

University of Minnesota 2017 Statewide Soybean Weed Management, a Comparison of dicamba and glufosinate systems at Rochester, MN.

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The objective of this trial was to evaluate and compare dicamba (Engenia) and glufosinate (Liberty) herbicide systems for weed control and crop response in soybeans in southeastern Minnesota. The research site was a loamy sand series with pH of 6.0, O.M. 2.4% and soil test P and K levels of 32 ppm and 182 ppm, respectively. The field was fall chisel plowed, spring disked and field cultivated once prior to planting. Fall fertilizer was broadcast on November 3, 2016 at a rate of 0-46-180-0 lbs/A. The previous crop was corn. The soybean varieties, ASGROW 21X7 XTEND (dicamba systems) and STINE 21LH02 (glufosinate systems) were planted on May 26, 2017 at a depth of 1.5 inches in 30-inch rows at a rate of 165,000 seeds per acre. Soybean emergence date was June 5, 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 with a ground speed of 4.5 mph using TTI 11002 nozzles. Evaluations of the plots were taken June 16, July 3, 14 and September 29. The center two rows of each plot were machine harvested on October 18, 2017. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance rating for giant ragweed, common lambsquarters, common waterhemp, grass control, and crop injury for each system, can be found in Tables 2 through 12.

Discussion: Dry weather after planting, 5/26/17, affected activation of preemergence herbicides. Slow activation allowed giant ragweed, an early season weed, to emerge before activation of preemergence herbicides, resulting in poor early season control. PRE herbicides provided from 10 to 50% control (6/16), which represents about 50% less control provided in other year. Control of small seeded broadleaf weeds, common lambsquarters, common waterhemp with most PRE herbicides was over 90% (6/16). The exceptions were Boundary at 2 pts/a which gave about 84% control of common lambsquarters and Zidua Pro at 5 fl oz/a which provided about 77% and 86% control of common lambsquarters and common waterhemp, respectively. The early post programs of Warrant Ultra or Prefix followed by either Engenia or Liberty were very effective in controlling all weeds. However, the Warrant Ultra and Prefix were applied on very small weeds (1 in or less), and just four days after the soybeans emerged. (University of Minnesota Extension Regional Office, Rochester.)

Table 1. Application timing, plant stages, environmental conditions.

Date	5/27	6/9	6/21	6/27	7/7
Treatment	PRE A	POST I B	POST II C	POST III D	POST IV E
Temperature (F)					
Air	67.0	80.0	68.0	72.0	78.0
Soil	60.7	79.2	65.8	73.5	85.1
Relative Humidity (%)	61	43	60	34	49
Wind (mph)	7	5	9	13	17
Soil Moisture	Normal	Slightly Dry	Normal	Normal	Normal
Soybean					
Stage		VC	V3	V3-V4	V6-R1
Height (in)	0.0	2.1	5.2	8.0	10.9
Giant Ragweed					
Weed Density (ft ²)			2.3		
Height (in)		1.0	3.3	6.0	7.1
Common Lambsquarter					
Weed Density (ft ²)			7.0		
Height (in)		0.3	1.4	2.5	3.9
Common Waterhemp					
Weed Density (ft ²)			40.5		
Height (in)		0.2	2.3	2.8	6.4
Grass					
Weed Density (ft ²)			4.0		
Height (in)		0.25	2.3	5.4	3.3
Rainfall after each application (in)					
Week 1	0.10	1.07	0.95	1.53	0.53
Week 2	0.08	2.82	1.53	0.53	3.34
Week 3	1.07	1.55	0.53	0.0	2.02

Table 2. Giant ragweed control with Engenia (dicamba) herbicide systems in soybeans at Rochester, MN in 2017.

