Purdue University Weed Science

Glyphosate-Resistant Palmer Amaranth Programs in Liberty-Link Beans

Trial ID: 13S-CCP-CTS-06 Location: Cass County Trial Year: 2013
Protocol ID: 13S-CCP-CTS-06 Investigator: Dr. Bill Johnson
Project ID: HP13USANH2 Study Director: Joe Ikley
Sponsor Contact: Bayer - Dave Lamore

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 **Trial Reliability:** HIGH
Initiation Date: 5/9/2013
Completion Date: 7/22/2013

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
Variety: Stine 32LD23
Description: LL
Planting Date: 5/9/2013
Planting Rate, Unit: 140000 S/A **Planting Method:** DIRDRI direct drilled
Depth, Unit: 2 IN
Row Spacing, Unit: 30 IN **Emergence Date:** 5/17/2013
Spacing Within Row, Unit: 2 IN

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:** 10 **Tillage Type:** CONTIL conventional-till
Replications: 4 **Study Design:** RACOBL Randomized Complete Block (RCB)

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	C	D	E
Application Date:	5/13/2013	6/3/2013	6/3/2013	7/2/2013	6/25/2013
Appl. Start Time:	11:30	14:00	14:00	10:00	12:30
Appl. Stop Time:	13:00	15:30	15:30	11:00	12:45
Application Method:	SPRAY	SPRAY	SPRAY	SPRAY	SPRAY
Application Timing:	PREPRE	ACCRST	ACCRST	POSPOS	POSPOS
Application Placement:	SOIL	BROADC	BROADC	BROADC	BROADC
Applied By:	Devkota	Heneghan	Heneghan	Heneghan	Heneghan
Air Temperature, Unit:	61 F	72.5 F	72.5 F	61 F	82 F
% Relative Humidity:	30	60	60	82	70
Wind Velocity, Unit:	5 MPH	2 MPH	2 MPH	3 MPH	5 MPH
Wind Direction:	NW	NNE	NNE	NNE	WSW
Dew Presence (Y/N):	N no	N no	N no	Y yes	N no
Soil Temperature, Unit:	58 F	76 F	76 F	62 F	80 F
Soil Moisture:	SLIWET	SLIWET	SLIWET	WET	SLIWET
% Cloud Cover:	30	0	0	100	70

Crop Stage At Each Application

	A	B	C	D	E
Crop 1 Code, BBCH Scale:	GLXMA BSOY	GLXMA BSOY	GLXMA BSOY	GLXMA BSOY	GLXMA BSOY
Stage Scale Used:		BBCH	BBCH	BBCH	BBCH
Stage Majority, Percent:		12	12	19	16
Stage Minimum, Percent:		12	12	17	14
Stage Maximum, Percent:		13	13	19	18
Height, Unit:		5 IN	5 IN	14 IN	8 IN
Height Minimum, Maximum:				10 18	6 10

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:	00	33	31	33G	51
Stage Minimum, Percent:		32	31	0	
Stage Maximum, Percent:		35	33	36G	
Height, Unit:		3 IN	1 IN	4 IN	9 IN
Height Minimum, Maximum:		2 4.5	0.5 2	0.5 8	6 12
Density, Unit:		200 YD2	30 YD2	10 YD2	10 YD2

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Application Equipment

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

Trt No	Treatment Application Comment
5	App C changed to App E due to application timing
8	App C changed to App E due to application timing

Trial Comments

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Glyphosate-Resistant Palmer Amaranth Programs in Liberty-Link Beans

Trial ID: 13S-CCP-CTS-06 Location: Cass County Trial Year: 2013
Protocol ID: 13S-CCP-CTS-06 Investigator: Dr. Bill Johnson
Project ID: HP13USANH2 Study Director: Joe Ikley
Sponsor Contact: Bayer - Dave Lamore

