

## ***Demonstration of the Advantages of a Full Spectrum Residual Herbicide Program in Soybean at Rochester, Minnesota in 2015.***

Behnken, Lisa M., Fritz R. Breitenbach, Dillon Welter and Ellen Sheehan.

The objective of this trial was to evaluate the advantages of using full spectrum residual herbicide programs for weed control in soybeans in southeastern Minnesota in 2015. The research site was a Lawler loam series with pH of 6.2, O.M. 2.4% and soil test P and K levels of 36 ppm and 194 ppm, respectively. In the spring the field was disked and field cultivated once prior to planting. The previous crop was corn. The soybean variety was NK Brand S20-T6 and was planted May 20, 2015 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 spray tips. POST applications for systemic herbicides were made using TTI 11002 spray tips and for contact herbicides using TTI J60 spray tips. Evaluations of this plot were taken June 10, June 18, June 26, June 30, July 8, July 15, and September 22. The center two rows of each plot were machine harvested on October 14, 2015. Application dates, environmental conditions, and weed stages can be found in Table 1. Performance ratings for giant ragweed, common lambsquarters, common waterhemp, grass control, and crop response can be found in Tables 2 through 6 respectively. (University of Minnesota Extension Regional Office, Rochester.)

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

Date	5/20	6/16	6/25
<b>Treatment</b>	PRE (A)	POST I (B)	POST II (C)
<b>Temperature (F)</b>			
Air	54	64	80
Soil	54.7	68.9	78.3
<b>Relative Humidity (%)</b>	46	68	52
<b>Wind (mph)</b>	5	7	12
<b>Soil Moisture</b>	SL Wet	Normal	Normal
<b>Soybean</b>			
Stage		V2	V4
Height (inch)		6	10
<b>Giant Ragweed</b>			
Weed Density (ft <sup>2</sup> )		10.3	
Height (inch)		4.3	3.8
<b>Common Lambsquarter</b>			
Weed Density (ft <sup>2</sup> )		50.0	
Height (inch)		1.5	1.6
<b>Common Waterhemp</b>			
Weed Density (ft <sup>2</sup> )		14	
Height (inch)		1.6	2.3
<b>Grass</b>			
Weed Density (ft <sup>2</sup> )		22.7	
Height (inch)		2	
<b>Rainfall after each application (inch)</b>			
Week 1	1.47	0.78	1.63
Week 2	1.09	1.17	0.69
Week 3	1.64	1.15	0.30

