

Giant Ragweed Control in Soybean - Demonstration of the Advantages of a Full Spectrum Residual Herbicide Program in Soybean at Rochester, Minnesota in 2016.

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The objective of this trial was to evaluate herbicide programs for giant ragweed control in soybeans in southeastern Minnesota in 2016. The research site was a loamy sand series with pH of 6.4, O.M. 2.2% and soil test P and K levels of 31 ppm and 123 ppm, respectively. The field was disked and field cultivated once in the spring prior to planting. The previous crop was corn. The soybean variety NK Brand S20-T6 was planted May 18, 2016 at a depth of 1.5 inches in 30-inch rows at a rate of 165,000 seeds per acre. A randomized complete block design with four replications was used. Preemergence (PRE) treatments were applied with a tractor-mounted sprayer delivering 15 gpa at 30 psi using TTI 11002 spray tips. POST applications were made using TTI 11002 spray tips for systemic herbicides and TTIJ60 11002 spray tips for contact herbicides. Evaluations of this plot were taken June 8, 16, 20, 28, July 11 and September 27. The center two rows of each plot were machine harvested on October 1, 2016. Application dates, environmental conditions, and weed stages are in Table 1. Performance ratings for control of giant ragweed, common lambsquarters, common waterhemp, and grass, plus crop response can be found in Tables 2 through 6 respectively.

Discussion

Authority First at either 6.4 or 8.0 oz/a provided the highest preemergence giant ragweed control (94%) and the longest duration of control, an additional 4 to 10 days, before postemergence herbicides were applied, June 16 rating, Table 2. Zidua Pro at 6 fl oz/a plus Tricor at 6 oz wt/ac provided 89% control of giant ragweed and POST herbicides were applied 4 days earlier (June 20 compared to June 24) than the 6.4 or 8.0 oz/a Authority First treatments. Verdict at 5 fl oz/a + Outlook at 10 fl oz/a + Tricor at 6 oz wt/a gave slightly less control at 85-87% control and POST programs were also applied on June 20. The addition of Tricor at 6 oz wt/a to preemergence ZiduaPro or Verdict gave a 4-7% increase in giant ragweed control in this trial, Table 2. (University of Minnesota Extension Regional Office, Rochester.)

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

Date	5/19	6/14	6/17	6/20	6/24
Treatment	PRE (A)	POST I (B)	POST II (C)	POST III (D)	POST IV (E)
Temperature (F)					
Air	64	73	72	76	69
Soil	57.6	73.9	73.9	78.4	65
Relative Humidity (%)	38	81	78	49	78
Wind (mph)	16	14	10	16	6
Soil Moisture	Normal	Normal	Normal	Normal	Normal
Soybean					
Stage		V2	V3	V4	V4-V5
Height (inch)		6.9	8.8	9.4	11.2
Giant Ragweed					
Weed Density (ft ²)				5.5	
Height (inch)		4	5.3	8.1	6.5
Common Lambsquarter					
Weed Density (ft ²)				8	
Height (inch)		1.4	1.8		1.5
Common Waterhemp					
Weed Density (ft ²)				15.5	
Height (inch)		1.5	2.1		2.0
Grass					
Weed Density (ft ²)				21.5	
Height (inch)		2.8	3.9	3.3	2.1
Rainfall after each application (inch)					
Week 1	2.12	2.68	0.41	0.71	0.70
Week 2	0.99	0.71	0.70	0.10	1.61
Week 3	2.27	1.0	1.61	2.07	0.82
Week 4	2.38	1.45	0.82	2.32	1.96

Table 4. Evaluation of herbicide systems to control common waterhemp in soybeans at Rochester, MN in 2016.

