

## ***2016 Evaluation of Enlist Duo for control of broadleaf weeds in soybeans at Rochester, MN.***

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The objective of this trial was to evaluate the performance of Enlist Duo herbicide and compare herbicide systems for weed control in soybeans in southeastern, MN. The research site was a loamy sand series with a pH of 6.6, O.M. of 2.1%, and soil test P and K levels of 49 ppm and 137 ppm, respectively. Fall fertilizer was applied on November 5, 2015 at a rate of 0-46-180-0 lbs/A (N-P-K-S). The field was field cultivated prior to planting in the spring. The Dow AgroSciences soybean variety 12R15X1 Enlist RR2Y was planted on May 9, 2016 at a depth of 1.5 inches in 30-inch rows at a rate of 150,000 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) treatments were applied with a tractor-mounted sprayer delivering 15 gpa at 30 psi using TTI-11002 nozzles. Postemergence (POST) treatments using systemic herbicides were applied with a tractor-mounted sprayer delivering 15 gpa at 30 psi using TTI-11002 nozzles. POST contact herbicide treatments were applied with TTIJ60-11002 nozzles. Evaluations of the plot were taken on June 3, 6, 15, 27, and July 11. The crop was destroyed on July 28, 2016. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance ratings for control of giant ragweed, common lambsquarters, common waterhemp and grass, and crop response can be found in Tables 2 through 6 respectively. (University of Minnesota Extension Regional Office, Rochester.)

### **SUMMARY:**

Glyphosate systems using Enlist Duo applied POST at 56 or 75 fl oz/A provided satisfactory control of giant ragweed, 96% and 97%, respectively, compared to the Durango system which achieved only 86% control. Glufosinate systems using 2,4-D Choline at 24 or 32 fl oz/A also provided satisfactory giant ragweed control, 96% and 97%, respectively, compared to the Liberty system which achieved 87% control. Common lambsquarters and common waterhemp control was satisfactory, 98-99%, with all systems except POST only Durango at 89% and 10%, respectively (July 11 rating).

**Table 1. Application timing, plant stage, environmental conditions.**

Date	5/9	6/3	6/8
Treatment	PRE (A)	POST I (B)	POST II (C)
<b>Temperature (F)</b>			
Air	59	79	67
Soil	61.7	70.7	68.5
<b>Relative Humidity (%)</b>	72	50	54
<b>Wind (mph)</b>	24	14	3
<b>Soil Moisture</b>	Normal	Normal	Normal
<b>Soybean</b>			
Stage		V1	V2
Height (inch)		3.0	4.4
<b>Giant Ragweed</b>			
Weed density (ft <sup>2</sup> )			14
Height (inch)		6.3	3.9
<b>Common Lambsquarters</b>			
Weed density (ft <sup>2</sup> )			1.8
Height (inch)		2.9	2.3
<b>Common Waterhemp</b>			
Weed density (ft <sup>2</sup> )			5.5
Height (inch)		1.6	0.9
<b>Grass</b>			
Weed density (ft <sup>2</sup> )			6.5
Height (inch)		2.5	1.7
<b>Rainfall after each application (inch)</b>			
Week 1	1.43	2.27	3.75
Week 2	0.02	2.38	0.30
Week 3	0.21	0.41	0.71

**Table 2. Giant ragweed control with herbicide systems that include Enlist Duo in soybean in Rochester, MN, 2016**

Pest Code						AMBTR									
Pest Name						Giant ragweed									
Rating Date						June-3		June-6		June-15		June-27		July-11	
Trt	Treatment	Rate	Stage	Appl		Percent Control (%)									
1	UNTREATED CHECK					0	d	0	d	0	d	0	e	0	d
<i>A/C = PRE 5/9/16 / POST II 6/8/16 - (MIDPOWE - less than 4 inch weeds)</i>															
2	SOA 2,14 / 9					84	ab	79	ab	91	c	85	c	86	b
	SONIC	4.5	oz wt/a	PREPRE	A										
	DURANGO	32	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
3	SOA 2,14 / 4,9					85	a	80	a	97	a	97	a	96	a
	SONIC	4.5	oz wt/a	PREPRE	A										
	ENLIST DUO	56	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
4	SOA 2,14 / 4,9					83	abc	78	ab	98	a	98	a	97	a
	SONIC	4.5	oz wt/a	PREPRE	A										
	ENLIST DUO	75	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
5	SOA 2, 14 / 4, 9					82	c	76	abc	97	a	98	a	97	a
	SONIC	4.5	oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	24	fl oz/a	MIDPOWE	C										
	DURANGO	24	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
6	SOA 2,14 / 4, 9					84	ab	79	ab	98	a	97	a	97	a
	SONIC	4.5	oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	32	fl oz/a	MIDPOWE	C										
	DURANGO	32	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
7	SOA 2,14 / 10					82	c	75	bc	95	b	88	b	87	b
	SONIC	4.5	oz wt/a	PREPRE	A										
	LIBERTY 280	29	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
8	SOA 2,14 / 4, 10					82	bc	73	c	98	a	97	a	96	a
	SONIC	4.5	oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	24	fl oz/a	MIDPOWE	C										
	LIBERTY 280	29	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
9	SOA 2,14 / 4, 10					83	abc	75	bc	99	a	98	a	97	a
	SONIC	4.5	oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	32	fl oz/a	MIDPOWE	C										
	LIBERTY 280	29	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
<i>B = POST I 6/3/16 - (MIDPOWE - less than 4 inch weeds)</i>															
10	SOA 9 CHECK					0	d	80	a	90	c	81	d	81	c
	DURANGO	32	fl oz/a	MIDPOWE	B										
	N-PAK AMS	2.5	% v/v	MIDPOWE	B										
<b>LSD P=.10</b>						<b>3</b>		<b>5</b>		<b>2</b>		<b>2</b>		<b>2</b>	