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	Amt Product to Measure	Rep 1	2	3	4
1	Untreated Check								A		101	205	401	508
2	Authority First	70	%	WG	320	g ai/ha	6.5	oz/a	A	5.865 g/mx	102	203	305	506
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	C	27.17 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	C	45.0 ml/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	D	27.17 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	D	45.0 ml/mx				
3	Valor	51	%	WG	73	g ai/ha	2.05	oz/a	A	1.836 g/mx	103	302	405	503
	Classic	25	%AW/W	DF	25.4	g ai/ha	1.45	oz/a	A	1.303 g/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	C	27.17 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	C	45.0 ml/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	D	27.17 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	D	45.0 ml/mx				
4	Valor	51	%	WG	71.5	g ai/ha	2	oz/a	A	1.799 g/mx	104	208	403	408
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	B	27.17 ml/mx				
	Zidua	85	%	WG	119	g ai/ha	2	oz/a	B	1.796 g/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	B	45.0 ml/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	D	27.17 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	D	45.0 ml/mx				
5	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	B	27.17 ml/mx	105	204	306	501
	Prefix	5.28	LBA/GAL	L	1480	g ai/ha	2	pt/a	B	29.97 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	B	45.0 ml/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	E	27.17 ml/mx				
	Zidua	85	%	WG	119	g ai/ha	2	oz/a	E	1.796 g/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	E	45.0 ml/mx				
6	Optill	68	%	WG	95	g ai/ha	2	oz/a	A	1.792 g/mx	106	206	308	407
	Outlook	719	G/L	EC	525	g ai/ha	10	fl oz/a	A	9.367 ml/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	C	27.17 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	C	45.0 ml/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	D	27.17 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	D	45.0 ml/mx				
7	Classic	25	%AW/W	DF	25.2	g ai/ha	1.44	oz/a	A	1.293 g/mx	107	304	307	507
	Harmony SG	50	%	SG	8	g ai/ha	0.228	oz/a	A	0.2053 g/mx				
	Valor	51	%	WG	80	g ai/ha	2.24	oz/a	A	2.012 g/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	B	27.17 ml/mx				
	Outlook	719	G/L	EC	736	g ai/ha	14	fl oz/a	B	13.13 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	B	45.0 ml/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	D	27.17 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	D	45.0 ml/mx				
8	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	B	27.17 ml/mx	108	303	402	504
	Warrant	3	LBA/GAL	EC	1260	g ai/ha	3	pt/a	B	44.9 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	B	45.0 ml/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	E	27.17 ml/mx				
	Outlook	719	G/L	EC	736	g ai/ha	14	fl oz/a	E	13.13 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	E	45.0 ml/mx				
9	Zidua	85	%	WG	59.5	g ai/ha	1	oz/a	A	0.898 g/mx	201	207	406	505
	Valor	51	%	WG	62.5	g ai/ha	1.75	oz/a	A	1.572 g/mx				
	Classic	25	%AW/W	DF	22	g ai/ha	1.25	oz/a	A	1.129 g/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	C	27.17 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	C	45.0 ml/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	D	27.17 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	D	45.0 ml/mx				
10	Valor	51	%	WG	73	g ai/ha	2.05	oz/a	A	1.836 g/mx	202	301	404	502
	Classic	25	%AW/W	DF	25.4	g ai/ha	1.45	oz/a	A	1.303 g/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	C	27.17 ml/mx				
	Warrant	3	LBA/GAL	EC	1260	g ai/ha	3	pt/a	C	44.9 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	C	45.0 ml/mx				
	LIBERTY 280	280	G/L	SL	593	g ai/ha	29	fl oz/a	D	27.17 ml/mx				
	N-Pak AMS	3.4	LBA/GAL	SL	2.5	% v/v	8.5	lb ai/100 gal	D	45.0 ml/mx				