Pest Code	AMATA										YIELD @13%						
	Common Waterhemp																
	Rating Date	June-8	June-16	June-20	June-28	July-11	Sept-27	Oct-11	BU/A								
No. Treatment	Rate	Unit	Application	Percent Control (%)													
6	UNTREATED CHECK			0	b	0	c	0	e	0	c	0	d	0	e	16.5	h
A/B = PRE 5/19/16 / POST I 6/14/16 (EAPOWE - 2-4 inch weeds)																	
1	SOA 2, 14 / 14, 9			99	a	99	a	99	a	99	a	99	a	99	a	54.2	b-f
	AUTHORITY ASSIST	9	fl oz/a														
	MARVEL	7.25	fl oz/a														
	ROUNDUP POWERMAX	32	fl oz/a														
	Ammonium Sulfate	3.3	lb/100 gal														
2	SOA 2,14 / 14, 9			99	a	99	a	99	a	99	a	99	abc	99	abc	53.5	c-f
	AUTHORITY ASSIST	12	fl oz/a														
	MARVEL	7.25	fl oz/a														
	ROUNDUP POWERMAX	32	fl oz/a														
	Ammonium Sulfate	3.3	lb/100 gal														
7	SOA 5, 15 / 14, 9			99	a	99	a	99	a	99	a	99	a	99	a	54.3	b-e
	BOUNDARY	1.5	pt/a														
	FLEXSTAR GT 3.5	3.5	pt/a														
	MSO	1	% v/v														
	Ammonium Sulfate	3.3	lb/100 gal														
8	SOA 5, 15 / 14, 9, 15			99	a	99	a	99	a	99	a	99	a	99	a	52.1	d-g
	BOUNDARY	1.5	pt/a														
	FLEXSTAR GT 3.5	3.5	pt/a														
	DUAL II MAGNUM	1	pt/a														
	MSO	1	% v/v														
	Ammonium Sulfate	3.3	lb/100 gal														
9	SOA 14, 15 / 14, 9			99	a	99	a	99	a	99	a	99	a	99	a	52.1	d-g
	BROADAXE	25	fl oz/a														
	FLEXSTAR GT 3.5	3.5	pt/a														
	MSO	1	% v/v														
	Ammonium Sulfate	3.3	lb/100 gal														
10	SOA 14, 15 / 14, 9, 15			99	a	99	a	99	a	99	a	99	ab	99	ab	50.7	efg
	BROADAXE	25	fl oz/a														
	FLEXSTAR GT 3.5	3.5	pt/a														
	DUAL II MAGNUM	1	pt/a														
	MSO	1	% v/v														
	Ammonium Sulfate	3.3	lb/100 gal														
A/C = PRE 5/19/16 / POST II 6/17/16 (MIDPOWE - 2-4 inch weeds)																	
16	SOA 14, 15, 5 / 14			99	a	99	a	99	a	99	a	99	a	99	a	50.7	fg
	VERDICT	5	fl oz/a														
	OUTLOOK	10	fl oz/a														
	TRICOR	6	oz wt/a														
	COBRA	8	fl oz/a														
	COC	1	pt/a														
	N-Pa-K AMS	3	qt/a														
17	SOA 14, 15, 5 / 14, 15			99	a	99	a	99	a	99	a	99	a	99	a	49.5	g
	VERDICT	5	fl oz/a														
	OUTLOOK	10	fl oz/a														
	TRICOR	6	oz wt/a														
	COBRA	8	fl oz/a														
	OUTLOOK	10	fl oz/a														
	COC	1	pt/a														
	N-Pa-K AMS	3	qt/a														
A/D = PRE 5/19/16 / POST III 6/20/16 (MIDPOWE - 2-4 inch weeds)																	
11	SOA 2, 14, 15 / 9			99	a	99	a	99	a	99	a	99	abc	99	abc	56.9	abc
	ZIDUA PRO	6	fl oz/a														
	ROUNDUP POWERMAX	32	fl oz/a														
12	SOA 2, 14, 15, 5 / 9			99	a	99	a	99	a	99	a	99	ab	99	ab	58.1	a
	ZIDUA PRO	6	fl oz/a														
	TRICOR	6	oz wt/a														
	ROUNDUP POWERMAX	32	fl oz/a														
13	SOA 14, 15			99	a	99	a	99	a	99	a	99	a	98	c	55.5	a-d
	VERDICT	5	fl oz/a														
	OUTLOOK	10	fl oz/a														
	ROUNDUP POWERMAX	32	fl oz/a														
14	SOA 14, 15, 5			99	a	99	b	99	a	99	a	97	b	98	bc	57.9	a
	VERDICT	5	fl oz/a														
	TRICOR	6	oz wt/a														
	ROUNDUP POWERMAX	32	fl oz/a														
15	SOA 14, 15, 5			99	a	99	a	99	a	99	a	99	abc	99	abc	54.8	a-d
	VERDICT	5	fl oz/a														
	OUTLOOK	10	fl oz/a														
	TRICOR	6	oz wt/a														
	ROUNDUP POWERMAX	32	fl oz/a														
A/E = PRE 5/19/16 / POST IV 6/24/16 (MIDPOWE - 2-4 inch weeds)																	
3	SOA 2,14 / 14, 9			99	a	99	a	98	c	99	a	99	a	99	a	57.6	ab
	AUTHORITY FIRST	4	oz/a														
	MARVEL	7.25	fl oz/a														
	ROUNDUP POWERMAX	32	fl oz/a														
	Ammonium Sulfate	3.3	lb/100 gal														
4	SOA 2,14 / 14, 9			99	a	99	b	99	b	99	a	99	a	99	a	55.5	a-d
	AUTHORITY FIRST	6.4	oz/a														
	MARVEL	7.25	fl oz/a														
	ROUNDUP POWERMAX	32	fl oz/a														
	Ammonium Sulfate	3.3	lb/100 gal														
5	SOA 2,14 / 14, 9			99	a	99	a	99	a	99	a	99	a	99	a	54.7	a-d
	AUTHORITY FIRST	8.0	oz/a														
	MARVEL	7.25	fl oz/a														
	ROUNDUP POWERMAX	32	fl oz/a														
	Ammonium Sulfate	3.3	lb/100 gal														
C = POST II 6/17/16 (4 inch weeds)																	
18	SOA 9			0	b	0	c	75	d	85	b	78	c	76	d	56.7	abc
	ROUNDUP POWERMAX	32	fl oz/a														
LSD P=.10						0.3		0.5		1		1		1		3.6	