**Table 2. Giant ragweed control with residual herbicide programs in soybean at Rochester, MN in 2015**

Pest Code			Giant Ragweed								YIELD						
Rating Date			June 10	June 18	June 26	July 8	July 15	Sept. 22	Oct-14-2015								
Trt	Treatment	Rate	Appl		Percent Control (%)						BU/A						
1	UNTREATED		0	g	0	h	0	e	0	c	0	c	0	d	6.1	d	
<b>PRE/POST I 5-20/6-16</b>																	
2	SOA 14, 15 / 14, 9																
	BROADAXE	25 fl oz/a	A	46	f	99	a	99	a	98	a	99	a	99	a	44.9	ab
	FLEXSTAR GT 3.5	3.5 pt/a	B														
	N-PAK AMS	2.5 % v/v	B														
	MSO	1 % v/v	B														
3	SOA 5, 15 / 14, 9			46	f	99	a	99	ab	98	a	98	a	97	ab	43.0	abc
	BOUNDARY	1.8 pt/a	A														
	FLEXSTAR GT 3.5	3.5 pt/a	B														
	N-PAK AMS	2.5 % v/v	B														
	MSO	1 % v/v	B														
4	SOA 14,15 / 9			46	f	63	f	97	c	94	b	94	b	93	c	43.2	abc
	BROADAXE	25 fl oz/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
5	SOA 5, 15 / 9			50	e	66	f	97	bc	95	b	94	b	94	c	43.2	abc
	BOUNDARY	1.8 pt/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
7	SOA 14, 15 / 9			77	c	82	e	96	c	92	b	91	b	90	c	39.9	c
	FIERCE	3 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
8	SOA 2, 14 / 9			85	b	89	d	97	c	94	b	94	b	93	c	44.8	ab
	SONIC	5 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
10	SOA 2, 14, 15 / 9			86	b	89	cd	96	c	93	b	93	b	92	c	45.2	ab
	OPTILL	2 oz/a	A														
	ZIDUA	2 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
11	SOA 14, 15 / 9			74	d	79	e	97	bc	94	b	93	b	94	bc	44.3	ab
	VERDICT	5 fl oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
<b>PRE/POST II 5-20/6-25</b>																	
6	SOA 14, 15 / 9			94	a	95	ab	92	d	99	a	99	a	99	a	42.1	bc
	PREFIX	2 pt/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	C														
	N-PAK AMS	2.5 % v/v	C														
9	SOA 2, 14 / 9			91	a	94	bc	91	d	99	a	98	a	99	a	46.1	a
	SURVEIL																
	FLUMIOXACIN	2.5 oz/a	A														
	CLORANSULAM-METHYL	0.5 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	C														
	N-PAK AMS	2.5 % v/v	C														
<b>POST II 6-25</b>																	
12	SOA 9			0	g	43	g	96	c	93	b	93	b	92	c	46.5	a
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
<b>LSD P=.10 for weed ratings, LSD P = .20 for yield</b>				3.0		4.7		1.6		3.1		3.5		3.5		4.25	

Means followed by same letter do not significantly differ

**Table 3. Common lambsquarters control with residual herbicide programs in soybean at Rochester, MN in 2015.**

Pest Code			Common lambsquarters								YIELD					
Rating Date			June 10	June 18	June 26	July 8	July 15	Sept 22	Bu/A							
Trt	Treatment	Rate	Appl		Percent Control (%)						Bu/A					
1	UNTREATED		0	c	0	d	0	e	0	f	0	e	0	d	6.1	d
<b>PRE / POST I 5-20 / 6-16</b>																
2	SOA 14, 15 / 14, 9		99	a	99	a	99	a	99	a	99	a	99	a	44.9	ab
	BROADAXE	25 fl oz/a														
	FLEXSTAR GT 3.5	3.5 pt/a														
	N-PAK AMS	2.5 % v/v														
	MSO	1 % v/v														
3	SOA 5, 15 / 14, 9		96	b	99	a	99	a	99	a	98	ab	98	a	43.0	abc
	BOUNDARY	1.8 pt/a														
	FLEXSTAR GT 3.5	3.5 pt/a														
	N-PAK AMS	2.5 % v/v														
	MSO	1 % v/v														
4	SOA 14,15 / 9		99	a	99	a	99	a	99	a	99	a	99	a	43.2	abc
	BROADAXE	25 fl oz/a														
	TOUCHDOWN TOTAL	32 fl oz/a														
	N-PAK AMS	2.5 % v/v														
5	SOA 5, 15 / 9		99	a	99	a	98	b	94	c	91	c	92	b	43.2	abc
	BOUNDARY	1.8 pt/a														
	TOUCHDOWN TOTAL	32 fl oz/a														
	N-PAK AMS	2.5 % v/v														
7	SOA 14, 15 / 9		99	a	99	a	99	a	98	b	95	b	98	a	39.9	c
	FIERCE	3 oz/a														
	ROUNDUP POWERMAX	29 fl oz/a														
	N-PAK AMS	2.5 % v/v														
8	SOA 2, 14 / 9		99	a	99	a	99	ab	99	ab	98	a	99	a	44.8	ab
	SONIC	5 oz/a														
	ROUNDUP POWERMAX	29 fl oz/a														
	N-PAK AMS	2.5 % v/v														
10	SOA 2, 14, 15 / 9		99	a	99	a	99	a	99	ab	98	ab	99	a	45.2	ab
	OPTILL	2 oz/a														
	ZIDUA	2 oz/a														
	ROUNDUP POWERMAX	29 fl oz/a														
	N-PAK AMS	2.5 % v/v														
11	SOA 14, 15 / 9		97	b	95	b	95	c	88	d	89	c	90	b	44.3	ab
	VERDICT	5 fl oz/a														
	ROUNDUP POWERMAX	29 fl oz/a														
	N-PAK AMS	2.5 % v/v														
<b>PRE / POST II 5-20 / 6-25</b>																
6	SOA 14, 15 / 9		99	a	98	a	95	c	99	ab	98	a	98	a	42.1	bc
	PREFIX	2 pt/a														
	TOUCHDOWN TOTAL	32 fl oz/a														
	N-PAK AMS	2.5 % v/v														
9	SOA 2, 14 / 9		99	a	99	a	99	ab	99	a	99	a	99	a	46.1	a
	SURVEIL															
	FLUMIOXACIN	2.5 oz/a														
	CLORANSULAM-METHYL	0.5 oz/a														
	ROUNDUP POWERMAX	29 fl oz/a														
	N-PAK AMS	2.5 % v/v														
<b>POST I 6-16</b>																
12	SOA 9		0	c	43	c	89	d	77	e	76	d	77	c	46.5	a
	ROUNDUP POWERMAX	29 fl oz/a														
	N-PAK AMS	2.5 % v/v														
<b>LSD P=.10 for weed ratings, LSD P = .20 for yield</b>			<b>2.4</b>		<b>2.4</b>		<b>1.3</b>		<b>1.3</b>		<b>2.5</b>		<b>2.1</b>		<b>4.25</b>	