Pest Code		Giant Ragweed								YIELD		
Rating Date		Jun-16		Jul-3		Jul-14		Sep-29				
Trt Treatment	Rate	Appl	Percent Control (%)								Bu/A	
PRE (5/27/17) / POST II (6/21/17) 4 inch weeds												
1	SOA 14,15,4		8.8	g	97.0	ab	97.8	ab	97.3	cd	42.8	-
	AUTHORITY ELITE	32 fl oz/a		A								
	ENGENIA	12.8 fl oz/a		C								
	NIS	0.25 % v/v		C								
2	SOA 2,14,4		32.5	d	97.5	ab	98.8	a	98.3	abc	41.4	-
	AUTHORITY FIRST	6.4 oz wt/a		A								
	ENGENIA	12.8 fl oz/a		C								
	NIS	0.25 % v/v		C								
3	SOA 5,15,4		0.0	h	97.3	ab	97.5	ab	98.0	a-d	42.3	-
	BOUNDARY	2 pt/a		A								
	ENGENIA	12.8 fl oz/a		C								
	NIS	0.25 % v/v		C								
5	SOA 2,14,4		17.5	f	97.8	a	98.5	ab	98.3	abc	46.7	-
	ENLITE	2.8 oz wt/a		A								
	ENGENIA	12.8 fl oz/a		C								
	NIS	0.25 % v/v		C								
6	SOA 14,15,4		33.8	d	97.5	ab	98.8	a	98.5	abc	45.0	-
	FIERCE	3.5 oz wt/a		A								
	ENGENIA	12.8 fl oz/a		C								
	NIS	0.25 % v/v		C								
8	SOA 14,4		26.3	e	97.5	ab	98.5	ab	98.0	a-d	44.2	-
	ROWEL	2.75 oz wt/a		A								
	ENGENIA	12.8 fl oz/a		C								
	NIS	0.25 % v/v		C								
9	SOA 2,14,15,4		5.0	g	95.5	bc	97.3	b	97.5	bcd	46.2	-
	ZIDUA PRO	5 fl oz/a		A								
	ENGENIA	12.8 fl oz/a		C								
	NIS	0.25 % v/v		C								
PRE (5/27/17) / POST III (6/27/17) 4 inch weeds												
4	SOA 5,15,4		90.0	b	97.0	ab	98.5	ab	98.8	ab	41.6	-
	BOUNDARY	2 pt/a		A								
	ENGENIA	12.8 fl oz/a		A								
	ENGENIA	12.8 fl oz/a		D								
	NIS	0.25 % v/v		D								
7	SOA 2,14,4		52.5	c	91.3	d	94.8	c	96.8	d	43.2	-
	SURVEIL	3 oz wt/a		A								
	ENGENIA	12.8 fl oz/a		D								
	NIS	0.25 % v/v		D								
POST I (6/9/17) / POST IV (7/7/17) V6-R1												
10	SOA 14,15,4		99.0	a	94.8	c	98.8	a	99.0	a	42.7	-
	WARRANT ULTRA	3 pt/a		B								
	NIS	0.25 % v/v		B								
	COC	1.0 % v/v		B								
	ENGENIA	12.8 fl oz/a		E								
	NIS	0.25 % v/v		E								
11	SOA 14,15,4		99.0	a	97.5	ab	98.8	a	99.0	a	43.1	-
	PREFIX	2 pt/a		B								
	NIS	0.25 % v/v		B								
	ENGENIA	12.8 fl oz/a		E								
	NIS	0.25 % v/v		E								
POST II (6/21/17) 4 inch weeds												
12	SOA 4		0.0	h	97.3	ab	98.5	ab	99.0	a	42.1	-
	ENGENIA CHECK	12.8 fl oz/a		C								
	NIS	0.25 % v/v		C								
LSD P=.10			3.9		2.2		1.5		1.3		NS	

Table 3. Giant ragweed control with Liberty (glufosinate) herbicide systems in soybeans at Rochester, MN in 2017.

Pest Code		Giant Ragweed								YIELD			
Rating Date		Jun-16	Jul-3	Jul-14	Sep-29								
Trt	Treatment	Rate	Appl	Percent Control (%)								Bu/A	
PRE (5/27/17) / POST II (6/21/17) 4 inch weeds													
13	SOA 14,15,10			6.3	g	96.5	ab	90.0	de	89.2	cde	41.5	-
	AUTHORITY ELITE	32	fl oz/a		A								
	LIBERTY 280	29	fl oz/a		C								
	N-Pa-K AMS	1.5	qt/a		C								
14	SOA 2,14,10			36.3	c	96.5	ab	94.3	b	93.3	b	42.6	-
	AUTHORITY FIRST	6.4	oz wt/a		A								
	LIBERTY 280	29	fl oz/a		C								
	N-Pa-K AMS	1.5	qt/a		C								
15	SOA 5,15,10			0.0	h	95.3	ab	90.5	cde	88.8	de	41.4	-
	BOUNDARY	2	pt/a		A								
	LIBERTY 280	29	fl oz/a		C								
	N-Pa-K AMS	1.5	qt/a		C								
16	SOA 2,14,10			15.0	f	96.0	ab	92.5	bcd	91.3	bcd	41.2	-
	ENLITE	2.8	oz wt/a		A								
	LIBERTY 280	29	fl oz/a		C								
	N-Pa-K AMS	1.5	qt/a		C								
17	SOA 14,15, 10			30.0	d	97.3	a	93.8	bc	93.5	b	41.5	-
	FIERCE	3.5	oz wt/a		A								
	LIBERTY 280	29	fl oz/a		C								
	N-Pa-K AMS	1.5	qt/a		C								
19	SOA 14,10			21.3	e	97.0	a	94.3	b	92.8	bc	42.2	-
	ROWEL	2.75	oz wt/a		A								
	LIBERTY 280	29	fl oz/a		C								
	N-Pa-K AMS	1.5	qt/a		C								
20	SOA 2,14,15,10			6.3	g	93.8	b	88.8	e	86.5	ef	40.7	-
	ZIDUA PRO	5	fl oz/a		A								
	LIBERTY 280	29	fl oz/a		C								
	N-Pa-K AMS	1.5	qt/a		C								
21	SOA 14,15,10			15.0	f	97.0	a	95.3	ab	94.5	b	40.9	-
	WARRANT ULTRA	3	pt/a		A								
	LIBERTY 280	29	fl oz/a		C								
	N-Pa-K AMS	1.5	qt/a		C								
PRE (5/27/17) / POST III (6/27/17) 4 inch weeds													
18	SOA 2,14,10			43.8	b	95.8	ab	89.0	de	87.5	ef	38.4	-
	SURVEIL	3	oz wt/a		A								
	LIBERTY 280	29	fl oz/a		D								
	N-Pa-K AMS	1.5	qt/a		D								
POST I (6/9/17) / POST IV (7/7/17) V6-R1													
22	SOA 14,15,10			99.0	a	96.5	ab	98.5	a	98.5	a	42.7	-
	WARRANT ULTRA	3	pt/a		B								
	NIS	0.25	% v/v		B								
	COC	1.0	% v/v		B								
	LIBERTY 280	29	fl oz/a		E								
	N-Pa-K AMS	1.5	qt/a		E								
23	SOA 14,15,10			99.0	a	96.3	ab	98.5	a	99.0	a	42.5	-
	PREFIX	2	pt/a		B								
	NIS	0.25	% v/v		B								
	LIBERTY 280	29	fl oz/a		E								
	N-Pa-K AMS	1.5	qt/a		E								
POST II (6/21/17) 4 inch weeds													
24	SOA 10			0.0	h	90.0	c	88.3	e	85.0	f	40.8	-
	LIBERTY 280 CHECK	29	fl oz/a		C								
	N-Pa-K AMS	1.5	qt/a		C								
LSD P=.10				4.1		3.1		3.6		3.5		NS	

