

## Evaluation of weed control strategies for Roundup Ready soybean in a hypothetical glyphosate resistant weed situation in soybean at Rochester, MN, in 2007.

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The objective of this trial was to evaluate weed control strategies for glyphosate tolerant soybean in a hypothetical glyphosate resistant weed situation in soybean in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.8 and soil test P and K levels of 12 ppm and 171 ppm, respectively. The field was spring disked and field cultivated prior to planting. The soybean variety, Dairyland DSR 199, was planted on May 17, 2007, at a depth of 1.5 inches in 30 inch rows at 150,000 seeds per acre. A randomized complete block design was used with four replications. PREemergence (PRE) and postemergence (POST I, POST II, and POST III) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plots were taken on June 6, June 14, June 20, June 28, July 6, July 18, and September 14. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 4, 2007.

<b>Date</b>	<b>May 18</b>	<b>June 15</b>	<b>June 20</b>	<b>July 6</b>
<b>Treatment</b>	PRE	POST I	POST II	POST III
<b>Temperature (F)</b>				
Air	69	82	86	79
soil	--	79	81.7	79
<b>Relative Humidity (%)</b>	48	50	30	50
<b>Wind (mph)</b>	12	8	15	3
<b>Soil moisture</b>	inadequate	adequate	adequate	inadequate
<b>Bean</b>				
stage	--	V2	V3	R1
height (inch)	--	5.0	8.5	13.0
<b>Giant Ragweed</b>				
weed density (ft <sup>2</sup> )	--	11.4	11.4	11.4
height (inch)	--	6.8	9.7	5.3
<b>Common Lambsquarters</b>				
weed density (ft <sup>2</sup> )	--	5.4	5.4	5.4
height (inch)	--	1.6	4.2	4.1
<b>Common Waterhemp</b>				
weed density (ft <sup>2</sup> )	--	13.8	13.8	13.8
height (inch)	--	2.4	2.9	4.0
<b>Giant Foxtail</b>				
weed density (ft <sup>2</sup> )	--	20.3	20.3	20.3
height (inch)	--	2.4	6.6	2.9
<b>Rainfall after each application (inch)</b>				
week 1	2.41	2.97	2.09	0.66
week 2	1.25	0.52	0.21	0.50
week 3	0.44	0.21	0.66	7/20-7/26

### **BACKGROUND**

The intent of this study was to simulate a glyphosate resistant weed situation, and to determine how we could improve weed control above and beyond glyphosate by itself. The glyphosate rate used in this study would be considered ½ X (half rate) of the suggested labeled use rate. Comparisons are made to the one-pass and two-pass glyphosate treatments.

### **CONCLUSIONS**

**Giant Ragweed:** Nine treatments provided statistically greater giant ragweed control (9/14 ratings) than the one-pass glyphosate treatment. These treatments included Valor PRE, followed by glyphosate, Valor PRE, followed by Cobra + glyphosate, Gangster PRE, followed by glyphosate, Gangster PRE, followed by Cobra and glyphosate, Sonic PRE, followed by glyphosate, Prefix PRE, followed by glyphosate, Flexstar + glyphosate, FirstRate + glyphosate, and Pursuit + glyphosate.

Two treatments provided statistically better giant ragweed control (9/14 ratings) compared to the two-pass glyphosate treatment. These two treatments were Gangster PRE, followed by glyphosate, and PREFIX PRE, followed by glyphosate.

One treatment, Resource + glyphosate, provided statistically lower final giant ragweed control (9/14 ratings) compared to the one-pass glyphosate treatment.