Sort Order: Replicate 1

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

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

Amount*	Unit	Treatment Name	Form Conc	Form Type	Lot Code
5.865	g	Authority First	70	WG	
489.048	ml	LIBERTY 280	280	SL	
810.000	ml	N-Pak AMS	3.4	SL	
9.056	g	Valor	51	WG	
5.029	g	Classic	25	DF	
4.490	g	Zidua	85	WG	
29.966	ml	Prefix	5.28	L	
1.792	g	Optill	68	WG	
35.631	ml	Outlook	719	EC	
0.205	g	Harmony SG	50	SG	
89.801	ml	Warrant	3	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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Protocol ID: 13S-CCP-CTS-06 Investigator: Dr. Bill Johnson
Project ID: HP13USANH2 Study Director: Joe Ikley
Sponsor Contact: Bayer - Dave Lamore

Pest Type		W Weed		W Weed	W Weed	W Weed	W Weed
Pest Code		AMAPA		AMAPA	AMAPA	AMAPA	AMAPA
Pest Scientific Name		Amaranthus pal>		Amaranthus pal>	Amaranthus pal>	Amaranthus pal>	Amaranthus pal>
Pest Name		Palmer amaranth		Palmer amaranth	Palmer amaranth	Palmer amaranth	Palmer amaranth
Crop Code			GLXMA				
BBCH Scale			BSOY				
Crop Scientific Name			Glycine max				
Crop Name			Soybean				
Part Rated		PLOT P	PLOT C	PLOT P	PLOT P	PLOT P	PLOT P
Rating Date		6/3/2013	6/3/2013	6/18/2013	6/25/2013	7/1/2013	7/8/2013
Rating Type		CONTRO	PHYGEN	CONTRO	CONTRO	CONTRO	CONTRO
Rating Unit		%	%	%	%	%	%
Sample Size, Unit		1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT
Days After First/Last Applic.		21 21	21 21	36 15	43 22	49 6	56 6
Trt-Eval Interval		0 DA-B	0 DA-B	15 DA-B	0 DA-E	-1 DA-D	13 DA-E
ARM Action Codes		P	P	P	P	P	P
Number of Decimals		0	0	0	0	0	0
Trt No. Treatment Name	Rate Rate Unit	Appl Code	1	2	3	4	5	6
1 Untreated Check		A	0 d	0 c	0 d	0 b	0 e	0 c
2 Authority First	320 g ai/ha	A	71 b	3 bc	91 ab		76 c	95 a
LIBERTY 280	593 g ai/ha	C						
N-Pak AMS	2.5 % v/v	C						
LIBERTY 280	593 g ai/ha	D						
N-Pak AMS	2.5 % v/v	D						
3 Valor	73 g ai/ha	A	95 a	9 ab	95 a		80 c	97 a
Classic	25.4 g ai/ha	A						
LIBERTY 280	593 g ai/ha	C						
N-Pak AMS	2.5 % v/v	C						
LIBERTY 280	593 g ai/ha	D						
N-Pak AMS	2.5 % v/v	D						
4 Valor	71.5 g ai/ha	A	90 a	9 ab	99 a		96 a	100 a
LIBERTY 280	593 g ai/ha	B						
Zidua	119 g ai/ha	B						
N-Pak AMS	2.5 % v/v	B						
LIBERTY 280	593 g ai/ha	D						
N-Pak AMS	2.5 % v/v	D						
5 LIBERTY 280	593 g ai/ha	B	0 d	0 c	83 bc	81 a	100 a	100 a
Prefix	1480 g ai/ha	B						
N-Pak AMS	2.5 % v/v	B						
LIBERTY 280	593 g ai/ha	E						
Zidua	119 g ai/ha	E						
N-Pak AMS	2.5 % v/v	E						
6 Optill	95 g ai/ha	A	58 c	4 abc	76 c		54 d	88 b
Outlook	525 g ai/ha	A						
LIBERTY 280	593 g ai/ha	C						
N-Pak AMS	2.5 % v/v	C						
LIBERTY 280	593 g ai/ha	D						
N-Pak AMS	2.5 % v/v	D						
7 Classic	25.2 g ai/ha	A	93 a	10 a	100 a		95 a	100 a
Harmony SG	8 g ai/ha	A						
Valor	80 g ai/ha	A						
LIBERTY 280	593 g ai/ha	B						
Outlook	736 g ai/ha	B						
N-Pak AMS	2.5 % v/v	B						
LIBERTY 280	593 g ai/ha	D						
N-Pak AMS	2.5 % v/v	D						

