

Glyphosate-Resistant Palmer Amaranth Control with Two-Pass Programs.

Trial ID: 16-COL-TwoPass Location: Collinsville, IL Trial Year: 2016
 Investigator: Karla L. Gage, Ph.D.

Trial Status: F one-year/final Initiation Date: 5-22-16 Completion Date: 7-25-16	Trial Location
City: Collinsville Country: USA State/Prov.: Illinois IL Postal Code: 62234	

Objectives: To demonstrate and evaluate glyphosate-resistant Palmer amaranth control with two-pass programs.
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Study Director: Karla Gage, Ph.D. Title: Assistant Professor of Weed Science Organization: Southern Illinois University Carbondale Address: 1205 Lincoln Drive MC 4415 Phone No.: 618-453-7679 City+State/Prov: Carbondale, IL Postal Code: 62901 E-mail: kgage@siu.edu Country: USA	Contacts
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Crop 1: GLXMA Glycine max Soybean Variety: See treatment list BBCH Scale: BSOY Description: See comments Planting Rate, Unit: 140000 S/A Planting Date: 5-22-16 Depth, Unit: 1 IN Planting Method: SEEDED Row Spacing, Unit: 30 IN	Crop Description
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Pest 1 Type: W Code: AMAPA <i>Amaranthus palmeri</i> S.Wats. Common Name: amaranth, Palmer Description: glyphosate-resistant Palmer amaranth Pest 2 Type: W Code: PANDI <i>Panicum dichotomiflorum</i> Michx. Common Name: panicum, fall	Pest Description
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Treated Plot Width: 6.67 FT Total Plot Width: 10 FT Treated Plot Length: 25 FT Total Plot Length: 25 FT Experimental Unit: 1 PLOT Replications: 4 Tillage Type: REDTIL reduced-till Untreated Arrangement: INCLUDED single control randomized in each block Study Design: RACOB� Randomized Complete Block (RCB)	Site and Design						
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;">No.</th> <th style="width: 45%;">Previous Crop</th> <th style="width: 50%;">Year</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>ZEAMX</td> <td style="text-align: center;">2015</td> </tr> </tbody> </table>	No.	Previous Crop	Year	1.	ZEAMX	2015	
No.	Previous Crop	Year					
1.	ZEAMX	2015					

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No.	Maintenance Product Name				
1.	N 0 LB/A, P2O5 0 LB/A, K2O 0 LB/A				

Description Name: Collinsville IL 2015 % Sand: 63.54 % OM: 2.17 Texture: SIL silt loam % Silt: 28.4 pH: 7.7 Soil Name: Littleton/Haymond/Orion % Clay: 8.06 CEC: 11.6	Soil Description									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Element</th> <th style="width: 35%;">Quantity</th> <th style="width: 50%;">Unit</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td style="text-align: center;">204</td> <td>lb/A</td> </tr> <tr> <td>K</td> <td style="text-align: center;">476</td> <td>lb/A</td> </tr> </tbody> </table>	Element	Quantity	Unit	P1	204	lb/A	K	476	lb/A	Additional Measured Elements
Element	Quantity	Unit								
P1	204	lb/A								
K	476	lb/A								

Overall Moisture Conditions: NORMAL Closest Weather Station: CLIMATE CORP	Moisture and Weather Conditions
	Distance, Unit: 1 MI