**Common Lambsquarters:** Thirteen treatments provided statistically higher common lambsquarters control (9/14 ratings) compared to the one-pass glyphosate treatment. Nine of the thirteen treatments provided control greater than 92 percent. These treatments included Valor PRE, followed by glyphosate, Valor PRE, followed by Cobra + glyphosate, Authority MTZ PRE, followed by glyphosate, Gangster PRE, followed by glyphosate, Gangster PRE, followed by Cobra and glyphosate, Sonic PRE, followed by glyphosate, PREFIX PRE, followed by glyphosate, Flexstar + glyphosate, FirstRate + glyphosate, Harmony GT + glyphosate and Pursuit + glyphosate. Four additional treatments provided statically better common lambsquarters control (9/14 ratings) albeit at a lower level. These treatments included Resource + glyphosate, FirstRate + glyphosate, Synchrony +glyphosate, and the high rate of Classic + glyphosate.

Eight treatments provided statistically higher common lambsquarters control (9/14 ratings) than the two-pass glyphosate treatment. These treatments included Valor PRE, followed by glyphosate, Valor PRE, followed by Cobra + glyphosate, Authority MTZ PRE, followed by glyphosate, Gangster PRE, followed by glyphosate, Gangster PRE, followed by Cobra and glyphosate, Sonic PRE, followed by glyphosate, Harmony GT + glyphosate and Pursuit + glyphosate.

**Common Waterhemp:** Nine treatments provided statistically better common waterhemp control (9/14 ratings) than the one-pass glyphosate treatment. Seven of the nine treatments provided control greater than 94 percent. These treatments included Valor PRE, followed by glyphosate, Valor PRE, followed by Cobra + glyphosate, Authority MTZ PRE, followed by glyphosate, Gangster PRE, followed by glyphosate, Gangster PRE, followed by Cobra and glyphosate, Sonic PRE followed by glyphosate, and Prefix PRE, followed by glyphosate. Two additional treatments provided statically better common waterhemp control (9/14 ratings) albeit at a lower level. These treatments included Flexstar + glyphosate, and Cobra + glyphosate.

Six treatments provided statistically greater common waterhemp control (9/14 ratings) than the two-pass glyphosate treatment. These treatments included Valor PRE, followed by glyphosate, Valor PRE, followed by Cobra + glyphosate, Authority MTZ PRE, followed by glyphosate, Gangster PRE, followed by glyphosate, Gangster PRE, followed by Cobra and glyphosate, and Prefix PRE, followed by glyphosate.

Two treatments provided statistically lower common waterhemp control, by the final rating of 9/14 , compared to the one-pass glyphosate treatment. These treatment were Classic (low rate) + glyphosate, and Classic (high rate) + glyphosate.

**Giant Foxtail:** Twelve treatments provided statistically better giant foxtail control (9/14 ratings) compared to the one-pass glyphosate treatment. These treatments included Valor PRE, followed by glyphosate, Gangster PRE, followed by glyphosate, Gangster PRE, followed by Cobra and glyphosate, Sonic PRE, followed by glyphosate, Prefix PRE, followed by glyphosate, Flexstar + glyphosate, Resource + glyphosate, FirstRate + glyphosate, the low rate of Classic + glyphosate, Synchrony +glyphosate, the high rate of Classic + glyphosate, and Harmony GT + glyphosate.

No treatments were statistically better than the two-pass glyphosate treatment.

**Crop Response:** Necrosis and stunting were measured on 6/18 and again on 6/27. Significant injury resulted with the addition of Cobra (especially when COC was part of the additive package), Flexstar, Resource, Pursuit, FirstRate, Classic, Synchrony, and Harmony GT. Grain yield did not appear to be effected by herbicide injury.

**Grain Yield:** Ten treatments provided statistically higher grain yield than the one-pass glyphosate treatment. These treatments included Valor PRE, followed by glyphosate, Valor PRE, followed by Cobra + glyphosate, Authority MTZ PRE, followed by glyphosate, Gangster PRE, followed by glyphosate, Gangster PRE,

followed by Cobra and glyphosate, Sonic PRE, followed by glyphosate, Prefix PRE, followed by glyphosate, FirstRate + glyphosate, Harmony GT + glyphosate and Pursuit + glyphosate. Five additional treatments provided statically higher grain yield than the two-pass glyphosate treatment. These treatments included Valor PRE, followed by glyphosate, Valor PRE, followed by Cobra + glyphosate, Authority MTZ PRE, followed by glyphosate, Gangster PRE, followed by Cobra and glyphosate, Sonic PRE, followed by glyphosate, and Prefix PRE, followed by glyphosate. On average, the sequential PRE/POST treatments out-yielded the total POST treatments; 39.2 to 25.5 bushel/acre, respectively.