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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Pest Type			W Weed		W Weed	W Weed	W Weed	W Weed
Pest Code			AMAPA		AMAPA	AMAPA	AMAPA	AMAPA
Pest Scientific Name			Amaranthus pal>		Amaranthus pal>	Amaranthus pal>	Amaranthus pal>	Amaranthus pal>
Pest Name			Palmer amaranth		Palmer amaranth	Palmer amaranth	Palmer amaranth	Palmer amaranth
Crop Code				GLXMA				
BBCH Scale				BSOY				
Crop Scientific Name				Glycine max				
Crop Name				Soybean				
Part Rated			PLOT P	PLOT C	PLOT P	PLOT P	PLOT P	PLOT P
Rating Date			6/3/2013	6/3/2013	6/18/2013	6/25/2013	7/1/2013	7/8/2013
Rating Type			CONTRO	PHYGEN	CONTRO	CONTRO	CONTRO	CONTRO
Rating Unit			%	%	%	%	%	%
Sample Size, Unit			1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT
Days After First/Last Applic.			21 21	21 21	36 15	43 22	49 6	56 6
Trt-Eval Interval			0 DA-B	0 DA-B	15 DA-B	0 DA-E	-1 DA-D	13 DA-E
ARM Action Codes			P	P	P	P	P	P
Number of Decimals			0	0	0	0	0	0
Trt No.	Treatment Name	Rate / Rate Unit	Appl Code	1	2	3	4	5	6
8	LIBERTY 280	593 g ai/ha	B	0 d	0 c	76 c	70 a	96 a	94 a
	Warrant	1260 g ai/ha	B						
	N-Pak AMS	2.5 % v/v	B						
	LIBERTY 280	593 g ai/ha	E						
	Outlook	736 g ai/ha	E						
	N-Pak AMS	2.5 % v/v	E						
9	Zidua	59.5 g ai/ha	A	94 a	6 abc	98 a		85 bc	100 a
	Valor	62.5 g ai/ha	A						
	Classic	22 g ai/ha	A						
	LIBERTY 280	593 g ai/ha	C						
	N-Pak AMS	2.5 % v/v	C						
	LIBERTY 280	593 g ai/ha	D						
	N-Pak AMS	2.5 % v/v	D						
10	Valor	73 g ai/ha	A	86 a	8 ab	98 a		91 ab	100 a
	Classic	25.4 g ai/ha	A						
	LIBERTY 280	593 g ai/ha	C						
	Warrant	1260 g ai/ha	C						
	N-Pak AMS	2.5 % v/v	C						
	LIBERTY 280	593 g ai/ha	D						
	N-Pak AMS	2.5 % v/v	D						
LSD (P=.05)				8.3	4.6	9.7	17.7	7.3	5.0
Standard Deviation				5.7	3.2	6.7	10.2	5.0	3.4
CV				9.71	66.88	8.16	20.31	6.52	3.95
Bartlett's X2				2.576	6.671	16.1	0.021	5.051	34.691
P(Bartlett's X2)				0.86	0.352	0.024*	0.885	0.654	0.001*
Skewness				-0.6406	1.0204*	-2.193*	-0.4719	-1.8401*	-2.6414*
Kurtosis				-1.393	1.2069	3.8416*	-1.6445	2.5155*	5.4969*

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Pest Type	W Weed
Pest Code	AMAPA
Pest Scientific Name	Amaranthus pal>
Pest Name	Palmer amaranth
Crop Code	
BBCH Scale	
Crop Scientific Name	
Crop Name	
Part Rated	PLOT P
Rating Date	7/22/2013
Rating Type	CONTRO
Rating Unit	%
Sample Size, Unit	1 PLOT
Days After First/Last Applic.	70 20
Trt-Eval Interval	27 DA-E
ARM Action Codes	P
Number of Decimals	0