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No.	Date	Amount	Unit	Type	Type Description	Interval	Unit	Min Temp	Max Temp	Temp Unit
1.	4-1-16					7	DAY	32	75	F
2.	4-6-16	0.35	IN	RAIN	rain	1	DAY			
3.	4-8-16					7	DAY	28	71	F
4.	4-10-16	1.45	IN	RAIN	rain	2	DAY			
5.	4-15-16					7	DAY	48	81	F
6.	4-19-16	0.88	IN	RAIN	rain	3	DAY			
7.	4-22-16					7	DAY	47	85	F
8.	4-26-16	0.93	IN	RAIN	rain	2	DAY			
9.	4-29-16					7	DAY	46	75	F
10.	4-29-16	1.17	IN	RAIN	rain	2	DAY			
11.	5-3-16	0.04	IN	RAIN	rain	1	DAY			
12.	5-6-16					7	DAY	44	87	F
13.	5-7-16	0.43	IN	RAIN	rain	1	DAY			
14.	5-9-16	2.21	IN	RAIN	rain	5	DAY			
15.	5-13-16					7	DAY	41	76	F
16.	5-16-16	0.74	IN	RAIN	rain	2	DAY			
17.	5-20-16					7	DAY	51	83	F
18.	5-26-16	0.8	IN	RAIN	rain	2	DAY			
19.	5-27-16					7	DAY	62	88	F
20.	5-31-16	0.18	IN	RAIN	rain	1	DAY			
21.	6-3-16					7	DAY	55	89	F
22.	6-3-16	0.28	IN	RAIN	rain	1	DAY			
23.	6-4-16	0.27	IN	RAIN	rain	1	DAY			
24.	6-10-16					7	DAY	65	96	F
25.	6-13-16	1	IN	RAIN	rain	1	DAY			
26.	6-17-16					7	DAY	67	97	F
27.	6-24-16					7	DAY	57	95	F
28.	6-25-16	1.42	IN	RAIN	rain	2	DAY			
29.	6-30-16	0.66	IN	RAIN	rain	1	DAY			
30.	7-1-16					7	DAY	60	91	F
31.	7-1-16	1.31	IN	RAIN	rain	4	DAY			
32.	7-6-16	0.85	IN	RAIN	rain	2	DAY			
33.	7-8-16					7	DAY	67	93	F
34.	7-12-16	1.07	IN	RAIN	rain	3	DAY			
35.	7-15-16					7	DAY	68	93	F
36.	7-19-16	2.11	IN	RAIN	rain	2	DAY			
37.	7-22-16					7	DAY	72	94	F
38.	7-22-16	0.06	IN	RAIN	rain	1	DAY			
39.	7-24-16	0.69	IN	RAIN	rain	1	DAY			
40.	7-25-16	0.2	IN	RAIN	rain	2	DAY			
41.	7-27-16	0.51	IN	RAIN	rain	1	DAY			
42.	7-29-16					7	DAY	69	91	F

Comment:

The Climate Corporation provided estimates of rainfall at this Collinsville location. Air temperature was recorded at Scott Air Force Base 15 miles SE and provided by NOAA's National Centers for Environmental Information. Air temperatures given are summarized as weekly high and low, detailed weather data is available on request.

Glyphosate-Resistant Palmer Amaranth Control with Two-Pass Programs.

Trial ID: 16-COL-TwoPass Location: Collinsville, IL Trial Year: 2016
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Application Description

	A	B	C	D	E
Application Date:	5-22-16	6-13-16	6-13-16	6-27-16	6-27-16
Appl. Start Time:	13:30	9:30	9:30	9:00	9:00
Appl. Stop Time:	14:00	10:00	10:00	9:30	9:30
Application Method:	Spray	Spray	Spray	Spray	Spray
Application Timing:	PRE	3-4"W-1	3-4"W-1	3-4"W-2	3-4"W-2
Application Placement:	BROSOI	BROFOL	BROFOL	BROFOL	BROFOL
Applied By:	MCG	BD	BD	BD	BD
Air Temperature, Unit:	84 F	85 F	85 F	84 F	84 F
% Relative Humidity:	37	65	65	70	70
Wind Velocity, Unit:	3 MPH	2 MPH	2 MPH	3 MPH	3 MPH
Wind Direction:	N	S	S	E	E
Dew Presence (Y/N):	N	N	N	N	N
Soil Temperature, Unit:	70 F	79 F	79 F	82 F	82 F
Soil Moisture:	NORMAL	NORMAL	NORMAL	ABONOR	ABONOR
% Cloud Cover:	0	0	0	0	0
Next Moisture Occurred On:	5-26-16	6-13-16	6-13-16	7-1-16	7-1-16
Time to Next Moisture, Unit:	4 DAY	10 HR	10 HR	4 DAY	4 DAY