Means followed by same letter do not significantly differ

**Table 4. Common waterhemp control with residual herbicide programs in soybean at Rochester, MN in 2015.**

Pest Code	Rating	Date	Common Waterhemp								YIELD						
			June 10	June 18	June 26	July 8	July 15	Sept 22	Bu/A								
Trt	Treatment	Rate	Appl	Percent Control (%)								Bu/A					
1	UNTREATED			0	c	0	c	0	d	0	e	0	e	0	e	6.1	d
<b>PRE / POST I 5-20 / 6-16</b>																	
2	SOA 14, 15 / 14, 9			99	a	99	a	99	a	99	a	99	a	99	a	44.9	ab
	BROADAXE	25 fl oz/a	A														
	FLEXSTAR GT 3.5	3.5 pt/a	B														
	N-PAK AMS	2.5 % v/v	B														
	MSO	1 % v/v	B														
3	SOA 5, 15 / 14, 9			99	b	99	a	99	a	99	a	99	a	99	a	43.0	abc
	BOUNDARY	1.8 pt/a	A														
	FLEXSTAR GT 3.5	3.5 pt/a	B														
	N-PAK AMS	2.5 % v/v	B														
	MSO	1 % v/v	B														
4	SOA 14,15 / 9			99	a	99	a	99	a	99	a	98	a	99	a	43.2	abc
	BROADAXE	25 fl oz/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
5	SOA 5, 15 / 9			99	a	99	a	99	a	96	b	93	b	97	b	43.2	abc
	BOUNDARY	1.8 pt/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
7	SOA 14, 15 / 9			99	a	99	a	99	a	98	a	98	a	99	a	39.9	c
	FIERCE	3 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
8	SOA 2, 14 / 9			99	a	99	a	99	a	99	a	98	a	99	a	44.8	ab
	SONIC	5 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
10	SOA 2, 14, 15 / 9			99	a	99	a	99	a	99	a	98	a	99	a	45.2	ab
	OPTILL	2 oz/a	A														
	ZIDUA	2 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
11	SOA 14, 15 / 9			99	a	99	a	96	b	91	c	89	c	92	c	44.3	ab
	VERDICT	5 fl oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
6	SOA 14, 15 / 9			99	a	99	a	99	a	99	a	98	a	99	a	42.1	bc
	PREFIX	2 pt/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	C														
	N-PAK AMS	2.5 % v/v	C														
<b>PRE / POST II 5-20 / 6-25</b>																	
9	SOA 2, 14 / 9			99	a	99	a	99	a	99	a	99	a	99	a	46.1	a
	SURVEIL																
	FLUMIOXACIN	2.5 oz/a	A														
	CLORANSULAM-METHYL	0.5 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	C														
	N-PAK AMS	2.5 % v/v	C														
<b>POST I 6-16</b>																	
12	SOA 9			0	c	43	b	89	c	78	d	74	d	75	d	46.5	a
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
<b>LSD P=.10 for weed ratings, LSD P = .20 for yield</b>				<b>0.3</b>		<b>1.7</b>		<b>0.4</b>		<b>1.7</b>		<b>2.3</b>		<b>1.8</b>		<b>4.25</b>	