Trt No.	Treatment Name	Rate	Rate Unit	Appl Code	7
1	Untreated Check			A	0 c
2	Authority First	320	g ai/ha	A	
	LIBERTY 280	593	g ai/ha	C	
	N-Pak AMS	2.5	% v/v	C	
	LIBERTY 280	593	g ai/ha	D	
	N-Pak AMS	2.5	% v/v	D	
3	Valor	73	g ai/ha	A	
	Classic	25.4	g ai/ha	A	
	LIBERTY 280	593	g ai/ha	C	
	N-Pak AMS	2.5	% v/v	C	
	LIBERTY 280	593	g ai/ha	D	
	N-Pak AMS	2.5	% v/v	D	
4	Valor	71.5	g ai/ha	A	
	LIBERTY 280	593	g ai/ha	B	
	Zidua	119	g ai/ha	B	
	N-Pak AMS	2.5	% v/v	B	
	LIBERTY 280	593	g ai/ha	D	
	N-Pak AMS	2.5	% v/v	D	
5	LIBERTY 280	593	g ai/ha	B	98 a
	Prefix	1480	g ai/ha	B	
	N-Pak AMS	2.5	% v/v	B	
	LIBERTY 280	593	g ai/ha	E	
	Zidua	119	g ai/ha	E	
	N-Pak AMS	2.5	% v/v	E	
6	Optill	95	g ai/ha	A	
	Outlook	525	g ai/ha	A	
	LIBERTY 280	593	g ai/ha	C	
	N-Pak AMS	2.5	% v/v	C	
	LIBERTY 280	593	g ai/ha	D	
	N-Pak AMS	2.5	% v/v	D	
7	Classic	25.2	g ai/ha	A	
	Harmony SG	8	g ai/ha	A	
	Valor	80	g ai/ha	A	
	LIBERTY 280	593	g ai/ha	B	
	Outlook	736	g ai/ha	B	
	N-Pak AMS	2.5	% v/v	B	
	LIBERTY 280	593	g ai/ha	D	
	N-Pak AMS	2.5	% v/v	D	

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Pest Type	W Weed
Pest Code	AMAPA
Pest Scientific Name	Amaranthus pal>
Pest Name	Palmer amaranth
Crop Code	
BBCH Scale	
Crop Scientific Name	
Crop Name	
Part Rated	PLOT P
Rating Date	7/22/2013
Rating Type	CONTRO
Rating Unit	%
Sample Size, Unit	1 PLOT
Days After First/Last Applic.	70 20
Trt-Eval Interval	27 DA-E
ARM Action Codes	P
Number of Decimals	0

Trt No.	Treatment Name	Rate	Rate Unit	Appl Code	7
8	LIBERTY 280	593	g ai/ha	B	87 b
	Warrant	1260	g ai/ha	B	
	N-Pak AMS	2.5	% v/v	B	
	LIBERTY 280	593	g ai/ha	E	
	Outlook	736	g ai/ha	E	
	N-Pak AMS	2.5	% v/v	E	
9	Zidua	59.5	g ai/ha	A	
	Valor	62.5	g ai/ha	A	
	Classic	22	g ai/ha	A	
	LIBERTY 280	593	g ai/ha	C	
	N-Pak AMS	2.5	% v/v	C	
	LIBERTY 280	593	g ai/ha	D	
	N-Pak AMS	2.5	% v/v	D	
10	Valor	73	g ai/ha	A	
	Classic	25.4	g ai/ha	A	
	LIBERTY 280	593	g ai/ha	C	
	Warrant	1260	g ai/ha	C	
	N-Pak AMS	2.5	% v/v	C	
	LIBERTY 280	593	g ai/ha	D	
	N-Pak AMS	2.5	% v/v	D	

LSD (P=.05)	10.0
Standard Deviation	5.8
CV	9.35
Bartlett's X2	3.274
P(Bartlett's X2)	0.07
Skewness	-0.7396
Kurtosis	-1.6603