Crop Stage At Each Application

	A	B	C	D	E
Crop 1 Code, BBCH Scale:	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA
Stage Scale Used:	DESC	DESC	DESC	DESC	DESC
Stage Majority, Percent:	NA	V3	V3	R1	R1
Stage Minimum, Percent:		V2	V2	R1	R1
Stage Maximum, Percent:		V3	V3	R1	R1
Height, Unit:		5 IN	5 IN	11 IN	11 IN
Height Minimum, Maximum:		4 5	4 5	9 11	9 11

Pest Stage At Each Application

	A	B	C	D	E
Pest 1 Code, Type, Scale:	AMAPA W	AMAPA W	AMAPA W	AMAPA W	AMAPA W
Stage Majority, Percent:	NA	10	10	10+	10+
Stage Minimum, Percent:		4	4	4	4
Stage Maximum, Percent:		10	10	10+	10+
Height, Unit:		4 IN	4 IN	4 IN	4 IN
Height Minimum, Maximum:		2 4	2 4	3 5	3 5
Density, Unit:		10 FT2	10 FT2	0.1 FT2	0.1 FT2
Pest 2 Code, Type, Scale:	PANDI W	PANDI W	PANDI W	PANDI W	PANDI W
Stage Majority, Percent:	NA	NA	NA	NA	NA

Application Equipment

	A	B	C	D	E
Appl. Equipment:	CO2 sprayer	CO2 sprayer	CO2 sprayer	CO2 sprayer	CO2 sprayer
Equipment Type:	BACSPR	BACSPR	BACSPR	BACSPR	BACSPR
Operation Pressure, Unit:	30 PSI	30 PSI	30 PSI	30 PSI	30 PSI
Nozzle Type:	XR	XR	TTI	XR	TTI
Nozzle Size:	8002	8002	11002	8002	11002
Boom Length, Unit:	6.67 FT	6.67 FT	6.67 FT	6.67 FT	6.67 FT
Spray Volume, Unit:	15 GPA	15 GPA	15 GPA	15 GPA	15 GPA