**Table 1. Performance of herbicide systems for giant ragweed control in soybean on June 6, June 14, June 20, July 6, July 18, and September 14 at Rochester, MN in 2007.**

Treatment	Rate (rate/A)	Giant Ragweed Control							Yield (bu/A)
		6/6	6/14	6/20	6/28	7/6	7/18	9/14	
Untreated Check		0	0	0	0	0	0	0	0.9
<b>PRE / POST I</b>									
Valor / Roundup Original + NIS + AMS	2.5 oz / 16 fl oz + 0.25% v/v + 2 lb	76	60	90	91	90	84	84	38.0
Valor / Cobra + Roundup Original + COC + AMS	2.5 oz / 6 fl oz + 16 fl oz + 1.25% v/v + 2 lb	74	60	98	97	95	92	88	41.8
Authority MTZ / Roundup Original + NIS + AMS	10 oz / 16 fl oz + 0.25% v/v + 2 lb	0	0	87	89	86	80	77	34.9
<b>PRE / POST II</b>									
Gangster V + Gangster FR / Roundup Original + NIS + AMS	2.5 oz + 0.5 oz / 16 fl oz + 0.25% v/v + 2 lb	85	90	95	97	96	95	93	36.0
Gangster V + Gangster FR / Cobra + Roundup Original + COC + AMS	2.5 oz + 0.5 oz / 6 fl oz + 16 fl oz + 1.25% v/v + 2 lb	85	90	94	98	99	97	96	40.9
Sonic / Roundup Original + NIS + AMS	3 oz / 16 fl oz + 0.25% v/v + 2 lb	66	83	86	95	92	92	88	42.3
Prefix / Roundup Original + NIS + AMS	1.75 pt / 16 fl oz + 0.25% v/v + 2 lb	85	85	90	97	96	95	97	40.9
<b>POST I</b>									
Flexstar + Roundup Original + NIS + AMS	12 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	88	94	90	87	84	22.7
Cobra + Roundup Original + NIS + AMS	6 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	89	91	92	88	82	21.2
Resource + Roundup Original + NIS + AMS	4 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	85	83	78	64	66	18.9
FirstRate + Roundup Original + NIS + AMS	0.3 oz + 16 fl oz + 0.5% v/v + 2 lb	0	0	81	89	93	93	90	29.0
Classic + Roundup Original + NIS + AMS	0.25 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	86	92	89	83	73	22.9
Synchrony XP + Roundup Original + NIS + AMS	0.375 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	85	90	87	81	78	27.3
Classic + Roundup Original + NIS + AMS	0.5 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	84	92	91	84	80	23.6
Harmony GT + Roundup Original + NIS + AMS	0.33 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	85	88	83	75	75	31.9
Pursuit + Roundup Original + NIS + AMS	4 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	82	89	88	85	86	35.1
Roundup Original + NIS + AMS	16 fl oz + 0.25% v/v + 2 lb	0	0	81	87	85	77	78	20.5
<b>POST I / POST III</b>									
Roundup Original + NIS + AMS / Roundup Original + NIS + AMS	16 oz + 0.25% v/v + 2 lb / 16 oz + 0.25% v/v + 2 lb	0	0	80	90	85	89	90	29.8
<b>POST II</b>									
Roundup Original + NIS + AMS	16 fl oz	0	0	0	86	82	76	74	22.8
		<b>LSD (P=0.10)</b>							<b>7.0</b>