Table 4. Common waterhemp control with Engenia (dicamba) herbicide systems in soybeans at Rochester, MN in 2017.

Pest Code		Common Waterhemp								YIELD			
Rating Date		Jun-16		Jul-3		Jul-14		Sep-29					
Trt	Treatment	Rate	Appl	Percent Control (%)								Bu/A	
PRE (5/27/17) / POST II (6/21/17) 4 inch weeds													
1	SOA 14,15,4			97.8	ab	98.0	ab	98.0	ab	97.8	abc	42.8	-
	AUTHORITY ELITE	32 fl oz/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
2	SOA 2,14,4			93.3	c	95.8	c	96.8	bc	95.5	c	41.4	-
	AUTHORITY FIRST	6.4 oz wt/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
3	SOA 5,15,4			95.8	abc	97.8	abc	98.3	ab	97.3	abc	42.3	-
	BOUNDARY	2 pt/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
5	SOA 2,14,4			93.8	bc	96.5	bc	96.3	c	96.0	bc	46.7	-
	ENLITE	2.8 oz wt/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
6	SOA 14,15,4			99.0	a	98.8	a	98.8	a	98.8	ab	45.0	-
	FIERCE	3.5 oz wt/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
8	SOA 14,4			96.5	abc	97.3	abc	97.8	abc	97.8	abc	44.2	-
	ROWEL	2.75 oz wt/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
9	SOA 2,14,15,4			83.8	d	97.0	abc	97.8	abc	96.3	abc	46.2	-
	ZIDUA PRO	5 fl oz/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
PRE (5/27/17) / POST III (6/27/17) 4 inch weeds													
4	SOA 5,15,4			99.0	a	98.0	ab	98.5	a	96.8	abc	41.6	-
	BOUNDARY	2 pt/a	A										
	ENGENIA	12.8 fl oz/a	A										
	ENGENIA	12.8 fl oz/a	D										
	NIS	0.25 % v/v	D										
7	SOA 2,14,4			97.8	ab	98.3	ab	96.8	bc	95.5	c	43.2	-
	SURVEIL	3 oz wt/a	A										
	ENGENIA	12.8 fl oz/a	D										
	NIS	0.25 % v/v	D										
POST I (6/9/17) / POST IV (7/7/17) V6-R1													
10	SOA 14,15,4			99.0	a	99.0	a	99.0	a	99.0	a	42.7	-
	WARRANT ULTRA	3 pt/a	B										
	NIS	0.25 % v/v	B										
	COC	1.0 % v/v	B										
	ENGENIA	12.8 fl oz/a	E										
	NIS	0.25 % v/v	E										
11	SOA 14,15,4			99.0	a	99.0	a	99.0	a	99.0	a	43.1	-
	PREFIX	2 pt/a	B										
	NIS	0.25 % v/v	B										
	ENGENIA	12.8 fl oz/a	E										
	NIS	0.25 % v/v	E										
POST II (6/21/17) 4 inch weeds													
12	SOA 4			0.0	e	50.0	d	66.3	d	57.5	d	42.1	-
	ENGENIA CHECK	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
LSD P=.10				4.2		2.2		1.6		2.8		NS	

Table 5. Common waterhemp control with Liberty (glufosinate) herbicide systems in soybeans at Rochester, MN in 2017.