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

Table 5. Evaluation of herbicide systems to control grasses in soybeans at Rochester, MN in 2016.

Pest Code	Rating Date	No.	Name	Rate	Unit	Application	Grass species.								YIELD Oct-11 BU/A					
							June-8		June-16		June-20		June-28				July-11		Sept-27	
							Percent Control (%)													
6	UNTREATED CHECK						0	b	0	d	0	f	0	d	0	f	0	d	16.5	h
A/B = PRE 5/19/16 / POST I 6/14/16 (EAPOWE - 2-4 inch weeds)																				
1	SOA 2, 14 / 14, 9						99	a	98	ab	99	a	99	ab	98	ab	99	ab	54.2	b-f
	AUTHORITY ASSIST	9	fl oz/a			A														
	MARVEL	7.25	fl oz/a			B														
	ROUNDUP POWERMAX	32	fl oz/a			B														
	Ammonium Sulfate	3.3	lb/100 gal			B														
2	SOA 2,14 / 14, 9						99	a	99	a	99	a	99	ab	99	a	99	ab	53.5	c-f
	AUTHORITY ASSIST	12	fl oz/a			A														
	MARVEL	7.25	fl oz/a			B														
	ROUNDUP POWERMAX	32	fl oz/a			B														
	Ammonium Sulfate	3.3	lb/100 gal			B														
7	SOA 5, 15 / 14, 9						99	a	99	a	99	a	99	a	99	a	99	ab	54.3	b-e
	BOUNDARY	1.5	pt/a			A														
	FLEXSTAR GT 3.5	3.5	pt/a			B														
	MSO	1	% v/v			B														
	Ammonium Sulfate	3.3	lb/100 gal			B														
8	SOA 5, 15 / 14, 9, 15						99	a	99	a	99	a	99	a	99	a	99	a	52.1	d-g
	BOUNDARY	1.5	pt/a			A														
	FLEXSTAR GT 3.5	3.5	pt/a			B														
	DUAL II MAGNUM	1	pt/a			B														
	MSO	1	% v/v			B														
	Ammonium Sulfate	3.3	lb/100 gal			B														
9	SOA 14, 15 / 14, 9						99	a	99	a	99	a	99	a	99	a	99	ab	52.1	d-g
	BROADAXE	25	fl oz/a			A														
	FLEXSTAR GT 3.5	3.5	pt/a			B														
	MSO	1	% v/v			B														
	Ammonium Sulfate	3.3	lb/100 gal			B														
10	SOA 14, 15 / 14, 9, 15						99	a	99	a	99	a	99	a	99	a	99	a	50.7	efg
	BROADAXE	25	fl oz/a			A														
	FLEXSTAR GT 3.5	3.5	pt/a			B														
	DUAL II MAGNUM	1	pt/a			B														
	MSO	1	% v/v			B														
	Ammonium Sulfate	3.3	lb/100 gal			B														
A/C = PRE 5/19/16 / POST II 6/17/16 (MIDPOWE - 2-4 inch weeds)																				
16	SOA 14, 15, 5 / 14						99	a	99	a	99	a	99	b	97	cd	98	ab	50.7	fg
	VERDICT	5	fl oz/a			A														
	OUTLOOK	10	fl oz/a			A														
	TRICOR	6	oz wt/a			A														
	COBRA	8	fl oz/a			C														
	COC	1	pt/a			C														
	N-Pa-K AMS	3	qt/a			C														