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Pest Code								GLXMA	GLXMA	GLXMA	GLXMA	
Crop Code								Injury	Injury	Injury	Injury	
Rating Date								Percent	Percent	Percent	Percent	
Rating Type								0 DA-DE	14 DA-ABC	28 DA-BC	28 DA-ABC	
Rating Unit												
Rating Timing												
Trt-Eval Interval												
Trt No.	Treatment Name	Form Conc	Form Type	Rate Unit	Other Rate	Other Rate	Growth Unit Stage	Appl Code				
1	XTEND SOYBEAN NONTREATED								0 a	0 a	0 a	0 a
2	XTEND SOYBEAN FIERCE XLT	62.41	WG	0.176 lb ai/a	4.5 oz/a		PRE	A	1 a	1 a	0 a	1 a
	DICAMBA DGA	4	SL	0.5 lb ae/a	1 pt/a		3-4"W-2	E				
	ROUNDUP POWERMAX	4.5	SL	1.13 lb ae/a	32 fl oz/a		3-4"W-2	E				
3	XTEND SOYBEAN AUTHORITY XL	70	WG	0.28 lb ai/a	6.4 oz/a		PRE	A	1 a	1 a	0 a	1 a
	ZIDUA	85	WG	0.133 lb ai/a	2.5 oz/a		PRE	A				
	DICAMBA DGA	4	SL	0.5 lb ae/a	1 pt/a		3-4"W-2	E				
	ROUNDUP POWERMAX	4.5	SL	1.13 lb ae/a	32 fl oz/a		3-4"W-2	E				
4	XTEND SOYBEAN PREFIX	5.29	EC	1.65 lb ai/a	2.5 pt/a		PRE	A	0 a	0 a	0 a	0 a
	DICAMBA DGA	4	SL	0.5 lb ae/a	1 pt/a		3-4"W-2	E				
	ROUNDUP POWERMAX	4.5	SL	1.13 lb ae/a	32 fl oz/a		3-4"W-2	E				
5	XTEND SOYBEAN BOUNDARY	6.5	EC	1.63 lb ai/a	2 pt/a		PRE	A	0 a	0 a	0 a	0 a
	DICAMBA DGA	4	SL	0.5 lb ae/a	1 pt/a		3-4"W-2	E				
	ROUNDUP POWERMAX	4.5	SL	1.13 lb ae/a	32 fl oz/a		3-4"W-2	E				
6	XTEND SOYBEAN DICAMBA DGA	4	SL	0.5 lb ae/a	1 pt/a		3-4"W-1	C	0 a	0 a	0 a	0 a
	ROUNDUP POWERMAX	4.5	SL	1.13 lb ae/a	32 fl oz/a		3-4"W-1	C				
7	LIBERTY LINK SOYBEAN NONTREATED								0 a	0 a	0 a	0 a
8	LIBERTY LINK SOYBEAN FIERCE XLT	62.41	WG	0.176 lb ai/a	4.5 oz/a		PRE	A	0 a	0 a	0 a	0 a
	LIBERTY 280	2.34	EC	0.53 lb ai/a	29 fl oz/a		3-4"W-2	D				
	AMS - LIQUID	100	SL	5 % v/v	5 % v/v		3-4"W-2	D				
9	LIBERTY LINK SOYBEAN AUTHORITY XL	70	WG	0.28 lb ai/a	6.4 oz/a		PRE	A	1 a	2 a	0 a	1 a
	ZIDUA	85	WG	0.133 lb ai/a	2.5 oz/a		PRE	A				
	LIBERTY 280	2.34	EC	0.53 lb ai/a	29 fl oz/a		3-4"W-2	D				
	AMS - LIQUID	100	SL	5 % v/v	5 % v/v		3-4"W-2	D				
10	LIBERTY LINK SOYBEAN PREFIX	5.29	EC	1.65 lb ai/a	2.5 pt/a		PRE	A	0 a	0 a	0 a	0 a
	LIBERTY 280	2.34	EC	0.53 lb ai/a	29 fl oz/a		3-4"W-2	D				
	AMS - LIQUID	100	SL	5 % v/v	5 % v/v		3-4"W-2	D				
11	LIBERTY LINK SOYBEAN BOUNDARY	6.5	EC	1.63 lb ai/a	2 pt/a		PRE	A	0 a	0 a	0 a	0 a
	LIBERTY 280	2.34	EC	0.53 lb ai/a	29 fl oz/a		3-4"W-2	D				
	AMS - LIQUID	100	SL	5 % v/v	5 % v/v		3-4"W-2	D				

Means followed by same letter or symbol do not significantly differ (P=.05, LSD)
 Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.
 Could not calculate LSD (% mean diff) for columns 11 because error mean square = 0.

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Pest Code								GLXMA	GLXMA	GLXMA	GLXMA			
Crop Code								Injury	Injury	Injury	Injury			
Rating Date								Percent	Percent	Percent	Percent			
Rating Type								0 DA-DE	14 DA-ABC	28 DA-BC	28 DA-ABC			
Rating Unit														
Rating Timing														
Trt-Eval Interval														
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Unit	Other Rate	Other Rate	Growth Unit	Stage	Appl Code				
12	LIBERTY LINK SOYBEAN										0 a	0 a	0 a	0 a
	LIBERTY 280	2.34	EC	0.53	lb ai/a	29	fl oz/a	3-4"	W-1 B					
	AMS - LIQUID	100	SL	5	% v/v	5	% v/v	3-4"	W-1 B					
LSD P=.05											1.2	1.2	.	1.2
Standard Deviation											0.8	0.8	0.0	0.8
CV											451.86	309.51	0.0	451.86
Replicate F											0.493	0.741	0.000	0.493
Replicate Prob(F)											0.6893	0.5351	1.0000	0.6893
Treatment F											0.831	1.647	0.000	0.831
Treatment Prob(F)											0.6112	0.1310	1.0000	0.6112

