

**Glyphosate-resistant waterhemp control in Enlist soybean**

Trial ID: SOY19-19 Study Dir.: Sprague, Stiles, Powell  
 Conducted: Isabella Co. Investigator: Christy Sprague

**Planting Date:** Jul-8-2019 **Row Spacing:**  
**Variety:** Stine 24EA12 **No. of Reps:** 4  
**Population:** 150000 seeds/A **% OM:** 2.4  
**Soil Type:** SL sandy loam **pH:** 6.1  
**Plot Size:** 10 X 25 FT **Study Design:** Randomized Complete Block (RCB)

**Tillage/Previous Crops:** Spring Disked Spring Cultimulched  
**Fertilizer:**

**Crop and Weed Description**

Weed	Code	Common Name	Scientific Name
1	AMATU	waterhemp, tall	Amaranthus tuberculatus
Crop	Code	Common Name	
1	GLXMA	Soybean	

**Application Description**

	A	B
<b>Application Timing:</b>	PRE	POST
<b>Date Treated:</b>	Jul-8-2019	Aug-9-2019
<b>Time Treated:</b>	1:45 PM	9:15 AM
<b>% Cloud Cover:</b>	20	0
<b>Air Temp., Unit:</b>	75 F	66 F
<b>% Relative Humidity:</b>	42	74
<b>Wind Speed/Unit/Dir:</b>	5 mph NE	3 mph W
<b>Soil Temp, Unit:</b>	78 F	68 F
<b>Leaf Moist/Dew Presence (Y/N):</b>	5	4
<b>Soil Moist:</b>	5	3

**Crop Stage at Each Application**

	A	B
<b>Crop 1 Name:</b>	GLXMA	GLXMA
<b>Height:</b>		12 "
<b>Stage:</b>		V4

**Weed Stage at Each Application**

	A	B
<b>Weed 1 Name:</b>	AMATU	AMATU
<b>Height:</b>		2-18 " (10)
<b>Stage:</b>		4-24L

**Weed Density**

	1
<b>Date:</b>	Aug-9-2019
<b>Weed Name:</b>	AMATU
<b>Density:</b>	19 FT2

**Application Equipment**

Appl	Sprayer Type	Ground Speed	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	Spray Volume	Carrier	Operation Pressure
A	CUB	3.8 mph	AIXR	11003	22 "	20 "	120 "	19 GPA	WATER	30 psi
B	CUB	3.8 mph	TTI	11003	28 "	20 "	100 "	19 GPA	WATER	25 psi

**Comments:** The waterhemp population at this location is Group 2 (ALS) and Group 9 (glyphosate) resistant.

Michigan State University  
**Glyphosate-resistant waterhemp control in Enlist soybean**  
**Trial ID: SOY19-19**      **Location: Isabella Co.**  
**Investigator: Christy Sprague**  
**Study Director: Sprague, Stiles, Powell**

Pest Code	AMATU		AMATU		GLXMA
	GLXMA	AMATU	GLXMA	AMATU	GLXMA
Crop Type, Code	Jul-29-2019	Jul-29-2019	Aug-8-2019	Aug-8-2019	Aug-16-2019
Rating Date	injury	control	injury	control	injury
Rating Type	percent	percent	percent	percent	percent
Rating Unit	21 DA-A	21 DA-A	31 DA-A	31 DA-A	7 DA-B
Trt-Eval Interval	0	0	0	0	0
Number of Decimals					