17	SOA 14, 15, 5 / 14, 15						99	a	99	a	99	a	99	b	98	abc	98	ab	49.5	g
	VERDICT	5	fl oz/a			A														
	OUTLOOK	10	fl oz/a			A														
	TRICOR	6	oz wt/a			A														
	COBRA	8	fl oz/a			C														
	OUTLOOK	10	fl oz/a			C														
	COC	1	pt/a			C														
	N-Pa-K AMS	3	qt/a			C														
A/D = PRE 5/19/16 / POST III 6/20/16 (MIDPOWE - 2-4 inch weeds)																				
11	SOA 2, 14, 15 / 9						99	a	99	a	99	a	99	a	99	a	99	ab	56.9	abc
	ZIDUA PRO	6	fl oz/a			A														
	ROUNDUP POWERMAX	32	fl oz/a			D														
12	SOA 2, 14, 15, 5 / 9						99	a	99	a	99	ab	99	a	98	ab	99	ab	58.1	a
	ZIDUA PRO	6	fl oz/a			A														
	TRICOR	6	oz wt/a			A														
	ROUNDUP POWERMAX	32	fl oz/a			D														
13	SOA 14, 15						99	a	99	a	99	ab	99	a	97	bcd	97	b	55.5	a-d
	VERDICT	5	fl oz/a			A														
	OUTLOOK	10	fl oz/a			A														
	ROUNDUP POWERMAX	32	fl oz/a			D														
14	SOA 14, 15, 5						99	a	94	c	95	d	99	a	96	d	98	ab	57.9	a
	VERDICT	5	fl oz/a			A														
	TRICOR	6	oz wt/a			A														
	ROUNDUP POWERMAX	32	fl oz/a			D														
15	SOA 14, 15, 5						99	a	99	a	99	a	99	a	97	cd	97	b	54.8	a-d
	VERDICT	5	fl oz/a			A														
	OUTLOOK	10	fl oz/a			A														
	TRICOR	6	oz wt/a			A														
	ROUNDUP POWERMAX	32	fl oz/a			D														
A/E = PRE 5/19/16 / POST IV 6/24/16 (MIDPOWE - 2-4 inch weeds)																				
3	SOA 2,14 / 14, 9						99	a	93	c	91	e	99	ab	99	a	99	a	57.6	ab
	AUTHORITY FIRST	4	oz/a			A														
	MARVEL	7.25	fl oz/a			E														
	ROUNDUP POWERMAX	32	fl oz/a			E														
	Ammonium Sulfate	3.3	lb/100 gal			E														
4	SOA 2,14 / 14, 9						99	a	97	b	97	c	99	a	99	a	99	a	55.5	a-d
	AUTHORITY FIRST	6.4	oz/a			A														
	MARVEL	7.25	fl oz/a			E														
	ROUNDUP POWERMAX	32	fl oz/a			E														
	Ammonium Sulfate	3.3	lb/100 gal			E														
5	SOA 2,14 / 14, 9						99	a	97	b	98	bc	99	a	99	a	99	a	54.7	a-d
	AUTHORITY FIRST	8.0	oz/a			A														
	MARVEL	7.25	fl oz/a			E														
	ROUNDUP POWERMAX	32	fl oz/a			E														
	Ammonium Sulfate	3.3	lb/100 gal			E														
C = POST II 6/17/16 (4 inch weeds)																				
18	SOA 9						0	b	0	d	90	e	91	c	81	e	80	c	56.7	abc
	ROUNDUP POWERMAX	32	fl oz/a			C														
LSD P=.10									2		1		0.5		1		2		3.6	

