	1.0000	1.0000	0.0114	0.0108	0.9035	0.6069	0.2524	0.0540	0.0012	0.0001	0.0111
	Treatment F										8.099	0.000	0.000	392.523	157.138	25.676	80.455	38.282	1.031	54.322	20.545	0.593
	Treatment Prob(F)										0.0001	1.0000	1.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.4436	0.0001	0.0001	0.8818

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Trial Comments

1. Protocol: SIU/ISPOB.
2. Reduce walking speed for higher GPA treatments, do not use larger nozzles.
3. DA-A = days after 6-8"W application. 1.0 m² = 1.0 square meter.