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## Glyphosate + PPO Herbicide and Adjuvant Burndown Study

Trial ID: 12S-SEP-NTS-19      Protocol ID: 12S-SEP-NTS-19  
 Location: SEPAC      Study Director: Paul Marquardt  
 Project ID: 12S-SEP-NTS-19      Investigator: Dr. Bill Johnson  
 Sponsor Contact: George Watters

### General Trial Information

**Study Director:** Paul Marquardt      **Title:** Research Associate  
**Investigator:** Bill Johnson      **Title:** Professor

**Discipline:** H herbicide  
**Trial Status:** E established  
**Initiation Date:** 4-2-2012

### Trial Location

**City:** Butleville  
**State/Prov.:** Indiana  
**Postal Code:** 47223  
**Country:** USA

### Personnel

**Study Director:** Paul Marquardt      **Title:** Research Associate

**Affiliation:** Purdue University  
**Address:** 915 W. State Street, Lilly Hall  
**Location:** West Lafayette, IN  
**Postal Code:** 47907      **E-mail:** pmarquar@purdue.edu  
**Phone No.:** 765-494-0891      **Mobile No.:** 765-409-6369

**Investigator:** Bill Johnson      **Title:** Professor

**Affiliation:** Purdue University  
**Address:** 915 W. State Street, Lilly Hall  
**Location:** West Lafayette, IN  
**Postal Code:** 47907      **E-mail:** wji@purdue.edu  
**Phone No.:** 765-494-4656      **Mobile No.:** 765-404-9801

### Cooperator/Landowner

**Cooperator:** Don Biehle      **Role:** Superintendent  
**Organization:** Southeast-Purdue Agricultural Center  
**Address 1:** 4425 E CR 350 N

**City:** Butleville      **Phone No.:** 812-458-6977  
**State/Prov.:** IN      **Fax No.:** 812-458-6979  
**Postal Code:** 47223      **Mobile No.:** 812-592-8426  
**Country:** USA      **E-mail:** biehled@purdue.edu  
 United States

### Crop Description

**Crop 1:** GLXMA Glycine max      Soybean  
**Variety:** AG2931      **Description:** Roundup Ready  
**BBCH Scale:** BSOY      **Planting Date:** 6-14-2012  
**Planting Method:** DIRDRI direct drilled      **Rate, Unit:** 150000 S/A  
**Depth, Unit:** 1 IN  
**Row Spacing, Unit:** 30 IN      **Spacing Within Row, Unit:** 2 IN  
**Seed Bed:** CRUSTE crusted      **Soil Temperature, Unit:** 75 F  
**Soil Moisture:** DRY dry      **Emergence Date:** 6-21-2012

### Pest Description

**Pest 1 Type:** W      **Code:** AMBEL Ambrosia artemisiifolia  
**Common Name:** Common ragweed

**Pest 2 Type:** W      **Code:** XANST Xanthium strumarium  
**Common Name:** Heart-leaf cocklebur

**Pest 3 Type:** W      **Code:** ERICA Conyza canadensis  
**Common Name:** Canada horseweed

**Pest 4 Type:** W      **Code:** GGGAN Annual grasses  
**Common Name:** Annual grasses

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## Site and Design

**Plot Width, Unit:** 10 FT  
**Plot Length, Unit:** 30 FT  
**Plot Area, Unit:** 300 FT<sup>2</sup>  
**Replications:** 4

**Site Type:** FIELD field  
**Experimental Unit:** 1 PLOT plot  
**Tillage Type:** NOTILL no-till  
**Study Design:** RACOB� Randomized Complete Block (RCB)  
**Untreated Arrangement:** INCLUDED single control randomized in each block

## Soil Description

**Description Name:** SEPAC- U4  
**% Sand:** 20      **% OM:** 1.8  
**% Silt:** 65      **pH:** 5.6  
**% Clay:** 15      **CEC:** 6.7

**Texture:** SIL silt loam  
**Soil Name:** Avonburg  
**Soil Drainage:** P poor

## Application Description

	A
<b>Application Date:</b>	6-14-2012
<b>Time of Day:</b>	10 AM
<b>Application Method:</b>	SPRAY
<b>Application Timing:</b>	PREPOS
<b>Application Placement:</b>	FOLIAR
<b>Applied By:</b>	PM
<b>Air Temperature, Unit:</b>	79 F
<b>% Relative Humidity:</b>	36
<b>Wind Velocity, Unit:</b>	1.2 MPH
<b>Wind Direction:</b>	SE
<b>Dew Presence (Y/N):</b>	N no
<b>Soil Moisture:</b>	DRY
<b>% Cloud Cover:</b>	5