Means followed by same letter or symbol do not significantly differ (P=.10, LSD)

**Table 3. Common lambsquarters control with herbicide systems that include Enlist Duo herbicide in soybean in Rochester, MN, 2016.**

Pest Code					CHEAL									
Pest Name					Common lambsquarters									
Rating Date					June 3		June 6		June-15		June-27		July-11	
Trt	Treatment	Rate	Stage	Appl	Percent Control (%)									
1	UNTREATED CHECK				0	c	0	e	0	c	0	c	0	c
<i>A/C = PRE 5/9/16 / POST II 6/8/16 – (MIDPOWE – less than 4 inch weeds)</i>														
2	SOA 2,14 / 9				99	ab	99	ab	98	a	99	a	99	a
	SONIC	4.5 oz wt/a	PREPRE	A										
	DURANGO	32 fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5 % v/v	MIDPOWE	C										
3	SOA 2,14 / 4,9				99	ab	99	a	99	a	99	a	99	a
	SONIC	4.5 oz wt/a	PREPRE	A										
	ENLIST DUO	56 fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5 % v/v	MIDPOWE	C										
4	SOA 2,14 / 4,9				98	b	99	bc	98	a	99	a	99	a
	SONIC	4.5 oz wt/a	PREPRE	A										
	ENLIST DUO	75 fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5 % v/v	MIDPOWE	C										
5	SOA 2, 14 / 4, 9				99	ab	99	a	99	a	99	a	99	a
	SONIC	4.5 oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	24 fl oz/a	MIDPOWE	C										
	DURANGO	24 fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5 % v/v	MIDPOWE	C										
6	SOA 2,14 / 4, 9				99	ab	99	a	99	a	99	a	99	a
	SONIC	4.5 oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	32 fl oz/a	MIDPOWE	C										
	DURANGO	32 fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5 % v/v	MIDPOWE	C										
7	SOA 2,14 / 10				99	ab	98	c	99	a	99	a	99	a
	SONIC	4.5 oz wt/a	PREPRE	A										
	LIBERTY 280	29 fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5 % v/v	MIDPOWE	C										
8	SOA 2,14 / 4, 10				99	ab	99	a	99	a	99	a	99	a
	SONIC	4.5 oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	24 fl oz/a	MIDPOWE	C										
	LIBERTY 280	29 fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5 % v/v	MIDPOWE	C										
9	SOA 2,14 / 4, 10				99	a	99	ab	99	a	99	a	99	a
	SONIC	4.5 oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	32 fl oz/a	MIDPOWE	C										
	LIBERTY 280	29 fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5 % v/v	MIDPOWE	C										
<i>B = POST I 6/3/16 – (MIDPOWE – less than 4 inch weeds)</i>														
10	SOA 9				0	c	80	d	89	b	89	b	89	b
	GLYPHOSATE CHECK													
	DURANGO	32 fl oz/a	MIDPOWE	B										
	N-PAK AMS	2.5 % v/v	MIDPOWE	B										
LSD P=.10					0.5		0.5		0.4		0.4		0.3	

Means followed by same letter or symbol do not significantly differ (P=.10, LSD)