**Table 2. Performance of herbicide systems for common lambsquarters control in soybean on June 6, June 14, June 20, July 6, July 18, and September 14 at Rochester, MN in 2007.**

Treatment	Rate	Common Lambsquarters Control							Yield
		6/6	6/14	6/20	6/28	7/6	7/18	9/14	
	(rate/A)	(%)							(bu/A)
Untreated Check		0	0	0	0	0	0	0	0.9
<b>PRE / POST I</b>									
Valor / Roundup Original + NIS + AMS	2.5 oz / 16 fl oz + 0.25% v/v + 2 lb	99	99	98	99	99	99	96	38.0
Valor / Cobra + Roundup Original + COC + AMS	2.5 oz / 6 fl oz + 16 fl oz + 1.25% v/v + 2 lb	99	98	99	98	98	98	97	41.8
Authority MTZ / Roundup Original + NIS + AMS	10 oz / 16 fl oz + 0.25% v/v + 2 lb	99	98	97	99	99	99	99	34.9
<b>PRE / POST II</b>									
Gangster V + Gangster FR / Roundup Original + NIS + AMS	2.5 oz + 0.5 oz / 16 fl oz + 0.25% v/v + 2 lb	99	99	98	99	99	99	99	36.0
Gangster V + Gangster FR / Cobra + Roundp Original + COC + AMS	2.5 oz + 0.5 oz / 6 fl oz + 16 fl oz + 1.25% v/v + 2 lb	99	97	97	98	97	97	96	40.9
Sonic / Roundup Original + NIS + AMS	3 oz / 16 fl oz + 0.25% v/v + 2 lb	99	99	97	99	99	99	99	42.3
Prefix / Roundup Original + NIS + AMS	1.75 pt / 16 fl oz + 0.25% v/v + 2 lb	99	90	94	96	95	92	92	40.9
<b>POST I</b>									
Flexstar + Roundup Original + NIS + AMS	12 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	77	78	73	60	63	22.7
Cobra + Roundup Original + NIS + AMS	6 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	80	72	68	60	56	21.2
Resource + Roundup Original + NIS + AMS	4 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	88	75	70	73	75	18.9
FirstRate + Roundup Original + NIS + AMS	0.3 oz + 16 fl oz + 0.5% v/v + 2 lb	0	0	84	83	78	73	70	29.0
Classic + Roundup Original + NIS + AMS	0.25 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	80	74	74	65	63	22.9
Synchrony XP + Roundup Original + NIS + AMS	0.375 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	75	80	80	73	71	27.3
Classic + Roundup Original + NIS + AMS	0.5 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	71	75	75	66	68	23.6
Harmony GT + Roundup Original + NIS + AMS	0.33 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	83	97	95	92	94	31.9
Pursuit + Roundup Original + NIS + AMS	4 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	82	83	85	88	96	35.1
Roundup Original + NIS + AMS	16 fl oz + 0.25% v/v + 2 lb	0	0	77	71	68	61	60	20.5
<b>POST I / POST III</b>									
Roundup Original + NIS + AMS / Roundup Original + NIS + AMS	16 oz + 0.25% v/v + 2 lb / 16 oz + 0.25% v/v + 2 lb	0	0	80	70	68	85	87	29.8
<b>POST II</b>									
Roundup Original + NIS + AMS	16 fl oz	0	0	0	74	73	66	58	22.8
<b>LSD (P=.10)</b>		<b>0</b>	<b>2</b>	<b>5</b>	<b>4</b>	<b>4</b>	<b>6</b>	<b>6</b>	<b>7.0</b>

**Table 3. Performance of herbicide systems for common waterhemp control in soybean on June 6, June 14, June 20, July 6, July 18, and September 14 at Rochester, MN in 2007.**

