Purdue University Weed Science

Comparisons of tank-mix programs for control of glyphosate-resistant Palmer amaranth in RR soybean

Trial ID: 13S-CCP-CTS-02 Location: Cass County Trial Year: 2013
Protocol ID: 13S-CCP-CTS-02 Investigator: Dr. Bill Johnson
Project ID: 64.01 Study Director: Joe Ikley
Sponsor Contact: Valent - Eric Ott

General Trial Information

Study Director: Joe Ikley **Title:** Research Associate
Investigator: Dr. Bill Johnson **Title:** Professor

Discipline: H herbicide
Trial Status: F one-year/final
Initiation Date: 6/6/2013 **Planned Completion Date:** 8/31/2013
Completion Date: 8/13/2013

Trial Location

City: 12 Mile **Country:** USA United States
State/Prov.: Indiana

Contacts

Study Director: Joe Ikley **Title:** Research Associate
Organization: Purdue University
Address: 915 West State Street **Phone No.:** 765-494-0891
City+State/Prov: West Lafayette **Mobile No.:** 410-596-9091
Postal Code: 47907 **E-mail:** jikley@purdue.edu

Investigator: Dr. Bill Johnson **Title:** Professor
Organization: Purdue University
Address: 915 West State Street **Phone No.:** 765-494-4656
City+State/Prov: West Lafayette **Mobile No.:** 765-404-9801
Postal Code: 47907 **E-mail:** wgj@purdue.edu

Crop Description

Crop 1: GLXMA Glycine max Soybean
Description: FG72

Planting Date: 6/6/2013
Planting Rate, Unit: 140000 S/A **Planting Method:** DIRDRI direct drilled
Depth, Unit: 2 IN
Row Spacing, Unit: 30 IN **Emergence Date:** 6/11/2013
Spacing Within Row, Unit: 2 IN
Soil Temperature, Unit: 70 F
Soil Moisture: SLIWET slightly wet, moist
Seed Bed: COARSE coarse

Pest Description

Pest 1 Type: W **Code:** AMAPA Amaranthus palmeri
Common Name: Palmer amaranth
Description: GLY-RES

Site and Design

Treated Plot Width: 10 FT **Site Type:** FIELD field
Treated Plot Length: 30 FT **Experimental Unit:** 1 PLOT plot
Treated Plot Area: 300 FT2 **Treatments:** 7 **Tillage Type:** CONTIL conventional-till
Replications: 4 **Study Design:** RACOBL Randomized Complete Block (RCB)

Maintenance

No.	Date	Maintenance Product Name	Rate	Rate Unit	Tank Mix
1.	6/6/2013	LIBERTY	48	FL OZ/A	no

Field Prep./Maintenance:
USED LIBERTY TO BURN OFF EXISTING PALMER

Soil Description

Description Name: Bloomfield Loamy Fine Sand
Texture: LFS loamy fine sand
Soil Name: Bloomfield Loamy Fine Sand
Soil Drainage: E excellent

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Application Description

	A	B
Application Date:	6/7/2013	7/2/2013
Appl. Start Time:	12:00	10:00
Appl. Stop Time:	1:30	11:00
Application Method:	SPRAY	SPRAY
Application Timing:	PREPRE	POSPOS
Application Placement:	SOIL	BROADC
Applied By:	Spaunhorst	Legleiter
Air Temperature, Unit:	70 F	61 F
% Relative Humidity:	70	82
Wind Velocity, Unit:	5 MPH	3 MPH
Wind Direction:	N	NNE
Dew Presence (Y/N):	N no	Y yes
Soil Temperature, Unit:	72 F	61 F
Soil Moisture:	SLIWET	WET
% Cloud Cover:	75	100

Crop Stage At Each Application

	A	B
Crop 1 Code, BBCH Scale:	GLXMA BSOY	GLXMA BSOY
Stage Scale Used:	BBCH	BBCH
Stage Majority, Percent:	00	13
Stage Minimum, Percent:		12
Stage Maximum, Percent:		13
Height, Unit:		5 IN
Height Minimum, Maximum:		4 6