Pest Code					Common Waterhemp								YIELD	
					Jun-16		Jul-3		Jul-14		Sep-29			
Rating Date					Percent Control (%)								Bu/A	
Trt	Treatment	Rate	Appl											
PRE (5/27/17) / POST II (6/21/17) 4 inch weeds														
13	SOA 14,15,10			99.0	a	99.0	a	99.0	a	98.3	ab	41.5	-	
	AUTHORITY ELITE	32 fl oz/a	A											
	LIBERTY 280	29 fl oz/a	C											
	N-Pa-K AMS	1.5 qt/a	C											
14	SOA 2,14,10			91.8	b	98.3	a	96.5	b	95.0	c	42.6	-	
	AUTHORITY FIRST	6.4 oz wt/a	A											
	LIBERTY 280	29 fl oz/a	C											
	N-Pa-K AMS	1.5 qt/a	C											
15	SOA 5,15,10			97.8	a	99.0	a	98.5	ab	96.8	abc	41.4	-	
	BOUNDARY	2 pt/a	A											
	LIBERTY 280	29 fl oz/a	C											
	N-Pa-K AMS	1.5 qt/a	C											
16	SOA 2,14,10			96.8	a	98.8	a	98.5	ab	98.0	abc	41.2	-	
	ENLITE	2.8 oz wt/a	A											
	LIBERTY 280	29 fl oz/a	C											
	N-Pa-K AMS	1.5 qt/a	C											
17	SOA 14,15, 10			99.0	a	99.0	a	99.0	a	99.0	a	41.5	-	
	FIERCE	3.5 oz wt/a	A											
	LIBERTY 280	29 fl oz/a	C											
	N-Pa-K AMS	1.5 qt/a	C											
19	SOA 14,10			98.5	a	99.0	a	99.0	a	98.8	a	42.2	-	
	ROWEL	2.75 oz wt/a	A											
	LIBERTY 280	29 fl oz/a	C											
	N-Pa-K AMS	1.5 qt/a	C											
20	SOA 2,14,15,10			88.5	b	98.3	a	96.8	ab	95.5	bc	40.7	-	
	ZIDUA PRO	5 fl oz/a	A											
	LIBERTY 280	29 fl oz/a	C											
	N-Pa-K AMS	1.5 qt/a	C											
21	SOA 14,15,10			98.3	a	99.0	a	99.0	a	99.0	a	40.9	-	
	WARRANT ULTRA	3 pt/a	A											
	LIBERTY 280	29 fl oz/a	C											
	N-Pa-K AMS	1.5 qt/a	C											
PRE (5/27/17) / POST III (6/27/17) 4 inch weeds														
18	SOA 2,14,10			98.3	a	99.0	a	98.8	ab	98.5	ab	38.4	-	
	SURVEIL	3 oz wt/a	A											
	LIBERTY 280	29 fl oz/a	D											
	N-Pa-K AMS	1.5 qt/a	D											
POST I (6/9/17) / POST IV (7/7/17) V6-R1														
22	SOA 14,15,10			99.0	a	99.0	a	99.0	a	99.0	a	42.7	-	
	WARRANT ULTRA	3 pt/a	B											
	NIS	0.25 % v/v	B											
	COC	1.0 % v/v	B											
	LIBERTY 280	29 fl oz/a	E											
	N-Pa-K AMS	1.5 qt/a	E											
23	SOA 14,15,10			99.0	a	98.8	a	99.0	a	99.0	a	42.5	-	
	PREFIX	2 pt/a	B											
	NIS	0.25 % v/v	B											
	LIBERTY 280	29 fl oz/a	E											
	N-Pa-K AMS	1.5 qt/a	E											
POST II (6/21/17) 4 inch weeds														
24	SOA 10			0.0	c	86.0	b	71.8	c	66.3	d	40.8	-	
	LIBERTY 280 CHECK	29 fl oz/a	C											
	N-Pa-K AMS	1.5 qt/a	C											
LSD P=.10				3.3		1.6		2.3		3.0		NS		

Table 6. Common lambsquarter control with Engenia (dicamba) herbicide systems in soybeans at Rochester, MN in 2017.