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Pest Code	Crop Code	Rating Date	Rating Type	Rating Unit	Rating Timing	Trt-Eval Interval	AMAPA-HR	AMAPA-HR	AMAPA-HR	AMAPA-HR	AMAPA-HR				
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Unit Unit	Other Rate	Other Rate	Growth Unit	Stage Stage	Appl Code	Control Percent	Control Percent	Control Percent	Control Percent	Control Percent
											0 DA-DE	14 DA-ABC	28 DA-BC	28 DA-ABC	42 DA-BC
											0 DA-DE	14 DA-ABC	28 DA-BC	28 DA-ABC	42 DA-BC
1	XTEND SOYBEAN NONTREATED										0 c	0 c	0 d	0 d	0 c
2	XTEND SOYBEAN FIERCE XLT DICAMBA DGA ROUNDUP POWERMAX	62.41 4 4.5	WG SL SL	0.176 0.5 1.13	lb ai/a lb ae/a lb ae/a	4.5	oz/a pt/a fl oz/a	PRE	A W-2 W-2	A E E	99 a	99 a	99 a	98 a	99 a
3	XTEND SOYBEAN AUTHORITY XL ZIDUA DICAMBA DGA ROUNDUP POWERMAX	70 85 4 4.5	WG WG SL SL	0.28 0.133 0.5 1.13	lb ai/a lb ai/a lb ae/a lb ae/a	6.4	oz/a oz/a pt/a fl oz/a	PRE	A A W-2 W-2	A A E E	98 a	99 a	99 a	96 ab	99 a
4	XTEND SOYBEAN PREFIX DICAMBA DGA ROUNDUP POWERMAX	5.29 4 4.5	EC SL SL	1.65 0.5 1.13	lb ai/a lb ae/a lb ae/a	2.5	pt/a pt/a fl oz/a	PRE	A W-2 W-2	A E E	99 a	99 a	99 a	98 a	99 a
5	XTEND SOYBEAN BOUNDARY DICAMBA DGA ROUNDUP POWERMAX	6.5 4 4.5	EC SL SL	1.63 0.5 1.13	lb ai/a lb ae/a lb ae/a	2	pt/a pt/a fl oz/a	PRE	A W-2 W-2	A E E	94 a	99 a	99 a	90 b	99 a
6	XTEND SOYBEAN DICAMBA DGA ROUNDUP POWERMAX	4 4.5	SL SL	0.5 1.13	lb ae/a lb ae/a	1	pt/a fl oz/a	3-4"	W-1 W-1	C C	93 a	50 b	93 b	93 ab	99 a
7	LIBERTY LINK SOYBEAN NONTREATED										0 c	0 c	0 d	0 d	0 c
8	LIBERTY LINK SOYBEAN FIERCE XLT LIBERTY 280 AMS - LIQUID	62.41 2.34 100	WG EC SL	0.176 0.53 5	lb ai/a lb ai/a % v/v	4.5	oz/a fl oz/a % v/v	PRE	A W-2 W-2	A D D	99 a	99 a	99 a	99 a	99 a
9	LIBERTY LINK SOYBEAN AUTHORITY XL ZIDUA LIBERTY 280 AMS - LIQUID	70 85 2.34 100	WG WG EC SL	0.28 0.133 0.53 5	lb ai/a lb ai/a lb ai/a % v/v	6.4	oz/a oz/a fl oz/a % v/v	PRE	A A W-2 W-2	A A D D	99 a	99 a	99 a	99 a	99 a
10	LIBERTY LINK SOYBEAN PREFIX LIBERTY 280 AMS - LIQUID	5.29 2.34 100	EC EC SL	1.65 0.53 5	lb ai/a lb ai/a % v/v	2.5	pt/a fl oz/a % v/v	PRE	A W-2 W-2	A D D	99 a	99 a	99 a	99 a	99 a
11	LIBERTY LINK SOYBEAN BOUNDARY LIBERTY 280 AMS - LIQUID	6.5 2.34 100	EC EC SL	1.63 0.53 5	lb ai/a lb ai/a % v/v	2	pt/a fl oz/a % v/v	PRE	A W-2 W-2	A D D	99 a	99 a	99 a	97 ab	99 a