Pest Stage At Each Application

	A	B
Pest 1 Code, Type, Scale:	AMAPA W	AMAPA W
Stage Majority, Percent:		32G
Stage Minimum, Percent:		30
Stage Maximum, Percent:		34G
Height, Unit:		2.5 IN
Height Minimum, Maximum:		0.5 4
Density, Unit:		20 YD2

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Application Equipment

	A	B
Appl. Equipment:	CO2 Backpack	CO2 Backpack
Equipment Type:	SPRBAC	SPRBAC
Operation Pressure, Unit:	17 PSI	17 PSI
Nozzle Type:	Flat Fan	Flat Fan
Nozzle Size:	XR11002	XR11002
Nozzle Spacing, Unit:	15 IN	15 IN
Nozzles/Row:	8	8
Boom Length, Unit:	10 FT	10 FT
Boom Height, Unit:	18 IN	18 IN
Ground Speed, Unit:	3 MPH	3 MPH
Carrier:	H2O	H2O
Water Hardness (ppm CaCO3):	150	150
Spray Volume, Unit:	15 GAL/AC	15 GAL/AC
Mix Size, Unit:	1.8 Liters	1.8 Liters
Propellant:	CO2	CO2
Tank Mix (Y/N):	N no	N no

Date	By	Notes
8/13/2013	lkley	Crop was destroyed prior to taking final efficacy ratings.

Trial Comments

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Reps: 4 Plots: 10 by 30 feet
Spray vol: 15 gal/ac Mix size: 1.8 liters (min 1.5642)

Trt No.	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit	Other Rate	Other Rate Unit	Appl Code	Appl Description	Amt Product to Measure	Rep 1	2	3	4
1	Valor	51	%	WG	71.5	g ai/ha	2	oz/a	A	PREPRE	1.799 g/mx	101	303	403	603
	Untreated Check														
2	Valor	51	%	WG	71.5	g ai/ha	2	oz/a	A	PREPRE	1.799 g/mx	102	304	503	602
	Roundup Powermax	4.5	LBAE/GAL	SL	1260	g ae/ha	32	fl oz/a	B	POSPOS	29.93 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	4.9	% v/v	2.5	lb ai/a	B	POSPOS	88.2 ml/mx				
3	Valor	51	%	WG	71.5	g ai/ha	2	oz/a	A	PREPRE	1.799 g/mx	103	401	501	702
	Prefix	5.28	LBA/GAL	L	1480	g ai/ha	1	qt/a	B	POSPOS	29.97 ml/mx				
	Roundup Powermax	4.5	LBAE/GAL	SL	1260	g ae/ha	32	fl oz/a	B	POSPOS	29.93 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	4.9	% v/v	2.5	lb ai/a	B	POSPOS	88.2 ml/mx				
	COC	100	%	SL	1.67	% v/v	1	qt/a	B	POSPOS	30.06 ml/mx				
4	Valor	51	%	WG	71.5	g ai/ha	2	oz/a	A	PREPRE	1.799 g/mx	104	402	502	704
	Cobra	2	LBA/GAL	EC	220	g ai/ha	12.5	fl oz/a	B	POSPOS	11.76 ml/mx				
	V-10206	85	%	WG	89	g ai/ha	1.5	oz/a	B	POSPOS	1.343 g/mx				
	Roundup Powermax	4.5	LBAE/GAL	SL	1260	g ae/ha	32	fl oz/a	B	POSPOS	29.93 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	4.9	% v/v	2.5	lb ai/a	B	POSPOS	88.2 ml/mx				
	COC	100	%	SL	1.67	% v/v	1	qt/a	B	POSPOS	30.06 ml/mx				
5	Valor	51	%	WG	71.5	g ai/ha	2	oz/a	A	PREPRE	1.799 g/mx	201	301	404	703
	Cobra	2	LBA/GAL	EC	220	g ai/ha	12.5	fl oz/a	B	POSPOS	11.76 ml/mx				
	V-10206	85	%	WG	119	g ai/ha	2	oz/a	B	POSPOS	1.796 g/mx				
	Roundup Powermax	4.5	LBAE/GAL	SL	1260	g ae/ha	32	fl oz/a	B	POSPOS	29.93 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	4.9	% v/v	2.5	lb ai/a	B	POSPOS	88.2 ml/mx				
	COC	100	%	SL	1.67	% v/v	1	qt/a	B	POSPOS	30.06 ml/mx				
6	Valor	51	%	WG	71.5	g ai/ha	2	oz/a	A	PREPRE	1.799 g/mx	202	204	601	604
	Cobra	2	LBA/GAL	EC	220	g ai/ha	12.5	fl oz/a	B	POSPOS	11.76 ml/mx				
	Warrant	3	LBA/GAL	EC	1260	g ai/ha	3	pt/a	B	POSPOS	44.9 ml/mx				
	Roundup Powermax	4.5	LBAE/GAL	SL	1260	g ae/ha	32	fl oz/a	B	POSPOS	29.93 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	4.9	% v/v	2.5	lb ai/a	B	POSPOS	88.2 ml/mx				
	COC	100	%	SL	1.67	% v/v	1	qt/a	B	POSPOS	30.06 ml/mx				
7	Valor	51	%	WG	71.5	g ai/ha	2	oz/a	A	PREPRE	1.799 g/mx	203	302	504	701
	Cobra	2	LBA/GAL	EC	220	g ai/ha	12.5	fl oz/a	B	POSPOS	11.76 ml/mx				
	Dual II Magnum	7.64	LBA/GAL	EC	1430	g ai/ha	1.33	pt/a	B	POSPOS	20.01 ml/mx				
	Roundup Powermax	4.5	LBAE/GAL	SL	1260	g ae/ha	32	fl oz/a	B	POSPOS	29.93 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	4.9	% v/v	2.5	lb ai/a	B	POSPOS	88.2 ml/mx				
	COC	100	%	SL	1.67	% v/v	1	qt/a	B	POSPOS	30.06 ml/mx				