## Crop Stage At Each Application

	A
<b>Crop 1 Code, BBCH Scale:</b>	GLXMA BSOY
<b>Stage Scale Used:</b>	BBCH
<b>Stage Majority, Percent:</b>	00

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## Pest Stage At Each Application

	A
<b>Pest 1 Code, Type, Scale:</b>	AMBEL W
<b>Stage Majority, Percent:</b>	34 100
<b>Height, Unit:</b>	7.5 IN
<b>Height Minimum, Maximum:</b>	3 12
<b>Density, Unit:</b>	13 M2
<b>Pest 2 Code, Type, Scale:</b>	XANST W
<b>Stage Majority, Percent:</b>	34 100
<b>Height, Unit:</b>	7.5 IN
<b>Height Minimum, Maximum:</b>	3 12
<b>Density, Unit:</b>	15 M2
<b>Pest 3 Code, Type, Scale:</b>	ERICA W
<b>Stage Majority, Percent:</b>	30 100
<b>Height, Unit:</b>	10 IN
<b>Height Minimum, Maximum:</b>	2 18
<b>Density, Unit:</b>	7.5 M2
<b>Pest 4 Code, Type, Scale:</b>	GGGAN W
<b>Stage Majority, Percent:</b>	22 100
<b>Height, Unit:</b>	13.5 IN
<b>Height Minimum, Maximum:</b>	3 24
<b>Density, Unit:</b>	25 M2

## Application Equipment

	A
<b>Appl. Equipment:</b>	CO2 Backpack
<b>Equipment Type:</b>	SPRBAC
<b>Operation Pressure, Unit:</b>	17 PSI
<b>Nozzle Type:</b>	Flat Fan
<b>Nozzle Size:</b>	XR11002
<b>Nozzle Spacing, Unit:</b>	15 IN
<b>Boom Length, Unit:</b>	7.5 FT
<b>Boom Height, Unit:</b>	18 IN
<b>Ground Speed, Unit:</b>	3 MPH
<b>Carrier:</b>	H2O
<b>Water Hardness (ppm CaCO3):</b>	150
<b>Spray Volume, Unit:</b>	15 gal/ac
<b>Mix Size, Unit:</b>	1.8 liters
<b>Propellant:</b>	CO2
<b>Tank Mix (Y/N):</b>	N no