Means followed by same letter do not significantly differ

**Table 5. Grass control with residual herbicide programs in soybean at Rochester, MN in 2015.**

Pest Code				Grass						YIELD							
Rating Date				June 10	June 18	June 26	July 8	July 15	Sept 22	Bu/A							
Trt	Treatment	Rate	Appl	Percent Control (%)													
1	UNTREATED			0	c	0	c	0	c	0	d	0	c	6.1	d		
<b>PRE / POST I 5-20 / 6-16</b>																	
2	SOA 14, 15 / 14, 9			99	a	99	a	99	a	99	a	99	a	99	a	44.9	ab
	BROADAXE	25 fl oz/a	A														
	FLEXSTAR GT 3.5	3.5 pt/a	B														
	N-PAK AMS	2.5 % v/v	B														
	MSO	1 % v/v	B														
3	SOA 5, 15 / 14, 9			99	a	99	a	99	a	99	a	99	a	99	a	43.0	abc
	BOUNDARY	1.8 pt/a	A														
	FLEXSTAR GT 3.5	3.5 pt/a	B														
	N-PAK AMS	2.5 % v/v	B														
	MSO	1 % v/v	B														
4	SOA 14,15 / 9			99	a	99	a	99	a	99	a	99	a	99	a	43.2	abc
	BROADAXE	25 fl oz/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
5	SOA 5, 15 / 9			99	a	99	a	99	a	99	a	99	a	99	a	43.2	abc
	BOUNDARY	1.8 pt/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
7	SOA 14, 15 / 9			99	a	99	a	99	a	99	ab	98	a	98	a	39.9	c
	FIERCE	3 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
8	SOA 2, 14 / 9			99	b	99	a	99	a	98	ab	98	a	99	a	44.8	ab
	SONIC	5 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
10	SOA 2, 14, 15 / 9			99	a	99	a	99	a	99	a	99	a	99	a	45.2	ab
	OPTILL	2 oz/a	A														
	ZIDUA	2 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
11	SOA 14, 15 / 9			99	a	99	a	99	a	96	b	94	b	97	a	44.3	ab
	VERDICT	5 fl oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
<b>PRE / POST II 5-20 / 6-25</b>																	
6	SOA 14, 15 / 9			99	a	99	a	99	a	99	a	99	a	99	a	42.1	bc
	PREFIX	2 pt/a	A														
	TOUCHDOWN TOTAL	32 fl oz/a	C														
	N-PAK AMS	2.5 % v/v	C														
9	SOA 2, 14 / 9			99	a	99	a	99	a	99	a	99	a	99	a	46.1	a
	SURVEIL																
	FLUMIOXACIN	2.5 oz/a	A														
	CLORANSULAM-METHYL	0.5 oz/a	A														
	ROUNDUP POWERMAX	29 fl oz/a	C														
	N-PAK AMS	2.5 % v/v	C														
<b>POST I 6-16</b>																	
12	SOA 9			0	c	43	b	96	b	86	c	88	c	89	b	46.5	a
	ROUNDUP POWERMAX	29 fl oz/a	B														
	N-PAK AMS	2.5 % v/v	B														
<b>LSD P=.10 for weed ratings, LSD P = .20 for yield</b>				<b>0.2</b>		<b>1.7</b>		<b>1.8</b>		<b>2.7</b>		<b>3.2</b>		<b>3.6</b>		<b>4.25</b>	