Pest Code		Common Lambsquarters				YIELD						
Rating Date		Jun-16	Jul-3	Jul-14	Sep-29							
Trt	Treatment	Rate	Appl	Percent Control (%)			Bu/A					
PRE (5/27/17) / POST II (6/21/17) 4 inch weeds												
1	SOA 14,15,4			97.5	ab	98.8	a	99.0	a	99.0	42.8	-
	AUTHORITY ELITE	32	fl oz/a									
	ENGENIA	12.8	fl oz/a									
	NIS	0.25	% v/v									
2	SOA 2,14,4			95.8	abc	98.8	a	99.0	a	99.0	41.4	-
	AUTHORITY FIRST	6.4	oz wt/a									
	ENGENIA	12.8	fl oz/a									
	NIS	0.25	% v/v									
3	SOA 5,15,4			80.8	e	97.8	a	98.5	b	98.8	42.3	-
	BOUNDARY	2	pt/a									
	ENGENIA	12.8	fl oz/a									
	NIS	0.25	% v/v									
5	SOA 2,14,4			90.5	d	98.8	a	99.0	a	99.0	46.7	-
	ENLITE	2.8	oz wt/a									
	ENGENIA	12.8	fl oz/a									
	NIS	0.25	% v/v									
6	SOA 14,15,4			98.0	a	99.0	a	99.0	a	99.0	45.0	-
	FIERCE	3.5	oz wt/a									
	ENGENIA	12.8	fl oz/a									
	NIS	0.25	% v/v									
8	SOA 14,4			94.5	bc	98.5	a	99.0	a	98.8	44.2	-
	ROWEL	2.75	oz wt/a									
	ENGENIA	12.8	fl oz/a									
	NIS	0.25	% v/v									
9	SOA 2,14,15,4			71.3	f	96.3	a	99.0	a	98.5	46.2	-
	ZIDUA PRO	5	fl oz/a									
	ENGENIA	12.8	fl oz/a									
	NIS	0.25	% v/v									
PRE (5/27/17) / POST III (6/27/17) 4 inch weeds												
4	SOA 5,15,4			97.0	ab	98.5	a	99.0	a	98.5	41.6	-
	BOUNDARY	2	pt/a									
	ENGENIA	12.8	fl oz/a									
	ENGENIA	12.8	fl oz/a									
	NIS	0.25	% v/v									
7	SOA 2,14,4			93.5	cd	98.0	a	98.8	ab	98.8	43.2	-
	SURVEIL	3	oz wt/a									
	ENGENIA	12.8	fl oz/a									
	NIS	0.25	% v/v									
POST I (6/9/17) / POST IV (7/7/17) V6-R1												
10	SOA 14,15,4			98.8	a	90.3	b	97.8	c	99.0	42.7	-
	WARRANT ULTRA	3	pt/a									
	NIS	0.25	% v/v									
	COC	1.0	% v/v									
	ENGENIA	12.8	fl oz/a									
	NIS	0.25	% v/v									
11	SOA 14,15,4			98.8	a	88.3	b	97.5	c	99.0	43.1	-
	PREFIX	2	pt/a									
	NIS	0.25	% v/v									
	ENGENIA	12.8	fl oz/a									
	NIS	0.25	% v/v									
POST II (6/21/17) 4 inch weeds												
12	SOA 4			0.0	g	97.3	a	99.0	a	99.0	42.1	-
	ENGENIA CHECK	12.8	fl oz/a									
	NIS	0.25	% v/v									
LSD P=.10				3.4		3.4		0.5		NS	NS	

Table 7. Common lambsquarter control with Liberty (glufosinate) herbicide systems in soybeans at Rochester, MN in 2017.

Pest Code		Common Lambsquarters								YIELD			
Rating Date		Jun-16		Jul-3		Jul-14		Sep-29					
Trt	Treatment	Rate	Appl	Percent Control (%)								Bu/A	
PRE (5/27/17) / POST II (6/21/17) 4 inch weeds													
13	SOA 14,15,10			93.3	bc	98.8	a	98.0	a	98.5	a	41.5	-
	AUTHORITY ELITE	32	fl oz/a										
	LIBERTY 280	29	fl oz/a										
	N-Pa-K AMS	1.5	qt/a										
14	SOA 2,14,10			96.0	abc	98.8	a	98.0	a	98.0	a	42.6	-
	AUTHORITY FIRST	6.4	oz wt/a										
	LIBERTY 280	29	fl oz/a										
	N-Pa-K AMS	1.5	qt/a										
15	SOA 5,15,10			87.3	de	99.0	a	97.3	a	96.0	a	41.4	-
	BOUNDARY	2	pt/a										
	LIBERTY 280	29	fl oz/a										
	N-Pa-K AMS	1.5	qt/a										
16	SOA 2,14,10			94.5	abc	98.3	a	97.8	a	96.8	a	41.2	-
	ENLITE	2.8	oz wt/a										
	LIBERTY 280	29	fl oz/a										
	N-Pa-K AMS	1.5	qt/a										
17	SOA 14,15, 10			98.8	a	99.0	a	99.0	a	98.8	a	41.5	-
	FIERCE	3.5	oz wt/a										
	LIBERTY 280	29	fl oz/a										
	N-Pa-K AMS	1.5	qt/a										
19	SOA 14,10			97.3	ab	98.8	a	97.5	a	97.3	a	42.2	-
	ROWEL	2.75	oz wt/a										
	LIBERTY 280	29	fl oz/a										
	N-Pa-K AMS	1.5	qt/a										
20	SOA 2,14,15,10			84.5	e	97.8	a	95.3	a	94.3	a	40.7	-
	ZIDUA PRO	5	fl oz/a										
	LIBERTY 280	29	fl oz/a										
	N-Pa-K AMS	1.5	qt/a										
21	SOA 14,15,10			91.5	cd	97.5	a	96.5	a	96.3	a	40.9	-
	WARRANT ULTRA	3	pt/a										
	LIBERTY 280	29	fl oz/a										
	N-Pa-K AMS	1.5	qt/a										
PRE (5/27/17) / POST III (6/27/17) 4 inch weeds													
18	SOA 2,14,10			95.8	abc	98.3	a	94.3	a	94.8	a	38.4	-
	SURVEIL	3	oz wt/a										
	LIBERTY 280	29	fl oz/a										
	N-Pa-K AMS	1.5	qt/a										
POST I (6/9/17) / POST IV (7/7/17) V6-R1													
22	SOA 14,15,10			98.8	a	90.8	b	98.8	a	98.0	a	42.7	-
	WARRANT ULTRA	3	pt/a										
	NIS	0.25	% v/v										
	COC	1.0	% v/v										
	LIBERTY 280	29	fl oz/a										
	N-Pa-K AMS	1.5	qt/a										
23	SOA 14,15,10			98.0	a	93.0	b	98.5	a	98.3	a	42.5	-
	PREFIX	2	pt/a										
	NIS	0.25	% v/v										
	LIBERTY 280	29	fl oz/a										
	N-Pa-K AMS	1.5	qt/a										
POST II (6/21/17) 4 inch weeds													
24	SOA 10			0.0	f	79.5	c	78.0	b	75.0	b	40.8	-
	LIBERTY 280	29	fl oz/a										
	CHECK												
	N-Pa-K AMS	1.5	qt/a										
LSD P=.10				4.7		4.4		5.1		5.4		NS	