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

Table 6. Soybean response to herbicide systems at Rochester, MN in 2016.

Pest Code	Rating Date	No.	Name	Rate	Unit	Application	CROP RESPONSE					YIELD Oct-11 BU/A						
							June-8		June-16		June-20		June-28		July-11			
							Percent Injury (%)		Percent Injury (%)		Percent Injury (%)		Percent Injury (%)		Percent Injury (%)			
6	UNTREATED CHECK						0	-	0	e	0	e	0	f	0	d	16.5	h
A/B = PRE 5/19/16 / POST I 6/14/16 (EAPOWE - 2-4 inch weeds)																		
1	SOA 2, 14 / 14, 9						0	-	40	d	40	d	10	de	0	d	54.2	b-f
	AUTHORITY ASSIST	9	fl oz/a			A												
	MARVEL	7.25	fl oz/a			B												
	ROUNDUP POWERMAX	32	fl oz/a			B												
	Ammonium Sulfate	3.3	lb/100 gal			B												
2	SOA 2,14 / 14, 9						0	-	40	d	39	d	10	de	0	d	53.5	c-f
	AUTHORITY ASSIST	12	fl oz/a			A												
	MARVEL	7.25	fl oz/a			B												
	ROUNDUP POWERMAX	32	fl oz/a			B												
	Ammonium Sulfate	3.3	lb/100 gal			B												
7	SOA 5, 15 / 14, 9						0	-	55	c	48	c	11	d	0	d	54.3	b-e
	BOUNDARY	1.5	pt/a			A												
	FLEXSTAR GT 3.5	3.5	pt/a			B												
	MSO	1	% v/v			B												
	Ammonium Sulfate	3.3	lb/100 gal			B												
8	SOA 5, 15 / 14, 9, 15						0	-	64	b	68	b	21	c	0	d	52.1	d-g
	BOUNDARY	1.5	pt/a			A												
	FLEXSTAR GT 3.5	3.5	pt/a			B												
	DUAL II MAGNUM	1	pt/a			B												
	MSO	1	% v/v			B												
	Ammonium Sulfate	3.3	lb/100 gal			B												
9	SOA 14, 15 / 14, 9						0	-	55	c	50	c	11	d	0	d	52.1	d-g
	BROADAXE	25	fl oz/a			A												
	FLEXSTAR GT 3.5	3.5	pt/a			B												
	MSO	1	% v/v			B												
	Ammonium Sulfate	3.3	lb/100 gal			B												
10	SOA 14, 15 / 14, 9, 15						0	-	65	a	71	a	23	c	1	cd	50.7	efg
	BROADAXE	25	fl oz/a			A												
	FLEXSTAR GT 3.5	3.5	pt/a			B												
	DUAL II MAGNUM	1	pt/a			B												
	MSO	1	% v/v			B												
	Ammonium Sulfate	3.3	lb/100 gal			B												
A/C = PRE 5/19/16 / POST II 6/17/16 (MIDPOWE - 2-4 inch weeds)																		
16	SOA 14, 15, 5 / 14						0	-	0	e	69	ab	43	b	4	abc	50.7	fg
	VERDICT	5	fl oz/a			A												
	OUTLOOK	10	fl oz/a			A												
	TRICOR	6	oz wt/a			A												
	COBRA	8	fl oz/a			C												
	COC	1	pt/a			C												