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Timing	Appl Code	2	99	3	84	1
1	Valor	51	WG	2 oz/a		PRE	A	2	99	2	84	1
1	Roundup PowerMax	4.5	SL	32 fl oz/a		POST	B					
1	AMS		WG	17 lb/100 gal		POST	B					
2	Valor	51	WG	2 oz/a		PRE	A	4	99	3	89	2
2	Enlist Duo	3.33	SL	3.5 pt/a		POST	B					
2	AMS		WG	17 lb/100 gal		POST	B					
3	Valor	51	WG	2 oz/a		PRE	A	3	99	3	86	3
3	Enlist Duo	3.33	SL	4.75 pt/a		POST	B					
3	AMS		WG	17 lb/100 gal		POST	B					
4	Valor	51	WG	2 oz/a		PRE	A	4	99	3	85	5
4	Liberty	2.34	L	32 fl oz/a		POST	B					
4	AMS		WG	17 lb/100 gal		POST	B					
5	Valor	51	WG	2 oz/a		PRE	A	3	99	3	85	6
5	Enlist One	3.8	SL	24 fl oz/a		POST	B					
5	Liberty	2.34	L	32 fl oz/a		POST	B					
5	AMS		WG	17 lb/100 gal		POST	B					
6	Valor	51	WG	2 oz/a		PRE	A	4	97	3	84	6
6	Enlist One	3.8	SL	32 fl oz/a		POST	B					
6	Liberty	2.34	L	32 fl oz/a		POST	B					
6	AMS		WG	17 lb/100 gal		POST	B					
7	Valor	51	WG	2 oz/a		PRE	A	3	98	4	94	6
7	Warrant	3	L	3 pt/a		POST	B					
7	Enlist One	3.8	SL	32 fl oz/a		POST	B					
7	Liberty	2.34	L	32 fl oz/a		POST	B					
7	AMS		WG	17 lb/100 gal		POST	B					
8	Roundup PowerMax	4.5	SL	32 fl oz/a		POST	B	0	0	0	0	0
8	AMS		WG	17 lb/100 gal		POST	B					
9	Enlist Duo	3.33	SL	4.75 pt/a		POST	B	0	0	0	0	0
9	AMS		WG	17 lb/100 gal		POST	B					
10	Liberty	2.34	L	32 fl oz/a		POST	B	0	0	0	0	0
10	AMS		WG	17 lb/100 gal		POST	B					
11	Enlist One	3.8	SL	24 fl oz/a		POST	B	0	0	0	0	0
11	Liberty	2.34	L	32 fl oz/a		POST	B					
11	AMS		WG	17 lb/100 gal		POST	B					

Missing data estimates are included in columns: Average=1,2,3,4,5,6,7,8,9,10  
 Could not calculate LSD (% mean diff) for columns 7,9 because error mean square = 0.

Michigan State University  
**Glyphosate-resistant waterhemp control in Enlist soybean**  
**Trial ID: SOY19-19**      **Location: Isabella Co.**  
**Investigator: Christy Sprague**  
**Study Director: Sprague, Stiles, Powell**

Pest Code	AMATU		AMATU		GLXMA
Crop Type, Code	GLXMA	AMATU	GLXMA	AMATU	GLXMA
Rating Date	Jul-29-2019	Jul-29-2019	Aug-8-2019	Aug-8-2019	Aug-16-2019
Rating Type	injury	control	injury	control	injury
Rating Unit	percent	percent	percent	percent	percent
Trt-Eval Interval	21 DA-A	21 DA-A	31 DA-A	31 DA-A	7 DA-B
Number of Decimals	0	0	0	0	0

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Timing	Appl Code					
12	Liberty	2.34	L	32	fl oz/a	POST	B	0	0	0	0	
12	Roundup PowerMax	4.5	SL	32	fl oz/a	POST	B					
12	AMS		WG	17	lb/100 gal	POST	B					
LSD P=.05								3.5	3.2	2.6	14.3	1.2
Standard Deviation								2.4	2.2	1.8	9.9	0.8
CV								127.54	3.9	109.74	19.64	35.96

Missing data estimates are included in columns: Average=1,2,3,4,5,6,7,8,9,10  
 Could not calculate LSD (% mean diff) for columns 7,9 because error mean square = 0.

Michigan State University  
**Glyphosate-resistant waterhemp control in Enlist soybean**  
**Trial ID: SOY19-19**      **Location: Isabella Co.**  
**Investigator: Christy Sprague**  
**Study Director: Sprague, Stiles, Powell**

Pest Code	AMATU		AMATU		AMATU
	Aug-16-2019	Aug-23-2019	Aug-23-2019	Sep-11-2019	Sep-11-2019
Crop Type, Code	control	injury	control	injury	control
Rating Date	percent	percent	percent	percent	percent
Rating Type	7 DA-B	14 DA-B	14 DA-B	33 DA-B	33 DA-B
Rating Unit	0	0	0	0	0
Trt-Eval Interval					
Number of Decimals					