Table 8. Grass control with Engenia (dicamba) herbicide systems in soybeans at Rochester, MN in 2017.

Pest Code		GRASS								YIELD			
Rating Date		Jun-16		Jul-3		Jul-14		Sep-29					
Trt	Treatment	Rate	Appl	Percent Control (%)								Bu/A	
PRE (5/27/17) / POST II (6/21/17) 4 inch weeds													
1	SOA 14,15,4			98.0	ab	99.0	a	98.8	a	98.0	a	42.8	-
	AUTHORITY ELITE	32 fl oz/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
2	SOA 2,14,4			96.5	b	95.5	d	95.5	bc	94.8	cd	41.4	-
	AUTHORITY FIRST	6.4 oz wt/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
3	SOA 5,15,4			98.5	a	99.0	a	98.5	a	98.3	a	42.3	-
	BOUNDARY	2 pt/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
5	SOA 2,14,4			97.5	ab	96.8	cd	94.8	c	93.8	d	46.7	-
	ENLITE	2.8 oz wt/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
6	SOA 14,15,4			99.0	a	99.0	a	98.3	a	98.0	a	45.0	-
	FIERCE	3.5 oz wt/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
8	SOA 14,4			98.8	a	98.0	abc	97.0	ab	96.0	a-d	44.2	-
	ROWEL	2.75 oz wt/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
9	SOA 2,14,15,4			97.5	ab	98.0	abc	98.0	a	97.0	abc	46.2	-
	ZIDUA PRO	5 fl oz/a	A										
	ENGENIA	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
PRE (5/27/17) / POST III (6/27/17) 4 inch weeds													
4	SOA 5,15,4			98.0	ab	98.5	ab	98.5	a	98.3	a	41.6	-
	BOUNDARY	2 pt/a	A										
	ENGENIA	12.8 fl oz/a	A										
	ENGENIA	12.8 fl oz/a	D										
	NIS	0.25 % v/v	D										
7	SOA 2,14,4			96.8	b	97.3	bc	97.3	ab	95.3	bcd	43.2	-
	SURVEIL	3 oz wt/a	A										
	ENGENIA	12.8 fl oz/a	D										
	NIS	0.25 % v/v	D										
POST I (6/9/17) / POST IV (7/7/17) V6-R1													
10	SOA 14,15,4			98.5	a	97.3	bc	97.0	ab	96.5	abc	42.7	-
	WARRANT ULTRA	3 pt/a	B										
	NIS	0.25 % v/v	B										
	COC	1.0 % v/v	B										
	ENGENIA	12.8 fl oz/a	E										
	NIS	0.25 % v/v	E										
11	SOA 14,15,4			99.0	a	98.8	ab	98.3	a	97.5	ab	43.1	-
	PREFIX	2 pt/a	B										
	NIS	0.25 % v/v	B										
	ENGENIA	12.8 fl oz/a	E										
	NIS	0.25 % v/v	E										
POST II (6/21/17) 4 inch weeds													
12	SOA 4			0.0	c	0.0	e	0.0	d	0.0	e	42.1	-
	ENGENIA CHECK	12.8 fl oz/a	C										
	NIS	0.25 % v/v	C										
LSD P=.10				1.7		17		2.0		2.7		NS	

Table 9. Grass control with Liberty (glufosinate) herbicide systems in soybeans at Rochester, MN in 2017.