	N-Pa-K AMS	3	qt/a			C												
17	SOA 14, 15, 5 / 14, 15						0	-	0	e	70	ab	54	a	3	bcd	49.5	g
	VERDICT	5	fl oz/a			A												
	OUTLOOK	10	fl oz/a			A												
	TRICOR	6	oz wt/a			A												
	COBRA	8	fl oz/a			C												
	OUTLOOK	10	fl oz/a			C												
	COC	1	pt/a			C												
	N-Pa-K AMS	3	qt/a			C												
A/D = PRE 5/19/16 / POST III 6/20/16 (MIDPOWE - 2-4 inch weeds)																		
11	SOA 2, 14, 15 / 9						0	-	0	e	0	e	5	ef	3	bcd	56.9	abc
	ZIDUA PRO	6	fl oz/a			A												
	ROUNDUP POWERMAX	32	fl oz/a			D												
12	SOA 2, 14, 15, 5 / 9						0	-	0	e	0	e	5	ef	3	bcd	58.1	a
	ZIDUA PRO	6	fl oz/a			A												
	TRICOR	6	oz wt/a			A												
	ROUNDUP POWERMAX	32	fl oz/a			D												
13	SOA 14, 15						0	-	0	e	0	e	1	f	3	bcd	55.5	a-d
	VERDICT	5	fl oz/a			A												
	OUTLOOK	10	fl oz/a			A												
	ROUNDUP POWERMAX	32	fl oz/a			D												
14	SOA 14, 15, 5						0	-	0	e	1	e	0	f	0	d	57.9	a
	VERDICT	5	fl oz/a			A												
	TRICOR	6	oz wt/a			A												
	ROUNDUP POWERMAX	32	fl oz/a			D												
15	SOA 14, 15, 5						0	-	0	e	0	e	3	f	3	bcd	54.8	a-d
	VERDICT	5	fl oz/a			A												
	OUTLOOK	10	fl oz/a			A												
	TRICOR	6	oz wt/a			A												
	ROUNDUP POWERMAX	32	fl oz/a			D												
A/E = PRE 5/19/16 / POST IV 6/24/16 (MIDPOWE - 2-4 inch weeds)																		
3	SOA 2,14 / 14, 9						0	-	0	e	0	e	46	b	6	a	57.6	ab
	AUTHORITY FIRST	4	oz/a			A												
	MARVEL	7.25	fl oz/a			E												
	ROUNDUP POWERMAX	32	fl oz/a			E												
	Ammonium Sulfate	3.3	lb/100 gal			E												
4	SOA 2,14 / 14, 9						0	-	0	e	0	e	46	b	5	ab	55.5	a-d
	AUTHORITY FIRST	6.4	oz/a			A												
	MARVEL	7.25	fl oz/a			E												
	ROUNDUP POWERMAX	32	fl oz/a			E												
	Ammonium Sulfate	3.3	lb/100 gal			E												
5	SOA 2,14 / 14, 9						0	-	0	e	0	e	46	b	5	ab	54.7	a-d
	AUTHORITY FIRST	8.0	oz/a			A												
	MARVEL	7.25	fl oz/a			E												
	ROUNDUP POWERMAX	32	fl oz/a			E												
	Ammonium Sulfate	3.3	lb/100 gal			E												
C = POST II 6/17/16 (4 inch weeds)																		
18	SOA 9						0	-	0	e	0	e	0	f	0	d	56.7	abc
	ROUNDUP POWERMAX	32	fl oz/a			C												
LSD P=.10									1		3		6		3		3.6	

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