Purdue University Weed Science

Glyphosate-Resistant Palmer Amaranth Programs in Liberty-Link Beans

Trial ID: 13S-CCP-CTS-06 Location: Cass County Trial Year: 2013
Protocol ID: 13S-CCP-CTS-06 Investigator: Dr. Bill Johnson
Project ID: HP13USANH2 Study Director: Joe Ikley
Sponsor Contact: Bayer - Dave Lamore

Randomized Complete Block (RCB) AOV For W Weed AMAPA Amaranthus palmeri Palmer amaranth PLOT P 6/3/2013 CONTRO % 1 PLOT 21 21 0 DA-B P 0 (Data Column 1)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	39	64799.375000			
Replicate	3	231.875000	77.291667	2.387	0.0911
Treatment	9	63693.125000	7077.013889	218.533	0.0001
Error	27	874.375000	32.384259		

Randomized Complete Block (RCB) AOV For GLXMA BSOY Glycine max Soybean PLOT C 6/3/2013 PHYGEN % 1 PLOT 21 21 0 DA-B P 0 (Data Column 2)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	39	897.500000			
Replicate	3	52.500000	17.500000	1.734	0.1837
Treatment	9	572.500000	63.611111	6.303	0.0001
Error	27	272.500000	10.092593		

Randomized Complete Block (RCB) AOV For W Weed AMAPA Amaranthus palmeri Palmer amaranth PLOT P 6/18/2013 CONTRO % 1 PLOT 36 15 15 DA-B P 0 (Data Column 3)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	39	33860.000000			
Replicate	3	155.000000	51.666667	1.167	0.3404
Treatment	9	32510.000000	3612.222222	81.615	0.0001
Error	27	1195.000000	44.259259		

Randomized Complete Block (RCB) AOV For W Weed AMAPA Amaranthus palmeri Palmer amaranth PLOT P 6/25/2013 CONTRO % 1 PLOT 43 22 0 DA-E P 0 (Data Column 4)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	11	16922.916667			
Replicate	3	789.583333	263.194444	2.510	0.1555
Treatment	2	15504.166667	7752.083333	73.927	0.0001
Error	6	629.166667	104.861111		

Randomized Complete Block (RCB) AOV For W Weed AMAPA Amaranthus palmeri Palmer amaranth PLOT P 7/1/2013 CONTRO % 1 PLOT 49 6 -1 DA-D P 0 (Data Column 5)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	39	34199.375000			
Replicate	3	156.875000	52.291667	2.056	0.1297
Treatment	9	33355.625000	3706.180556	145.684	0.0001
Error	27	686.875000	25.439815		

Randomized Complete Block (RCB) AOV For W Weed AMAPA Amaranthus palmeri Palmer amaranth PLOT P 7/8/2013 CONTRO % 1 PLOT 56 6 13 DA-E P 0 (Data Column 6)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	39	34777.500000			
Replicate	3	45.700000	15.233333	1.280	0.3012
Treatment	9	34410.500000	3823.388889	321.293	0.0001
Error	27	321.300000	11.900000		

Randomized Complete Block (RCB) AOV For W Weed AMAPA Amaranthus palmeri Palmer amaranth PLOT P 7/22/2013 CONTRO % 1 PLOT 70 20 27 DA-E P 0 (Data Column 7)

Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	11	23240.916667			
Replicate	3	76.916667	25.638889	0.774	0.5497
Treatment	2	22965.166667	11482.583333	346.499	0.0001
Error	6	198.833333	33.138889		

Pest Type
W, Weed, G-BYRW7, G-WedStg = Weed or volunteer crop
Crop Code
GLXMA, BSOY, Glycine max, = US
Part Rated
PLOT = plot
P = Pest is Part Rated
C = Crop is Part Rated
Rating Type
CONTRO = control / burndown or knockdown
PHYGEN = phytotoxicity - general / injury
Rating Unit
% = percent

Purdue University Weed Science

PLOT = total plot
ARM Action Codes
P = Rating scale of 0 to 100 (e.g. % control or injury)