Pest Code	GRASS								YIELD				
	Rating Date		Jun-16	Jul-3	Jul-14	Sep-29							
Trt	Treatment	Rate	Appl	Percent Control (%)								Bu/A	
PRE (5/27/17) / POST II (6/21/17) 4 inch weeds													
13	SOA 14,15,10			98.8	a	99.0	-	98.5	a	98.5	a	41.5	-
	AUTHORITY ELITE	32 fl oz/a	A										
	LIBERTY 280	29 fl oz/a	C										
	N-Pa-K AMS	1.5 qt/a	C										
14	SOA 2,14,10			97.0	ab	99.0	-	98.0	a	98.3	a	42.6	-
	AUTHORITY FIRST	6.4 oz wt/a	A										
	LIBERTY 280	29 fl oz/a	C										
	N-Pa-K AMS	1.5 qt/a	C										
15	SOA 5,15,10			99.0	a	99.0	-	99.0	a	99.0	a	41.4	-
	BOUNDARY	2 pt/a	A										
	LIBERTY 280	29 fl oz/a	C										
	N-Pa-K AMS	1.5 qt/a	C										
16	SOA 2,14,10			98.3	a	98.8	-	99.0	a	98.5	a	41.2	-
	ENLITE	2.8 oz wt/a	A										
	LIBERTY 280	29 fl oz/a	C										
	N-Pa-K AMS	1.5 qt/a	C										
17	SOA 14,15, 10			99.0	a	99.0	-	99.0	a	99.0	a	41.5	-
	FIERCE	3.5 oz wt/a	A										
	LIBERTY 280	29 fl oz/a	C										
	N-Pa-K AMS	1.5 qt/a	C										
19	SOA 14,10			99.0	a	99.0	-	98.5	a	98.5	a	42.2	-
	ROWEL	2.75 oz wt/a	A										
	LIBERTY 280	29 fl oz/a	C										
	N-Pa-K AMS	1.5 qt/a	C										
20	SOA 2,14,15,10			95.3	b	99.0	-	98.8	a	99.0	a	40.7	-
	ZIDUA PRO	5 fl oz/a	A										
	LIBERTY 280	29 fl oz/a	C										
	N-Pa-K AMS	1.5 qt/a	C										
21	SOA 14,15,10			98.8	a	98.8	-	98.5	a	99.0	a	40.9	-
	WARRANT ULTRA	3 pt/a	A										
	LIBERTY 280	29 fl oz/a	C										
	N-Pa-K AMS	1.5 qt/a	C										
PRE (5/27/17) / POST III (6/27/17) 4 inch weeds													
18	SOA 2,14,10			98.5	a	98.5	-	98.5	a	98.8	a	38.4	-
	SURVEIL	3 oz wt/a	A										
	LIBERTY 280	29 fl oz/a	D										
	N-Pa-K AMS	1.5 qt/a	D										
POST I (6/9/17) / POST IV (7/7/17) V6-R1													
22	SOA 14,15,10			99.0	a	98.8	-	99.0	a	99.0	a	42.7	-
	WARRANT ULTRA	3 pt/a	B										
	NIS	0.25 % v/v	B										
	COC	1.0 % v/v	B										
	LIBERTY 280	29 fl oz/a	E										
	N-Pa-K AMS	1.5 qt/a	E										
23	SOA 14,15,10			99.0	a	98.8	-	99.0	a	99.0	a	42.5	-
	PREFIX	2 pt/a	B										
	NIS	0.25 % v/v	B										
	LIBERTY 280	29 fl oz/a	E										
	N-Pa-K AMS	1.5 qt/a	E										
POST II (6/21/17) 4 inch weeds													
24	SOA 10			0.0	c	98.8	-	95.5	b	b	ef	40.8	-
	LIBERTY 280	29 fl oz/a	C										
	CHECK												
	N-Pa-K AMS	1.5 qt/a	C										
LSD P=.10				2.5		0.5		1.6		1.7		NS	

Table 10. Crop response to Engenia (dicamba) herbicide systems in soybeans at Rochester, MN in 2017.

Pest Code		Crop Response						YIELD			
		Jun-16		Jul-3		Jul-14		Oct-18			
Trt	Treatment	Rate	Appl	Percent Control (%)				BU/A			
PRE (5/27/17) / POST II (6/21/17) 4 inch weeds											
1	SOA 14,15,4			0.0	f	5.0	c	0.0	-	42.8	-
	AUTHORITY ELITE	32	fl oz/a								
	ENGENIA	12.8	fl oz/a								
	NIS	0.25	% v/v								
2	SOA 2,14,4			0.0	f	5.0	c	0.0	-	41.4	-
	AUTHORITY FIRST	6.4	oz wt/a								
	ENGENIA	12.8	fl oz/a								
	NIS	0.25	% v/v								
3	SOA 5,15,4			0.0	f	5.0	c	0.0	-	42.3	-
	BOUNDARY	2	pt/a								
	ENGENIA	12.8	fl oz/a								
	NIS	0.25	% v/v								
5	SOA 2,14,4			3.8	e	5.0	c	0.0	-	46.7	-
	ENLITE	2.8	oz wt/a								
	ENGENIA	12.8	fl oz/a								
	NIS	0.25	% v/v								
6	SOA 14,15,4			22.5	c	13.8	a	0.0	-	45.0	-
	FIERCE	3.5	oz wt/a								
	ENGENIA	12.8	fl oz/a								
	NIS	0.25	% v/v								
8	SOA 14,4			18.8	d	12.5	ab	0.0	-	44.2	-
	ROWEL	2.75	oz wt/a								
	ENGENIA	12.8	fl oz/a								
	NIS	0.25	% v/v								
9	SOA 2,14,15,4			0.0	f	5.0	c	0.0	-	46.2	-
	ZIDUA PRO	5	fl oz/a								
	ENGENIA	12.8	fl oz/a								
	NIS	0.25	% v/v								
PRE (5/27/17) / POST III (6/27/17) 4 inch weeds											
4	SOA 5,15,4			0.0	f	1.3	d	0.0	-	41.6	-
	BOUNDARY	2	pt/a								
	ENGENIA	12.8	fl oz/a								
	ENGENIA	12.8	fl oz/a								
	NIS	0.25	% v/v								
7	SOA 2,14,4			23.3	c	12.5	ab	0.0	-	43.2	-
	SURVEIL	3	oz wt/a								
	ENGENIA	12.8	fl oz/a								
	NIS	0.25	% v/v								
POST I (6/9/17) / POST IV (7/7/17) V6-R1											
10	SOA 14,15,4			28.8	b	6.3	c	0.0	-	42.7	-
	WARRANT ULTRA	3	pt/a								
	NIS	0.25	% v/v								
	COC	1.0	% v/v								
	ENGENIA	12.8	fl oz/a								
	NIS	0.25	% v/v								
11	SOA 14,15,4			48.8	a	10.0	b	0.0	-	43.1	-
	PREFIX	2	pt/a								
	NIS	0.25	% v/v								
	ENGENIA	12.8	fl oz/a								
	NIS	0.25	% v/v								
POST II (6/21/17) 4 inch weeds											
12	SOA 4			0.0	f	5.0	c	0.0	-	42.1	-
	ENGENIA CHECK	12.8	fl oz/a								
	NIS	0.25	% v/v								
LSD P=.10				3.3		3.2		NS		NS	