Treatment	Rate (rate/A)	Common Waterhemp Control						Yield (bu/A)		
		6/6	6/14	6/20	6/28	7/6	7/18		9/14	
Untreated Check		0	0	0	0	0	0	0	0.9	
<b>PRE / POST I</b>										
Valor / Roundup Original + NIS + AMS	2.5 oz / 16 fl oz + 0.25% v/v + 2 lb	99	99	99	99	99	99	99	99	38.0
Valor / Cobra + Roundup Original + COC + AMS	2.5 oz / 6 fl oz + 16 fl oz + 1.25% v/v + 2 lb	99	99	99	99	99	98	98		41.8
Authority MTZ / Roundup Original + NIS + AMS	10 oz / 16 fl oz + 0.25% v/v + 2 lb	99	99	99	99	99	99	97		34.9
<b>PRE / POST II</b>										
Gangster V + Gangster FR / Roundup Original + NIS + AMS	2.5 oz + 0.5 oz / 16 fl oz + 0.25% v/v + 2 lb	99	99	97	99	99	99	99		36.0
Gangster V + Gangster FR / Cobra + Roundp Original + COC + AMS	2.5 oz + 0.5 oz / 6 fl oz + 16 fl oz + 1.25% v/v + 2 lb	99	99	99	99	99	99	99		40.9
Sonic / Roundup Original + NIS + AMS	3 oz / 16 fl oz + 0.25% v/v + 2 lb	99	97	95	98	99	99	94		42.3
Prefix / Roundup Original + NIS + AMS	1.75 pt / 16 fl oz + 0.25% v/v + 2 lb	99	99	98	99	99	99	99		40.9
<b>POST I</b>										
Flexstar + Roundup Original + NIS + AMS	12 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	95	90	92	90	88		22.7
Cobra + Roundup Original + NIS + AMS	6 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	97	91	92	88	86		21.2
Resource + Roundup Original + NIS + AMS	4 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	95	84	79	76	73		18.9
FirstRate + Roundup Original + NIS + AMS	0.3 oz + 16 fl oz + 0.5% v/v + 2 lb	0	0	92	90	85	81	78		29.0
Classic + Roundup Original + NIS + AMS	0.25 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	95	87	83	76	64		22.9
Synchrony XP + Roundup Original + NIS + AMS	0.375 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	93	90	81	76	71		27.3
Classic + Roundup Original + NIS + AMS	0.5 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	93	88	83	80	69		23.6
Harmony GT + Roundup Original + NIS + AMS	0.33 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	95	91	81	75	65		31.9
Pursuit + Roundup Original + NIS + AMS	4 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	94	87	80	67	60		35.1
Roundup Original + NIS + AMS	16 fl oz + 0.25% v/v + 2 lb	0	0	93	84	79	73	73		20.5
<b>POST I / POST III</b>										
Roundup Original + NIS + AMS / Roundup Original + NIS + AMS	16 oz + 0.25% v/v + 2 lb / 16 oz + 0.25% v/v + 2 lb	0	0	92	83	76	94	89		29.8
<b>POST II</b>										
Roundup Original + NIS + AMS	16 fl oz	0	0	0	80	76	66	63		22.8
<b>LSD (P=.10)</b>		<b>0</b>	<b>1</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>6</b>		<b>7.0</b>

**Table 4. Performance of herbicide systems for giant foxtail control in soybean on June 6, June 14, June 20, July 6, July 18, and September 14 at Rochester, MN in 2007.**