Sort Order: Replicate 1

Product quantities required for listed treatments and applications of trials included in this table:

Amount*	Unit	Treatment Name	Form Conc	Form Type	Lot Code
12.590	g	Valor	51	WG	
179.602	ml	Roundup Powermax	4.5	SL	
529.200	ml	N-Pak AMS	3.4	SL	
29.966	ml	Prefix	5.28	L	
150.300	ml	COC	100	SL	
47.039	ml	Cobra	2	EC	
3.139	g	V-10206	85	WG	
44.900	ml	Warrant	3	EC	
20.010	ml	Dual II Magnum	7.64	EC	

* 'Per area' calculations based on spray volume= 15 gal/ac, mix size= 1.8 liters (mix size basis).
* 'Per volume' calculations use spray volume= 15 gal/ac, mix size= 1.8 liters.

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Trt No.	Treatment Name	Rate	Rate Unit	Appl Code	1	2	3	4
	Pest Type						W Weed	W Weed
	Pest Code						AMAPA	AMAPA
	Pest Scientific Name						Amaranthus pal>	Amaranthus pal>
	Pest Name						Palmer amaranth	Palmer amaranth
	Crop Code				GLXMA	GLXMA		
	BBCH Scale				BSOY	BSOY		
	Crop Scientific Name				Glycine max	Glycine max		
	Crop Name				Soybean	Soybean		
	Part Rated				PLOT C	PLOT C	PLOT P	PLOT P
	Rating Date				7/8/2013	7/16/2013	7/16/2013	8/6/2013
	Rating Type				PHYGEN	PHYGEN	PERCEN	PERCEN
	Rating Unit				%	%	%	%
	Days After First/Last Applic.				31 6	39 14	39 14	60 35
	Trt-Eval Interval				6 DA-B	14 DA-B	14 DA-B	35 DA-B
	ARM Action Codes				P	P	P	P
	Number of Decimals				0	0	0	0
1	Valor	71.5	g ai/ha	A	0 c	0 b	0 b	0 c
	Untreated Check							
2	Valor	71.5	g ai/ha	A	0 c	0 b	19 b	8 c
	Roundup Powermax	1260	g ae/ha	B				
	N-Pak AMS	4.9	% v/v	B				
3	Valor	71.5	g ai/ha	A	8 b	3 ab	98 a	89 a
	Prefix	1480	g ai/ha	B				
	Roundup Powermax	1260	g ae/ha	B				
	N-Pak AMS	4.9	% v/v	B				
	COC	1.67	% v/v	B				
4	Valor	71.5	g ai/ha	A	23 a	9 a	95 a	89 a
	Cobra	220	g ai/ha	B				
	V-10206	89	g ai/ha	B				
	Roundup Powermax	1260	g ae/ha	B				
	N-Pak AMS	4.9	% v/v	B				
	COC	1.67	% v/v	B				
5	Valor	71.5	g ai/ha	A	25 a	8 a	93 a	83 ab
	Cobra	220	g ai/ha	B				
	V-10206	119	g ai/ha	B				
	Roundup Powermax	1260	g ae/ha	B				
	N-Pak AMS	4.9	% v/v	B				
	COC	1.67	% v/v	B				
6	Valor	71.5	g ai/ha	A	21 a	8 a	90 a	84 ab
	Cobra	220	g ai/ha	B				
	Warrant	1260	g ai/ha	B				
	Roundup Powermax	1260	g ae/ha	B				
	N-Pak AMS	4.9	% v/v	B				
	COC	1.67	% v/v	B				
7	Valor	71.5	g ai/ha	A	28 a	9 a	89 a	70 b