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Pest Type	W Weed AMBEL	W Weed ERICA	W Weed XANST	W Weed SETFA	W Weed AMBEL	W Weed ERICA	W Weed XANST
Pest Code	Ambrosia artem>	Conyza canad>	Xanthium strum>	Setaria faberi	Ambrosia artem>	Conyza canad>	Xanthium strum>
Pest Scientific Name	Common ragweed	Canada horsewe>	Heart-leaf coc>	Giant foxtail	Common ragweed	Canada horsewe>	Heart-leaf coc>
Pest Name	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA
Crop Code	BSOY	BSOY	BSOY	BSOY	BSOY	BSOY	BSOY
BBCH Scale	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max
Crop Scientific Name	Soybean	Soybean	Soybean	Soybean	Soybean	Soybean	Soybean
Crop Name	AG2931	AG2931	AG2931	AG2931	AG2931	AG2931	AG2931
Crop Variety	2 IN	2 IN	2 IN	2 IN	2 IN	2 IN	2 IN
Description	PLOT P	PLOT P	PLOT P	PLOT P	PLOT P	PLOT P	PLOT P
Part Rated	6-29-2012	6-29-2012	6-29-2012	6-29-2012	7-12-2012	7-12-2012	7-12-2012
Rating Date	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO
Rating Type	%	%	%	%	%	%	%
Rating Unit	1	1	1	1	1	1	1
Number of Subsamples	11	11	11	11	13	13	13
Crop Stage Majority	10-24 IN	2-24 IN	6-18 IN	6-18 IN	10-24 IN	2-24 IN	6-18 IN
Pest Stage Majority	13 M2	10 M2	5 M2	42.5M2	13 M2	10 M2	5 M2
Pest Density, Unit	PM	PM	PM	PM	PM	PM	PM
Assessed By	15 15	15 15	15 15	15 15	28 28	28 28	28 28
Days After First/Last Applic.	15 DA-A	15 DA-A	15 DA-A	15 DA-A	15 DA-A	15 DA-A	15 DA-A
Trt-Eval Interval	15 DP-1	15 DP-1	15 DP-1	15 DP-1	28 DP-1	28 DP-1	28 DP-1
Plant-Eval Interval	8 DE-1	8 DE-1	8 DE-1	8 DE-1	21 DE-1	21 DE-1	21 DE-1
Days After Emergence							
Trt Treatment	Rate	Rate	Rate	Rate	Rate	Rate	Rate
No. Name	Unit	Unit	Unit	Unit	Unit	Unit	Unit
	Code	Code	Code	Code	Code	Code	Code
1 UNTREATED	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b	0.0 b
2 Touchdown HiTech Sharpen	307 g ae/ha A 25 g ai/ha A	90.8 a	88.3 a	100.0 a	95.0 a	90.8 a	88.3 a
3 Touchdown HiTech Sharpen N-Pak AMS	307 g ae/ha A 25 g ai/ha A 2.5 % v/v A	94.5 a	87.5 a	100.0 a	99.0 a	94.5 a	87.5 a
4 Touchdown HiTech Sharpen AG 8034	307 g ae/ha A 25 g ai/ha A 1 % v/v A	93.3 a	96.5 a	100.0 a	98.5 a	93.3 a	96.5 a
5 Touchdown HiTech Sharpen Noble MSO	307 g ae/ha A 25 g ai/ha A 1170 g ai/ha A	95.8 a	87.5 a	100.0 a	97.8 a	95.8 a	87.5 a
6 Touchdown HiTech Sharpen Noble MSO N-Pak AMS	307 g ae/ha A 25 g ai/ha A 1170 g ai/ha A 2.5 % v/v A	99.5 a	99.0 a	100.0 a	96.0 a	99.5 a	99.0 a
7 Touchdown HiTech Sharpen Prime Oil N-Pak AMS	307 g ae/ha A 25 g ai/ha A 1170 g ai/ha A 2.5 % v/v A	99.5 a	97.0 a	100.0 a	98.5 a	99.5 a	97.0 a
8 Touchdown HiTech Sharpen Superb HC AG 8034	307 g ae/ha A 25 g ai/ha A 1170 g ai/ha A 1 % v/v A	98.3 a	99.0 a	100.0 a	97.8 a	98.3 a	99.0 a