Treatment	Rate (rate/A)	Giant Foxtail Control							Yield (bu/A)
		6/6	6/14	6/20	6/28	7/6	7/18	9/14	
Untreated Check		0	0	0	0	0	0	0	0.9
<b>PRE / POST I</b>									
Valor / Roundup Original + NIS + AMS	2.5 oz / 16 fl oz + 0.25% v/v + 2 lb	96	89	99	97	96	95	95	38.0
Valor / Cobra + Roundup Original + COC + AMS	2.5 oz / 6 fl oz + 16 fl oz + 1.25% v/v + 2 lb	93	86	98	94	93	90	90	41.8
Authority MTZ / Roundup Original + NIS + AMS	10 oz / 16 fl oz + 0.25% v/v + 2 lb	78	80	91	90	91	87	92	34.9
<b>PRE / POST II</b>									
Gangster V + Gangster FR / Roundup Original + NIS + AMS	2.5 oz + 0.5 oz / 16 fl oz + 0.25% v/v + 2 lb	96	88	93	92	95	97	98	36.0
Gangster V + Gangster FR / Cobra + Roundp Original + COC + AMS	2.5 oz + 0.5 oz / 6 fl oz + 16 fl oz + 1.25% v/v + 2 lb	96	91	97	92	96	94	94	40.9
Sonic / Roundup Original + NIS + AMS	3 oz / 16 fl oz + 0.25% v/v + 2 lb	70	59	49	87	94	94	94	42.3
Prefix / Roundup Original + NIS + AMS	1.75 pt / 16 fl oz + 0.25% v/v + 2 lb	95	89	95	94	96	96	99	40.9
<b>POST I</b>									
Flexstar + Roundup Original + NIS + AMS	12 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	94	94	91	97	96	22.7
Cobra + Roundup Original + NIS + AMS	6 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	94	92	88	89	90	21.2
Resource + Roundup Original + NIS + AMS	4 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	86	89	90	93	93	18.9
FirstRate + Roundup Original + NIS + AMS	0.3 oz + 16 fl oz + 0.5% v/v + 2 lb	0	0	85	97	89	97	97	29.0
Classic + Roundup Original + NIS + AMS	0.25 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	86	95	90	95	94	22.9
Synchrony XP + Roundup Original + NIS + AMS	0.375 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	87	96	90	95	94	27.3
Classic + Roundup Original + NIS + AMS	0.5 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	87	94	91	96	95	23.6
Harmony GT + Roundup Original + NIS + AMS	0.33 oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	88	95	90	96	95	31.9
Pursuit + Roundup Original + NIS + AMS	4 fl oz + 16 fl oz + 0.25% v/v + 2 lb	0	0	86	94	93	94	92	35.1
Roundup Original + NIS + AMS	16 fl oz + 0.25% v/v + 2 lb	0	0	82	94	89	92	88	20.5
<b>POST I / POST III</b>									
Roundup Original + NIS + AMS / Roundup Original + NIS + AMS	16 oz + 0.25% v/v + 2 lb / 16 oz + 0.25% v/v + 2 lb	0	0	82	94	90	99	98	29.8
<b>POST II</b>									
Roundup Original + NIS + AMS	16 fl oz	0	0	0	81	93	96	93	22.8
<b>LSD (P=.10)</b>		<b>4</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>7.0</b>

**Table 5. Performance of herbicide systems for velvetleaf control and injury in soybean on July 6 and July 18 at Rochester, MN in 2007.**