	Cobra	220	g ai/ha	B				
	Dual II Magnum	1430	g ai/ha	B				
	Roundup Powermax	1260	g ae/ha	B				
	N-Pak AMS	4.9	% v/v	B				
	COC	1.67	% v/v	B				
	LSD (P=.05)				6.0	4.4	19.1	12.0
	Standard Deviation				4.1	2.9	12.8	8.1
	CV				27.46	58.76	18.61	13.43
	Bartlett's X2				6.844	2.198	19.173	3.729
	P(Bartlett's X2)				0.144	0.699	0.002*	0.589
	Skewness				-0.1171	0.3254	-1.0968*	-0.9036*
	Kurtosis				-1.6415	-0.9952	-0.6783	-0.9942

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

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Randomized Complete Block (RCB) AOV For GLXMA BSOY Glycine max Soybean PLOT C 7/8/2013 PHYGEN % 31 6 6 DA-B P 0 (Data Column 1)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	27	3774.107143			
Replicate	3	45.535714	15.178571	0.916	0.4529
Treatment	6	3430.357143	571.726190	34.509	0.0001
Error	18	298.214286	16.567460		

Randomized Complete Block (RCB) AOV For GLXMA BSOY Glycine max Soybean PLOT C 7/16/2013 PHYGEN % 39 14 14 DA-B P 0 (Data Column 2)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	27	550.000000			
Replicate	3	7.142857	2.380952	0.276	0.8420
Treatment	6	387.500000	64.583333	7.483	0.0004
Error	18	155.357143	8.630952		

Randomized Complete Block (RCB) AOV For W Weed AMAPA Amaranthus palmeri Palmer amaranth PLOT P 7/16/2013 PERCEN % 39 14 14 DA-B P 0 (Data Column 3)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	27	45117.857143			
Replicate	3	1525.000000	508.333333	3.089	0.0533
Treatment	6	40630.357143	6771.726190	41.145	0.0001
Error	18	2962.500000	164.583333		

Randomized Complete Block (RCB) AOV For W Weed AMAPA Amaranthus palmeri Palmer amaranth PLOT P 8/6/2013 PERCEN % 60 35 35 DA-B P 0 (Data Column 4)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	27	38274.107143			
Replicate	3	381.250000	127.083333	1.947	0.1582
Treatment	6	36717.857143	6119.642857	93.748	0.0001
Error	18	1175.000000	65.277778		

Pest Type
W, Weed, G-BYRW7, G-WedStg = Weed or volunteer crop
Crop Code
GLXMA, BSOY, Glycine max, = US
Part Rated
PLOT = plot
C = Crop is Part Rated
P = Pest is Part Rated
Rating Type
PHYGEN = phytotoxicity - general / injury
PERCEN = percent
Rating Unit
% = percent
ARM Action Codes
P = Rating scale of 0 to 100 (e.g. % control or injury)