Table 11. Crop response to Liberty (glufosinate) herbicide systems in soybeans at Rochester, MN in 2017.

Pest Code					Crop Response					YIELD		
Rating Date					Jun-16		Jul-3		Jul-14			
Trt	Treatment	Rate	Appl		Percent Injury (%)							Bu/A
PRE (5/27/17) / POST II (6/21/17) 4 inch weeds												
13	SOA 14,15,10				0.0	f	18.8	d	0.0	c	41.5	-
	AUTHORITY ELITE	32	fl oz/a	A								
	LIBERTY 280	29	fl oz/a	C								
	N-Pa-K AMS	1.5	qt/a	C								
14	SOA 2,14,10				0.0	f	18.8	d	0.0	c	42.6	-
	AUTHORITY FIRST	6.4	oz wt/a	A								
	LIBERTY 280	29	fl oz/a	C								
	N-Pa-K AMS	1.5	qt/a	C								
15	SOA 5,15,10				0.0	f	18.8	d	0.0	c	41.4	-
	BOUNDARY	2	pt/a	A								
	LIBERTY 280	29	fl oz/a	C								
	N-Pa-K AMS	1.5	qt/a	C								
16	SOA 2,14,10				0.0	f	21.3	bc	0.0	c	41.2	-
	ENLITE	2.8	oz wt/a	A								
	LIBERTY 280	29	fl oz/a	C								
	N-Pa-K AMS	1.5	qt/a	C								
17	SOA 14,15, 10				16.3	d	23.8	a	0.0	c	41.5	-
	FIERCE	3.5	oz wt/a	A								
	LIBERTY 280	29	fl oz/a	C								
	N-Pa-K AMS	1.5	qt/a	C								
19	SOA 14,10				11.3	e	22.5	ab	0.0	c	42.2	-
	ROWEL	2.75	oz wt/a	A								
	LIBERTY 280	29	fl oz/a	C								
	N-Pa-K AMS	1.5	qt/a	C								
20	SOA 2,14,15,10				0.0	f	20.0	cd	0.0	c	40.7	-
	ZIDUA PRO	5	fl oz/a	A								
	LIBERTY 280	29	fl oz/a	C								
	N-Pa-K AMS	1.5	qt/a	C								
21	SOA 14,15,10				0.0	f	20.0	cd	0.0	c	40.9	-
	WARRANT ULTRA	3	pt/a	A								
	LIBERTY 280	29	fl oz/a	C								
	N-Pa-K AMS	1.5	qt/a	C								
PRE (5/27/17) / POST III (6/27/17) 4 inch weeds												
18	SOA 2,14,10				20.0	c	23.8	a	0.0	c	38.4	-
	SURVEIL	3	oz wt/a	A								
	LIBERTY 280	29	fl oz/a	D								
	N-Pa-K AMS	1.5	qt/a	D								
POST I (6/9/17) / POST IV (7/7/17) V6-R1												
22	SOA 14,15,10				26.3	b	8.8	f	12.5	b	42.7	-
	WARRANT ULTRA	3	pt/a	B								
	NIS	0.25	% v/v	B								
	COC	1.0	% v/v	B								
	LIBERTY 280	29	fl oz/a	E								
	N-Pa-K AMS	1.5	qt/a	E								
23	SOA 14,15,10				41.3	a	11.3	e	17.5	a	42.5	-
	PREFIX	2	pt/a	B								
	NIS	0.25	% v/v	B								
	LIBERTY 280	29	fl oz/a	E								
	N-Pa-K AMS	1.5	qt/a	E								
POST II (6/21/17) 4 inch weeds												
24	SOA 10				0.0	f	20.0	cd	0.0	c	40.8	-
	LIBERTY 280 CHECK	29	fl oz/a	C								
	N-Pa-K AMS	1.5	qt/a	C								
LSD P=.10					2.9		1.9		1.3		NS	