**Table 4. Common waterhemp control with herbicide systems that include Enlist Duo in soybean in Rochester, MN, 2016.**

Pest Code Pest Name Rating Date Trt Treatment Rate Growth Appl					AMATA									
					Common waterhemp									
					June 3		June 6		June 15		June 27		July 11	
					Percent Control (%)									
1 UNTREATED CHECK					0	c	0	d	0	c	0	d	0	c
<b>A/B = PRE 5/9/16 / POST II 6/8/16 – (MIDPOWE – less than 4 inch weeds)</b>														
2 SOA 2,14 / 9					99	a	99	a	99	a	99	b	99	a
SONIC 4.5 oz wt/a PREPRE A														
DURANGO 32 fl oz/a MIDPOWE C														
N-PAK AMS 2.5 % v/v MIDPOWE C														
3 SOA 2,14 / 4,9					99	a	99	a	99	a	99	ab	99	a
SONIC 4.5 oz wt/a PREPRE A														
ENLIST DUO 56 fl oz/a MIDPOWE C														
N-PAK AMS 2.5 % v/v MIDPOWE C														
4 SOA 2,14 / 4,9					99	a	99	a	99	a	99	ab	99	a
SONIC 4.5 oz wt/a PREPRE A														
ENLIST DUO 75 fl oz/a MIDPOWE C														
N-PAK AMS 2.5 % v/v MIDPOWE C														
5 SOA 2, 14 / 4, 9					99	b	99	a	99	a	99	a	98	a
SONIC 4.5 oz wt/a PREPRE A														
2,4-D CHOLINE SALT 24 fl oz/a MIDPOWE C														
DURANGO 24 fl oz/a MIDPOWE C														
N-PAK AMS 2.5 % v/v MIDPOWE C														
6 SOA 2,14 / 4, 9					99	a	99	b	99	a	99	a	99	a
SONIC 4.5 oz wt/a PREPRE A														
2,4-D CHOLINE SALT 32 fl oz/a MIDPOWE C														
DURANGO 32 fl oz/a MIDPOWE C														
N-PAK AMS 2.5 % v/v MIDPOWE C														
7 SOA 2,14 / 10					99	a	99	a	99	a	99	b	98	a
SONIC 4.5 oz wt/a PREPRE A														
LIBERTY 280 29 fl oz/a MIDPOWE C														
N-PAK AMS 2.5 % v/v MIDPOWE C														
8 SOA 2,14 / 4, 10					99	a	99	a	99	a	99	ab	98	a
SONIC 4.5 oz wt/a PREPRE A														
2,4-D CHOLINE SALT 24 fl oz/a MIDPOWE C														
LIBERTY 280 29 fl oz/a MIDPOWE C														
N-PAK AMS 2.5 % v/v MIDPOWE C														
9 SOA 2,14 / 4, 10					99	a	99	a	99	a	99	a	98	a
SONIC 4.5 oz wt/a PREPRE A														
2,4-D CHOLINE SALT 32 fl oz/a MIDPOWE C														
LIBERTY 280 29 fl oz/a MIDPOWE C														
N-PAK AMS 2.5 % v/v MIDPOWE C														
<b>B = POST I 6/3/16 – (MIDPOWE – less than 4 inch weeds)</b>														
10 SOA 9					0	c	90	c	73	b	10	c	10	b
GLYPHOSATE CHECK														
DURANGO 32 fl oz/a MIDPOWE B														
N-PAK AMS 2.5 % v/v MIDPOWE B														
LSD P=.10					0.2		0.2		2		0.5		1	

Means followed by same letter or symbol do not significantly differ (P=.10, LSD)

**Table 5. Grass control with herbicide systems that include Enlist Duo in soybean in Rochester, MN, 2016.**

Pest Name						Grass species									
Rating Date						June 3		June 6		June 15		June 27		July 11	
Trt	Treatment	Rate	Growth	Appl	Percent control (%)										
1	UNTREATED CHECK					0	d	0	e	0	c	0	c	0	d
<i>A/B = PRE 5/9/16 / POST II 6/8/16 - (MIDPOWE - less than 4 inch weeds)</i>															
2	SOA 2,14 / 9				98	bc	97	c	99	a	97	a	97	a	
	SONIC	4.5	oz wt/a	PREPRE	A										
	DURANGO	32	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
3	SOA 2,14 / 4,9				99	a	99	a	99	a	97	a	97	a	
	SONIC	4.5	oz wt/a	PREPRE	A										
	ENLIST DUO	56	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
4	SOA 2,14 / 4,9				98	c	97	c	99	a	97	a	95	b	
	SONIC	4.5	oz wt/a	PREPRE	A										
	ENLIST DUO	75	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
5	SOA 2, 14 / 4, 9				99	ab	99	a	99	a	95	a	94	b	
	SONIC	4.5	oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	24	fl oz/a	MIDPOWE	C										
	DURANGO	24	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
6	SOA 2,14 / 4, 9				99	a	99	a	99	a	98	a	97	a	
	SONIC	4.5	oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	32	fl oz/a	MIDPOWE	C										
	DURANGO	32	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
7	SOA 2,14 / 10				99	ab	99	a	99	a	98	a	97	a	
	SONIC	4.5	oz wt/a	PREPRE	A										
	LIBERTY 280	29	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
8	SOA 2,14 / 4, 10				99	ab	99	ab	99	a	98	a	97	a	
	SONIC	4.5	oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	24	fl oz/a	MIDPOWE	C										
	LIBERTY 280	29	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
9	SOA 2,14 / 4, 10				98	c	98	bc	99	a	96	a	95	b	
	SONIC	4.5	oz wt/a	PREPRE	A										
	2,4-D CHOLINE SALT	32	fl oz/a	MIDPOWE	C										
	LIBERTY 280	29	fl oz/a	MIDPOWE	C										
	N-PAK AMS	2.5	% v/v	MIDPOWE	C										
<i>B = POST I 6/3/16 - (MIDPOWE - less than 4 inch weeds)</i>															
10	SOA 9				0	d	90	d	86	b	90	b	80	c	
	GLYPHOSATE CHECK														
	DURANGO	32	fl oz/a	MIDPOWE	B										
	N-PAK AMS	2.5	% v/v	MIDPOWE	B										
LSD P=.10						0.6	2	2	3	2					