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Pest Code								AMAPA-HR	AMAPA-HR	AMAPA-HR	AMAPA-HR	AMAPA-HR			
Crop Code								Control	Control	Control	Control	Control			
Rating Date								Percent	Percent	Percent	Percent	Percent			
Rating Type								0 DA-DE	14 DA-ABC	28 DA-BC	28 DA-ABC	42 DA-BC			
Rating Unit								14 DA-DE	28 DA-ABC	28 DA-ABC	28 DA-DE	28 DA-DE			
Rating Timing															
Trt-Eval Interval															
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Unit Unit	Other Rate	Other Rate	Growth Unit	Stage	Appl Code					
12	LIBERTY LINK SOYBEAN										60 b	53 b	60 c	60 c	60 b
	LIBERTY 280	2.34	EC	0.53	lb ai/a	29	fl oz/a	3-4"	W-1 B						
	AMS - LIQUID	100	SL	5	% v/v	5	% v/v	3-4"	W-1 B						
	LSD P=.05										6.8	7.9	6.2	7.4	5.1
	Standard Deviation										4.7	5.5	4.3	5.2	3.5
	CV										6.02	7.33	5.45	6.69	4.46
	Replicate F										0.956	1.000	1.247	0.832	1.000
	Replicate Prob(F)										0.4249	0.4051	0.3083	0.4860	0.4051
	Treatment F										262.639	206.857	321.139	212.443	478.320
	Treatment Prob(F)										0.0001	0.0001	0.0001	0.0001	0.0001

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Trial Comments

1. Protocol: SIU/RFK.
2. Ratings:
CI 14 and 28 DA-A (PRE); 14, 28, and 56 DA-B+C (3-4"W-1); 14, 28, and 56 DA-D+E (3-4"W-2).
WC 14 and 28 DA-A (PRE); 14, 28, and 56 DA-B+C (3-4"W-1); 14, 28, and 56 DA-D+E (3-4"W-2).
Rate before spray applications D and E.
3. No yield;
4. Soybean varieties are Pioneer 37T09L (LL) and Asgrow 38X6 (Xtend).
5. Applications A (PRE), B (Liberty), and D (Liberty) use XR 8002 nozzles.
Applications C (Dicamba) and E (Dicamba) use TTI 11002 nozzels.
6. Photos as appropriate.
7. Rainfall following the PRE application A was 0.80 inch over 2 days beginning 4 days later.
Rainfall following the 3-4"W-1 applications B and C was 1.0 inch over 1 day beginning 10 hours later.
Rainfall following the 3-4"W-2 applications D and E was 2.26 inch over 4 days beginning 4 days later.
8. AMAPA-HR = Herbicide-resistant Palmer amaranth (glyphosate).
9. DA-ABC, DA-BC and DA-DE = Days after applications A, B, and C, applications B and C,
and application D and E, respectively.
Ratings at 14 days after A and BC were on 6-5-16 and 6-27-16, respectively.
Ratings at 28 days after A and BC were on 6-19-16 and 7-11-16, respectively.
Ratings at 0, 14 and 28 DA-DE were on 6-27-16, 7-11-16 and 7-25-16, respectively.
Ratings at 42 DA-BC were on 7-25-16.
10. Not harvested.