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Appl Timing	Appl Code	82	0	79	0	76
1	Valor	51	WG	2 oz/a		PRE	A					
1	Roundup PowerMax	4.5	SL	32 fl oz/a		POST	B					
1	AMS		WG	17 lb/100 gal		POST	B					
2	Valor	51	WG	2 oz/a		PRE	A	97	0	100	0	100
2	Enlist Duo	3.33	SL	3.5 pt/a		POST	B					
2	AMS		WG	17 lb/100 gal		POST	B					
3	Valor	51	WG	2 oz/a		PRE	A	99	0	100	0	100
3	Enlist Duo	3.33	SL	4.75 pt/a		POST	B					
3	AMS		WG	17 lb/100 gal		POST	B					
4	Valor	51	WG	2 oz/a		PRE	A	98	0	97	0	95
4	Liberty	2.34	L	32 fl oz/a		POST	B					
4	AMS		WG	17 lb/100 gal		POST	B					
5	Valor	51	WG	2 oz/a		PRE	A	98	0	100	0	100
5	Enlist One	3.8	SL	24 fl oz/a		POST	B					
5	Liberty	2.34	L	32 fl oz/a		POST	B					
5	AMS		WG	17 lb/100 gal		POST	B					
6	Valor	51	WG	2 oz/a		PRE	A	97	0	100	0	100
6	Enlist One	3.8	SL	32 fl oz/a		POST	B					
6	Liberty	2.34	L	32 fl oz/a		POST	B					
6	AMS		WG	17 lb/100 gal		POST	B					
7	Valor	51	WG	2 oz/a		PRE	A	100	0	100	0	100
7	Warrant	3	L	3 pt/a		POST	B					
7	Enlist One	3.8	SL	32 fl oz/a		POST	B					
7	Liberty	2.34	L	32 fl oz/a		POST	B					
7	AMS		WG	17 lb/100 gal		POST	B					
8	Roundup PowerMax	4.5	SL	32 fl oz/a		POST	B	0	0	0	0	15
8	AMS		WG	17 lb/100 gal		POST	B					
9	Enlist Duo	3.33	SL	4.75 pt/a		POST	B	80	0	91	0	93
9	AMS		WG	17 lb/100 gal		POST	B					
10	Liberty	2.34	L	32 fl oz/a		POST	B	93	0	84	0	69
10	AMS		WG	17 lb/100 gal		POST	B					
11	Enlist One	3.8	SL	24 fl oz/a		POST	B	95	0	91	0	89
11	Liberty	2.34	L	32 fl oz/a		POST	B					
11	AMS		WG	17 lb/100 gal		POST	B					

Missing data estimates are included in columns: Average=1,2,3,4,5,6,7,8,9,10  
 Could not calculate LSD (% mean diff) for columns 7,9 because error mean square = 0.

Michigan State University  
**Glyphosate-resistant waterhemp control in Enlist soybean**  
**Trial ID: SOY19-19**      **Location: Isabella Co.**  
**Investigator: Christy Sprague**  
**Study Director: Sprague, Stiles, Powell**

Pest Code	AMATU		GLXMA		AMATU		GLXMA		AMATU				
Crop Type, Code	Aug-16-2019	Aug-23-2019	Aug-23-2019	Sep-11-2019	Sep-11-2019	Sep-11-2019	Sep-11-2019	Sep-11-2019	Sep-11-2019				
Rating Date	control		injury		control		injury		control				
Rating Type	percent		percent		percent		percent		percent				
Rating Unit	7 DA-B		14 DA-B		14 DA-B		33 DA-B		33 DA-B				
Trt-Eval Interval	0		0		0		0		0				
Number of Decimals													
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Unit	Appl Timing	Appl Code						
12	Liberty	2.34	L	32	fl oz/a	POST	B	94	0	86	0	68	
12	Roundup PowerMax	4.5	SL	32	fl oz/a	POST	B						
12	AMS		WG	17	lb/100 gal	POST	B						
LSD	P=.05			4.3						5.0			8.8
Standard Deviation				3.0					0.0	3.4	0.0		6.1
CV				3.46					0.0	4.03	0.0		7.26

Missing data estimates are included in columns: Average=1,2,3,4,5,6,7,8,9,10  
 Could not calculate LSD (% mean diff) for columns 7,9 because error mean square = 0.