

## Evaluation of Difficult to Control Broadleaf Weeds with an HPPD Herbicide Based Program in Soybean in SE Minnesota in 2017

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The objective of this trial was to evaluate weed control systems and crop response in soybeans that are tolerant to HPPD herbicides in southeastern Minnesota. The research site was a Lawler loam series with pH of 6.3, O.M. 2.6% and soil test P and K levels of 30 ppm and 154 ppm, respectively. Fall fertilizer was broadcast on November 3, 2016 at a rate of 0-46-180-0 lbs/A. In the spring the field was disked and the field was cultivated twice prior to planting. The previous crop was corn. The soybean variety was Syngenta CL1470028, an HPPD herbicide tolerant variety, and was planted May 31, 2017 at a depth of 1.5 inches in 30-inch rows at a rate of 149,344 seeds per acre. Soybean emergence date was June 6, 2017. A randomized complete block design was used with four replications. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 15 gpa at 30 psi using TTI 11002 spray tips. Evaluations of the plots were made on June 26, July 3, and July 10. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance ratings for common lambsquarters, common waterhemp, velvetleaf and grass control and crop response can be found in Tables 2 through 6, respectively. Crop was destroyed on July 13, 2017 to comply with protocol requirements.

### Discussion

Preemergence applications of A22089 at 2.26 qt/a, with or without Tricor at 6.66 oz/a, provided excellent control (98-99%) of common lambsquarters, waterhemp and velvetleaf control, 6/26 and 7/3. Grass control was improved from 88 to 94% with the addition of Tricor to A22089, 7/10. When compared to the standards in this trial, Boundary at 1.8 pt/a, Zidua Pro at 5 oz/a and Sonic at 4 oz/a, A22089 gave superior common lambsquarters control than Boundary, superior waterhemp and velvetleaf control than all three, and better grass control than Sonic. *Note: Treatments included in this trial contain unregistered products.* (University of Minnesota Extension Regional Office, Rochester.)

Date	6/1	7/7
Treatment	PRE	POST I
Temperature (F)		
Air	68	78
Soil	63.7	86
Relative Humidity (%)	34	49
Wind (mph)	3	17
Soil Moisture	Normal	Normal
Soybean		
Stage		V5
Height (inch)		8.1
Common Lambsquarter		
Weed Density (ft <sup>2</sup> )		3.5
Height (inch)		6.4
Common Waterhemp		
Weed Density (ft <sup>2</sup> )		36.1
Height (inch)		7.6
Grass		
Weed Density (ft <sup>2</sup> )		2.6
Height (inch)		14.8
Velvetleaf		
Weed Density (ft <sup>2</sup> )		1.3
Height (inch)		6.0
Rainfall after each application (inch)		
Week 1	0.08	0.53
Week 2	1.07	N/A
Week 3	1.94	N/A

**Table 2. Common lambsquarters control with HPPD (SOA 27) herbicide systems in HPPD tolerant soybean at Rochester, MN in 2017.**

Pest Code				CHEAL					
Pest Name				Common Lambsquarter					
Rating Date				June -26		July-3		July-10	
No.	Name	Rate	Appl	Percent Control (%)					
1	UNTREATED CHECK			0.0	c	0.0	c	0.0	c
<b>PRE (6/1/17)</b>									
2	SOA 15, 27 A22089	2.26 qt/a	A	99.0	a	99.0	a	99.0	a
3	SOA 5, 15, 27 TRICOR A22089	6.66 oz wt/a 2.26 qt/a	A A	99.0	a	99.0	a	99.0	a
<b>PRE(6/1/17) / POST I (7/7/17)</b>									
4	SOA 15, 27, 10 A22089 LIBERTY 280 N-PAK AMS	2.26 qt/a 36 fl oz/a 2.5 % v/v	A B B	99.0	a	99.0	a	99.0	a
5	SOA 5,15, 27,10 TRICOR A22089 LIBERTY 280 N-PAK AMS	6.66 oz wt/a 2.26 qt/a 36 fl oz/a 2.5 % v/v	A A B B	99.0	a	99.0	a	99.0	a
6	SOA 15, 27, 14,1 A22089 FLEXSTAR FUSION MSO N-PAK AMS	2.26 qt/a 16 fl oz/a 10 fl oz/a 1.0 % v/v 2.5 % v/v	A B B B B	99.0	a	98.8	a	99.0	a
7	SOA 5,15,10 BOUNDARY LIBERTY 280 N-PAK AMS	1.8 pt/a 36 fl oz/a 2.5 % v/v	A B B	92.0	b	90.0	b	98.0	b
8	SOA 2,14,15, 10 ZIDUA PRO LIBERTY 280 N-PAK AMS	5 fl oz/a 36 fl oz/a 2.5 % v/v	A B B	98.8	a	97.5	a	98.5	ab
9	SOA 2,14,10 SONIC LIBERTY 280 N-PAK AMS	4 oz wt/a 36 fl oz/a 2.5 % v/v	A B B	98.3	a	97.5	a	98.5	ab
<b>LSD P=.10</b>				<b>1.2</b>		<b>1.7</b>		<b>0.8</b>	