Means followed by same letter do not significantly differ

**Table 6. Crop response to residual herbicide programs in soybean at Rochester, MN in 2015.**

Pest Code				Crop Response						YIELD					
Rating Date				June 10	June 18	June 26	June 30	July 8	Bu/A						
Trt	Treatment	Rate	Appl	Percent Crop Response (%)						Bu/A					
1	UNTREATED			0	c	0	e	0	d	0	b	0	b	6.1	d
<b>PRE / POST I 5-20 / 6-16</b>															
2	SOA 14, 15 / 14, 9			0	c	64	a	56	a	10	a	6	a	44.9	ab
	BROADAXE	25 fl oz/a	A												
	FLEXSTAR GT 3.5	3.5 pt/a	B												
	N-PAK AMS	2.5 % v/v	B												
	MSO	1 % v/v	B												
3	SOA 5, 15 / 14, 9			0	c	65	a	55	b	10	a	8	a	43.0	abc
	BOUNDARY	1.8 pt/a	A												
	FLEXSTAR GT 3.5	3.5 pt/a	B												
	N-PAK AMS	2.5 % v/v	B												
	MSO	1 % v/v	B												
4	SOA 14,15 / 9			0	c	1	e	0	d	0	b	0	b	43.2	abc
	BROADAXE	25 fl oz/a	A												
	TOUCHDOWN TOTAL	32 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
5	SOA 5, 15 / 9			0	c	1	e	0	d	0	b	0	b	43.2	abc
	BOUNDARY	1.8 pt/a	A												
	TOUCHDOWN TOTAL	32 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
7	SOA 14, 15 / 9			39	a	25	b	10	c	0	b	0	b	39.9	c
	FIERCE	3 oz/a	A												
	ROUNDUP POWERMAX	29 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
8	SOA 2, 14 / 9			0	c	11	c	0	d	0	b	0	b	44.8	ab
	SONIC	5 oz/a	A												
	ROUNDUP POWERMAX	29 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
10	SOA 2, 14, 15 / 9			3	c	11	c	0	d	0	b	0	b	45.2	ab
	OPTILL	2 oz/a	A												
	ZIDUA	2 oz/a	A												
	ROUNDUP POWERMAX	29 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
11	SOA 14, 15 / 9			0	c	8	cd	0	d	0	b	0	b	44.3	ab
	VERDICT	5 fl oz/a	A												
	ROUNDUP POWERMAX	29 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
<b>PRE / POST II 5-20 / 6-25</b>															
6	SOA 14, 15 / 9			0	c	6	d	0	d	0	b	0	b	42.1	bc
	PREFIX	2 pt/a	A												
	TOUCHDOWN TOTAL	32 fl oz/a	C												
	N-PAK AMS	2.5 % v/v	C												
9	SOA 2, 14 / 9			24	b	21	b	0	d	0	b	0	b	46.1	a
	SURVEIL														
	FLUMIOXACIN	2.5 oz/a	A												
	CLORANSULAM-METHYL	0.5 oz/a	A												
	ROUNDUP POWERMAX	29 fl oz/a	C												
	N-PAK AMS	2.5 % v/v	C												
<b>POST I 6-16</b>															
12	SOA 9			0	c	0	e	0	d	0	b	0	b	46.5	a
	ROUNDUP POWERMAX	29 fl oz/a	B												
	N-PAK AMS	2.5 % v/v	B												
<b>LSD P=.10 for weed ratings, LSD P = .20 for yield</b>				<b>3.7</b>		<b>4.0</b>		<b>0.9</b>			<b>1.6</b>		<b>4.25</b>		

Means followed by same letter do not significantly differ