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	W Weed	W Weed				
Pest Code	AMBEL	ERICA	XANST	SETFA	AMBEL	ERICA	XANST				
Pest Scientific Name	Ambrosia artem>	Conyza canad>	Xanthium strum>	Setaria faberi	Ambrosia artem>	Conyza canad>	Xanthium strum>				
Pest Name	Common ragweed	Canada horsewe>	Heart-leaf coc>	Giant foxtail	Common ragweed	Canada horsewe>	Heart-leaf coc>				
Crop Code	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA	GLXMA				
BBCH Scale	BSOY	BSOY	BSOY	BSOY	BSOY	BSOY	BSOY				
Crop Scientific Name	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max	Glycine max				
Crop Name	Soybean	Soybean	Soybean	Soybean	Soybean	Soybean	Soybean				
Crop Variety	AG2931	AG2931	AG2931	AG2931	AG2931	AG2931	AG2931				
Description	2 IN	2 IN	2 IN	2 IN	2 IN	2 IN	2 IN				
Part Rated	PLOT P	PLOT P	PLOT P	PLOT P	PLOT P	PLOT P	PLOT P				
Rating Date	6-29-2012	6-29-2012	6-29-2012	6-29-2012	7-12-2012	7-12-2012	7-12-2012				
Rating Type	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO	CONTRO				
Rating Unit	%	%	%	%	%	%	%				
Number of Subsamples	1	1	1	1	1	1	1				
Crop Stage Majority	11	11	11	11	13	13	13				
Pest Stage Majority	10-24 IN	2-24 IN	6-18 IN	6-18 IN	10-24 IN	2-24 IN	6-18 IN				
Pest Density, Unit	13 M2	10 M2	5 M2	42.5M2	13 M2	10 M2	5 M2				
Assessed By	PM	PM	PM	PM	PM	PM	PM				
Days After First/Last Applic.	15 15	15 15	15 15	15 15	28 28	28 28	28 28				
Trt-Eval Interval	15 DA-A	15 DA-A	15 DA-A	15 DA-A	15 DA-A	15 DA-A	15 DA-A				
Plant-Eval Interval	15 DP-1	15 DP-1	15 DP-1	15 DP-1	28 DP-1	28 DP-1	28 DP-1				
Days After Emergence	8 DE-1	8 DE-1	8 DE-1	8 DE-1	21 DE-1	21 DE-1	21 DE-1				
Trt No.	Treatment Name	Rate	Appl Unit	Code	1	2	3	4	5	6	7
9	Touchdown HiTech	307 g ae/ha	A		100.0 a	93.3 a	100.0 a	98.5 a	100.0 a	93.3 a	100.0 a
	Sharpen	25 g ai/ha	A								
	Superb HC	1170 g ai/ha	A								
	AG 8034	1 % v/v	A								
	Interlock	292 g ai/ha	A								
10	Touchdown HiTech	307 g ae/ha	A		92.8 a	93.8 a	100.0 a	98.5 a	92.8 a	93.8 a	100.0 a
	Sharpen	25 g ai/ha	A								
	Destiny HC	880 g ai/ha	A								
	AG 8034	1 % v/v	A								
11	Touchdown HiTech	307 g ae/ha	A		98.5 a	98.0 a	100.0 a	98.5 a	98.5 a	98.0 a	100.0 a
	Sharpen	25 g ai/ha	A								
	Destiny HC	880 g ai/ha	A								
	AG 8034	1 % v/v	A								
12	Touchdown HiTech	307 g ae/ha	A		99.5 a	95.0 a	100.0 a	98.0 a	99.5 a	95.0 a	100.0 a
	Sharpen	25 g ai/ha	A								
	Destiny HC	880 g ai/ha	A								
	AG 8034	1 % v/v	A								
	Interlock	292 g ai/ha	A								
LSD (P=.05)		6.36			7.41	0.00	2.59	6.36	7.41	0.00	
Standard Deviation		4.40			5.13	0.00	1.80	4.40	5.13	0.00	
CV		4.97			5.95	0.0	2.0	4.97	5.95	0.0	
Bartlett's X2		32.276			20.993	0.0	16.786	32.276	20.993	0.0	
P(Bartlett's X2)		0.001*			0.013*	.	0.052	0.001*	0.013*	.	
Replicate F		0.606			1.869	0.000	2.293	0.606	1.869	0.000	
Replicate Prob(F)		0.6158			0.1541	1.0000	0.0962	0.6158	0.1541	1.0000	
Treatment F		162.437			114.709	0.000	991.528	162.437	114.709	0.000	
Treatment Prob(F)		0.0001			0.0001	1.0000	0.0001	0.0001	0.0001	1.0000	

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Pest Type	W Weed		
Pest Code	SETFA		
Pest Scientific Name	Setaria faberi		
Pest Name	Giant foxtail		
Crop Code	GLXMA		
BBCH Scale	BSOY		
Crop Scientific Name	Glycine max		
Crop Name	Soybean		
Crop Variety	AG2931		
Description	2 IN		
Part Rated	PLOT P		
Rating Date	7-12-2012		
Rating Type	CONTRO		
Rating Unit	%		
Number of Subsamples	1		
Crop Stage Majority	13		
Pest Stage Majority	6-18 IN		
Pest Density, Unit	42.5M2		
Assessed By	PM		
Days After First/Last Applic.	28 28		
Trt-Eval Interval	15 DA-A		
Plant-Eval Interval	28 DP-1		
Days After Emergence	21 DE-1		
Trt No.	Treatment Name	Rate	Appl Code
		Rate Unit	
1	UNTREATED		0.0 b
2	Touchdown HiTech Sharpen	307 g ae/ha A 25 g ai/ha A	95.0 a
3	Touchdown HiTech Sharpen N-Pak AMS	307 g ae/ha A 25 g ai/ha A 2.5 % v/v A	99.0 a
4	Touchdown HiTech Sharpen AG 8034	307 g ae/ha A 25 g ai/ha A 1 % v/v A	98.5 a
5	Touchdown HiTech Sharpen Noble MSO	307 g ae/ha A 25 g ai/ha A 1170 g ai/ha A	97.8 a
6	Touchdown HiTech Sharpen Noble MSO N-Pak AMS	307 g ae/ha A 25 g ai/ha A 1170 g ai/ha A 2.5 % v/v A	96.0 a
7	Touchdown HiTech Sharpen Prime Oil N-Pak AMS	307 g ae/ha A 25 g ai/ha A 1170 g ai/ha A 2.5 % v/v A	98.5 a
8	Touchdown HiTech Sharpen Superb HC AG 8034	307 g ae/ha A 25 g ai/ha A 1170 g ai/ha A 1 % v/v A	97.8 a