**Table 3. Common waterhemp control with HPPD (SOA 27) herbicide systems in HPPD tolerant soybean at Rochester, MN in 2017.**

Pest Code					AMATA					
Pest Name					Common Waterhemp					
Rating Date					June-26		July-3		July-10	
No.	Name	Rate	Appl	Percent Control %						
1	UNTREATED CHECK			0.0	e	0.0	e	0.0	e	
<b>PRE (6/1/17)</b>										
2	SOA 15, 27 A22089	2.26 qt/a	A	99.0	a	98.8	a	97.8	b	
3	SOA 5, 15, 27 TRICOR A22089	6.66 oz wt/a 2.26 qt/a	A A	99.0	a	99.0	a	99.0	a	
<b>PRE (6/1/17) / POST I (7/7/17)</b>										
4	SOA 15, 27, 10 A22089 LIBERTY 280 N-PAK AMS	2.26 qt/a 36 fl oz/a 2.5 % v/v	A B B	99.0	a	99.0	a	99.0	a	
5	SOA 5,15, 27,10 TRICOR A22089 LIBERTY 280 N-PAK AMS	6.66 oz wt/a 2.26 qt/a 36 fl oz/a 2.5 % v/v	A A B B	99.0	a	99.0	a	99.0	a	
6	SOA 15, 27, 14,1 A22089 FLEXSTAR FUSION MSO N-PAK AMS	2.26 qt/a 16 fl oz/a 10 fl oz/a 1.0 % v/v 2.5 % v/v	A B B B B	98.8	a	98.0	ab	99.0	a	
7	SOA 5,15,10 BOUNDARY LIBERTY 280 N-PAK AMS	1.8 pt/a 36 fl oz/a 2.5 % v/v	A B B	97.0	b	96.3	b	97.8	b	
8	SOA 2,14,15, 10 ZIDUA PRO LIBERTY 280 N-PAK AMS	5 fl oz/a 36 fl oz/a 2.5 % v/v	A B B	94.8	c	91.5	c	96.3	c	
9	SOA 2,14,10 SONIC LIBERTY 280 N-PAK AMS	4 oz wt/a 36 fl oz/a 2.5 % v/v	A B B	62.5	d	58.3	d	93.5	d	
<b>LSD P=.10</b>				<b>1.5</b>		<b>2.3</b>		<b>0.9</b>		

**Table 4. Velvetleaf control with HPPD (SOA 27) herbicide systems in HPPD tolerant soybean at Rochester, MN in 2017.**

Pest Code					ABUTH					
Pest Name					Velvetleaf					
Rating Date					June-26		July-3		July-10	
No.	Name	Rate	Appl.		Percent Control %					
1	UNTREATED CHECK				0.0	e	0.0	e	0.0	d
<b>PRE (6/1/17)</b>										
2	SOA 15, 27 A22089	2.26	qt/a	A	99.0	a	98.8	a	99.0	a
3	SOA 5, 15, 27 TRICOR A22089	6.66 2.26	oz wt/a qt/a	A A	99.0	a	99.0	a	99.0	a
<b>PRE (6/1/17) / POST I (7/7/17)</b>										
4	SOA 15, 27, 10 A22089 LIBERTY 280 N-PAK AMS	2.26 36 2.5	qt/a fl oz/a % v/v	A B B	99.0	a	99.0	a	99.0	a
5	SOA 5,15, 27,10 TRICOR A22089 LIBERTY 280 N-PAK AMS	6.66 2.26 36 2.5	oz wt/a qt/a fl oz/a % v/v	A A B B	99.0	a	99.0	a	99.0	a
6	SOA 15, 27, 14,1 A22089 FLEXSTAR FUSION MSO N-PAK AMS	2.26 16 10 1.0 2.5	qt/a fl oz/a fl oz/a % v/v % v/v	A B B B B	99.0	a	99.0	a	99.0	a
7	SOA 5,15,10 BOUNDARY LIBERTY 280 N-PAK AMS	1.8 36 2.5	pt/a fl oz/a % v/v	A B B	71.5	d	68.5	d	94.3	c
8	SOA 2,14,15, 10 ZIDUA PRO LIBERTY 280 N-PAK AMS	5 36 2.5	fl oz/a fl oz/a % v/v	A B B	89.8	b	89.5	b	96.0	b
9	SOA 2,14,10 SONIC LIBERTY 280 N-PAK AMS	4 36 2.5	oz wt/a fl oz/a % v/v	A B B	79.8	c	79.5	c	95.0	c
<b>LSD P=.10</b>					<b>4.8</b>		<b>5.4</b>		<b>0.8</b>	