Treatment	Rate	Velvetleaf Control		Injury		Yield		
		7/6	7/18	6/18	6/27			
	(rate/A)	(%)		(%)		(bu/A)		
Untreated Check		0	0	0	0	0.9		
<b>PRE / POST I</b>								
Valor / Roundup Original + NIS + AMS	2.5 oz / 16 fl oz + 0.25% v/v + 2 lb	99	99	1	0	38.0		
Valor / Cobra + Roundup Original + COC + AMS	2.5 oz / 6 fl oz + 16 fl oz + 1.25% v/v + 2 lb	99	99	68	20	41.8		
Authority MTZ / Roundup Original + NIS + AMS	10 oz / 16 fl oz + 0.25% v/v + 2 lb	99	99	1	0	34.9		
<b>PRE / POST II</b>								
Gangster V + Gangster FR / Roundup Original + NIS + AMS	2.5 oz + 0.5 oz / 16 fl oz + 0.25% v/v + 2 lb	99	99	0	0	36.0		
Gangster V + Gangster FR / Cobra + Roundup Original + COC + AMS	2.5 oz + 0.5 oz / 6 fl oz + 16 fl oz + 1.25% v/v + 2 lb	99	99	0	39	40.9		
Sonic / Roundup Original + NIS + AMS	3 oz / 16 fl oz + 0.25% v/v + 2 lb	99	99	0	0	42.3		
Prefix / Roundup Original + NIS + AMS	1.75 pt / 16 fl oz + 0.25% v/v + 2 lb	97	97	0	0	40.9		
<b>POST I</b>								
Flexstar + Roundup Original + NIS + AMS	12 fl oz + 16 fl oz + 0.25% v/v + 2 lb	98	98	24	8	22.7		
Cobra + Roundup Original + NIS + AMS	6 fl oz + 16 fl oz + 0.25% v/v + 2 lb	98	99	35	21	21.2		
Resource + Roundup Original + NIS + AMS	4 fl oz + 16 fl oz + 0.25% v/v + 2 lb	98	98	20	7	18.9		
FirstRate + Roundup Original + NIS + AMS	0.3 oz + 16 fl oz + 0.5% v/v + 2 lb	99	99	11	5	29.0		
Classic + Roundup Original + NIS + AMS	0.25 oz + 16 fl oz + 0.25% v/v + 2 lb	99	99	7	2	22.9		
Synchrony XP + Roundup Original + NIS + AMS	0.375 oz + 16 fl oz + 0.25% v/v + 2 lb	99	99	9	2	27.3		
Classic + Roundup Original + NIS + AMS	0.5 oz + 16 fl oz + 0.25% v/v + 2 lb	99	99	9	3	23.6		
Harmony GT + Roundup Original + NIS + AMS	0.33 oz + 16 fl oz + 0.25% v/v + 2 lb	99	99	7	2	31.9		
Pursuit + Roundup Original + NIS + AMS	4 fl oz + 16 fl oz + 0.25% v/v + 2 lb	99	99	13	8	35.1		
Roundup Original + NIS + AMS	16 fl oz + 0.25% v/v + 2 lb	95	99	0	0	20.5		
<b>POST I / POST III</b>								
Roundup Original + NIS + AMS / Roundup Original + NIS + AMS	16 oz + 0.25% v/v + 2 lb / 16 oz + 0.25% v/v + 2 lb	95	99	1	0	29.8		
<b>POST II</b>								
Roundup Original + NIS + AMS	16 fl oz	96	99	0	0	22.8		
		<b>LSD (P=.10)</b>		<b>1</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>7.0</b>

**Table 6. Performance comparison of sequential soil applied herbicides to one-pass glyphosate.**

Soil applied herbicide	Giant ragweed	Common lambsquarters	Common waterhemp	Giant foxtail
Valor	+	++	++	++
Valor/Cobra	+	++	++	=
Authority MTZ	=	++	++	=
Gangster	++	++	++	++
Gangster/Cobra	++	++	++	++
Sonic	+	++	++	++
Prefix	++	++	++	++
<b>One-pass glyphosate</b>	<b>78%</b>	<b>60%</b>	<b>73%</b>	<b>88%</b>

(++) = performance over 90% control, (+) = better control compared to one-pass glyphosate, (=) = same control as one-pass glyphosate, (-) = less control than the on-pass glyphosate

**Table 7. Performance comparison of glyphosate tank mix partners to one-pass glyphosate**

Tank mix partner	Giant ragweed	Common lambsquarters	Common waterhemp	Giant foxtail
Flexstar	+	=	+	++
Cobra	=	=	+	=
Resource	-	+	=	++
FirstRate	++	+	=	++
Classic LR	=	=	-	++
Classic HR	=	+	=	++
Synchrony	=	+	=	++
Harmony	=	++	-	++
Pursuit	+	++	-	=
<b>One-pass glyphosate</b>	<b>78%</b>	<b>60%</b>	<b>73%</b>	<b>88%</b>

(++) = performance over 90% control, (+) = better control compared to one-pass glyphosate, (=) = same control as one-pass glyphosate, (-) = less control than the on-pass glyphosate