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Pest Type	W Weed				
Pest Code	SETFA				
Pest Scientific Name	Setaria faberi				
Pest Name	Giant foxtail				
Crop Code	GLXMA				
BBCH Scale	BSOY				
Crop Scientific Name	Glycine max				
Crop Name	Soybean				
Crop Variety	AG2931				
Description	2 IN				
Part Rated	PLOT P				
Rating Date	7-12-2012				
Rating Type	CONTRO				
Rating Unit	%				
Number of Subsamples	1				
Crop Stage Majority	13				
Pest Stage Majority	6-18 IN				
Pest Density, Unit	42.5M2				
Assessed By	PM				
Days After First/Last Applic.	28 28				
Trt-Eval Interval	15 DA-A				
Plant-Eval Interval	28 DP-1				
Days After Emergence	21 DE-1				
Trt No.	Treatment Name	Rate	Appl Unit	Code	
					8
9	Touchdown HiTech	307 g ae/ha	A		98.5 a
	Sharpen	25 g ai/ha	A		
	Superb HC	1170 g ai/ha	A		
	AG 8034	1 % v/v	A		
	Interlock	292 g ai/ha	A		
10	Touchdown HiTech	307 g ae/ha	A		98.5 a
	Sharpen	25 g ai/ha	A		
	Destiny HC	880 g ai/ha	A		
	AG 8034	1 % v/v	A		
11	Touchdown HiTech	307 g ae/ha	A		98.5 a
	Sharpen	25 g ai/ha	A		
	Destiny HC	880 g ai/ha	A		
	AG 8034	1 % v/v	A		
12	Touchdown HiTech	307 g ae/ha	A		98.0 a
	Sharpen	25 g ai/ha	A		
	Destiny HC	880 g ai/ha	A		
	AG 8034	1 % v/v	A		
	Interlock	292 g ai/ha	A		
LSD (P=.05)					2.59
Standard Deviation					1.80
CV					2.0
Bartlett's X2					16.786
P(Bartlett's X2)					0.052
Replicate F					2.293
Replicate Prob(F)					0.0962
Treatment F					991.528
Treatment Prob(F)					0.0001

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## Glyphosate + PPO Herbicide and Adjuvant Burndown Study

Trial ID: 12S-SEP-NTS-19      Protocol ID: 12S-SEP-NTS-19  
 Location: SEPAC              Study Director: Paul Marquardt  
 Project ID: 12S-SEP-NTS-19    Investigator: Dr. Bill Johnson  
    Sponsor Contact: George Watters

### Pest Type

W, Weed, G-BYRW7, G-WedStg = Weed or volunteer crop

### Pest Code

AMBEL, Ambrosia artemisiifolia, = US

ERICA, Conyza canadensis, = US

XANST, Xanthium strumarium, = US

SETFA, Setaria faberi, = US

### Crop Code

GLXMA, BSOY, Glycine max, = US

### Part Rated

PLOT = plot

P = Pest is Part Rated

### Rating Type

CONTRO = control / burndown or knockdown

### Rating Unit

% = percent

### Crop Stage Majority

11 = First pair of true leaves unfolded (unifoliolate leaves on the first node)

13 = Trifoliolate leaf on the 3rd node unfolded

M2 = per square meter

### Plant-Eval Interval

15 DP-1 = 1 GLXMA 6-14-2012

28 DP-1 = 1 GLXMA 6-14-2012