**Table 5. Grass control with HPPD (SOA 27) herbicide systems in HPPD tolerant soybean at Rochester, MN in 2017.**

Pest Code					GRAM					
Pest Name					Grass					
Rating Date					June-26		July-3		July-10	
No.	Name	Rate		Appl	Percent Control %					
1	UNTREATED CHECK				0.0	d	0.0	e	0.0	d
<b>PRE (6/1/17)</b>										
2	SOA 15, 27 A22089	2.26	qt/a	A	93.5	b	91.3	bc	87.5	c
3	SOA 5, 15, 27 TRICOR A22089	6.66 2.26	oz wt/a qt/a	A A	95.8	ab	94.8	ab	94.3	b
<b>PRE (6/1/17) / POST I (7/7/17)</b>										
4	SOA 15, 27, 10 A22089 LIBERTY 280 N-PAK AMS	2.26 36 2.5	qt/a fl oz/a % v/v	A B B	96.0	ab	93.8	abc	97.3	a
5	SOA 5,15, 27,10 TRICOR A22089 LIBERTY 280 N-PAK AMS	6.66 2.26 36 2.5	oz wt/a qt/a fl oz/a % v/v	A A B B	97.0	a	96.0	a	98.5	a
6	SOA 15, 27, 14,1 A22089 FLEXSTAR FUSION MSO N-PAK AMS	2.26 16 10 1.0 2.5	qt/a fl oz/a fl oz/a % v/v % v/v	A B B B B	94.3	ab	90.8	bc	97.5	a
7	SOA 5,15,10 BOUNDARY LIBERTY 280 N-PAK AMS	1.8 36 2.5	pt/a fl oz/a % v/v	A B B	94.8	ab	93.3	abc	96.8	ab
8	SOA 2,14,15, 10 ZIDUA PRO LIBERTY 280 N-PAK AMS	5 36 2.5	fl oz/a fl oz/a % v/v	A B B	93.0	b	89.5	c	97.0	ab
9	SOA 2,14,10 SONIC LIBERTY 280 N-PAK AMS	4 36 2.5	oz wt/a fl oz/a % v/v	A B B	25.0	c	22.5	d	95.8	ab
<b>LSD P=.10</b>					<b>3.4</b>		<b>4.5</b>		<b>2.9</b>	

**Table 6. HPPD tolerant soybean response to A22089 herbicide systems at Rochester, MN in 2017.**

Pest Name					INJURY					
Rating Date					June-26		July-3		July-10	
No.	Name	Rate		Appl.	Percent Injury %					
1	UNTREATED CHECK				0.0	-	0.0	-	0.0	d
<b>PRE (6/1/17)</b>										
2	SOA 15, 27 A22089	2.26	qt/a	A	0.0	-	0.0	-	0.0	d
3	SOA 5, 15, 27 TRICOR A22089	6.66 2.26	oz wt/a qt/a	A A	0.0	-	0.0	-	0.0	d
<b>PRE (6/1/17) / POST I (7/7/17)</b>										
4	SOA 15, 27, 10 A22089 LIBERTY 280 N-PAK AMS	2.26 36 2.5	qt/a fl oz/a % v/v	A B B	0.0	-	0.0	-	33.8	c
5	SOA 5,15, 27,10 TRICOR A22089 LIBERTY 280 N-PAK AMS	6.66 2.26 36 2.5	oz wt/a qt/a fl oz/a % v/v	A A B B	0.0	-	0.0	-	37.5	b
6	SOA 15, 27, 14,1 A22089 FLEXSTAR FUSION MSO N-PAK AMS	2.26 16 10 1.0 2.5	qt/a fl oz/a fl oz/a % v/v % v/v	A B B B B	0.0	-	0.0	-	60.0	a
7	SOA 5,15,10 BOUNDARY LIBERTY 280 N-PAK AMS	1.8 36 2.5	pt/a fl oz/a % v/v	A B B	0.0	-	0.0	-	38.8	b
8	SOA 2,14,15, 10 ZIDUA PRO LIBERTY 280 N-PAK AMS	5 36 2.5	fl oz/a fl oz/a % v/v	A B B	0.0	-	0.0	-	35.0	c
9	SOA 2,14,10 SONIC LIBERTY 280 N-PAK AMS	4 36 2.5	oz wt/a fl oz/a % v/v	A B B	0.0	-	0.0	-	33.8	c
<b>LSD P=.10</b>					.		.		1.95	