Means followed by same letter or symbol do not significantly differ (P=.10, LSD)

**Table 6. Soybean response to herbicide systems that include Enlist Duo in Rochester, MN, 2016.**

					Crop Response						
Rating Date					June 3	June 15	June 27				
No.	Name	Rate	Unit	Stage	Code	Percent Injury (%)					
1	UNTREATED CHECK					0	-	0	c	0	-
<b>A/B = PRE 5/9/16 / POST II 6/8/16 - (MIDPOWE - less than 4 inch weeds)</b>											
2	SOA 2,14 / 9					0	-	0	c	0	-
	SONIC	4.5	oz wt/a	PREPRE	A						
	DURANGO	32	fl oz/a	MIDPOWE	C						
	N-PAK AMS	2.5	% v/v	MIDPOWE	C						
3	SOA 2,14 / 4,9					0	-	10	b	0	-
	SONIC	4.5	oz wt/a	PREPRE	A						
	ENLIST DUO	56	fl oz/a	MIDPOWE	C						
	N-PAK AMS	2.5	% v/v	MIDPOWE	C						
4	SOA 2,14 / 4,9					0	-	11	b	0	-
	SONIC	4.5	oz wt/a	PREPRE	A						
	ENLIST DUO	75	fl oz/a	MIDPOWE	C						
	N-PAK AMS	2.5	% v/v	MIDPOWE	C						
5	SOA 2, 14 / 4, 9					0	-	10	b	0	-
	SONIC	4.5	oz wt/a	PREPRE	A						
	2,4-D CHOLINE SALT	24	fl oz/a	MIDPOWE	C						
	DURANGO	24	fl oz/a	MIDPOWE	C						
	N-PAK AMS	2.5	% v/v	MIDPOWE	C						
6	SOA 2,14 / 4, 9					0	-	11	b	0	-
	SONIC	4.5	oz wt/a	PREPRE	A						
	2,4-D CHOLINE SALT	32	fl oz/a	MIDPOWE	C						
	DURANGO	32	fl oz/a	MIDPOWE	C						
	N-PAK AMS	2.5	% v/v	MIDPOWE	C						
7	SOA 2,14 / 10					0	-	11	b	0	-
	SONIC	4.5	oz wt/a	PREPRE	A						
	LIBERTY 280	29	fl oz/a	MIDPOWE	C						
	N-PAK AMS	2.5	% v/v	MIDPOWE	C						
8	SOA 2,14 / 4, 10					0	-	18	a	0	-
	SONIC	4.5	oz wt/a	PREPRE	A						
	2,4-D CHOLINE SALT	24	fl oz/a	MIDPOWE	C						
	LIBERTY 280	29	fl oz/a	MIDPOWE	C						
	N-PAK AMS	2.5	% v/v	MIDPOWE	C						
9	SOA 2,14 / 4, 10					0	-	20	a	0	-
	SONIC	4.5	oz wt/a	PREPRE	A						
	2,4-D CHOLINE SALT	32	fl oz/a	MIDPOWE	C						
	LIBERTY 280	29	fl oz/a	MIDPOWE	C						
	N-PAK AMS	2.5	% v/v	MIDPOWE	C						
<b>B = POST I 6/3/16 - (MIDPOWE - less than 4 inch weeds)</b>											
10	SOA 9					0	-	0	c	0	-
	GLYPHOSATE CHECK										
	DURANGO	32	fl oz/a	MIDPOWE	B						
	N-PAK AMS	2.5	% v/v	MIDPOWE	B						
<b>LSD P=.10</b>						.		3		.	

Means followed by same letter or symbol do not significantly differ (P=.10, LSD)