

2012 Evaluation of Herbicide Systems in Soybeans at Rochester, MN

Behnken, Lisa M., Fritz R. Breitenbach, Ryan P. Miller, Jeffrey Gunsolus, Thomas Hoverstad and Matthew Mitchell

The objective of this trial was to evaluate the performance of herbicide systems for weed control in soybeans in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.6, O.M. of 2.8%, and soil test P and K levels of 46 ppm and 150 ppm, respectively. The field was fall moldboard plowed, and disked and field cultivated once prior to planting in the spring. The soybean variety, Pioneer 92Y22, was planted on May 9, 2012 at a depth of 1.5 inches in 30 inch rows at a rate of 165,500 seeds per acre. A randomized complete block design was used with four replications. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 20 gpa at 32 psi using Turbo Tee 11002 nozzles. Evaluations of the plot were taken on June 11, 18, July 3, 19, and September 14. The center two rows of each plot were machine harvested on October 10. Application dates, environmental conditions, and weed stages are listed in Table 1. Herbicide performance for giant ragweed, common lambsquarters, common waterhemp and giant foxtail control, plus plant injury ratings are found in Tables 2 through 6 respectively. (University of Minnesota Extension Regional Office, Rochester)

SUMMARY

The PRE/POST herbicide system out yielded POST only systems with PRE/POST system average of 44.5 bu/a (range 39 to 48 bu/a) and POST only system average of 42.3 bu/a (range 40 to 46 bu/a). Crop response (injury) to herbicide is the likely cause for yield reductions in POST only systems.

Highly variable giant ragweed density throughout the trial resulted in few statistical differences among soil applied treatments. Only the high rate of Authority First/Sonic (6.4 oz/a) separated out as highly effective in controlling giant ragweed (6/11 rating date). Post emergent control of giant ragweed was excellent for all sequential based treatments (PRE/POST or POST/POST). A slight reduction was observed with the POST I Marvel + Roundup PowerMax combination, possibly due to antagonism and/or late emergence of giant ragweed seedlings.

Common lambsquarters control with the soil applied (PRE) materials was consistently good; however there was statistical separation. The highest control was with the high rate of Authority First/Sonic (6.4 oz/a) 96% control (6/11 rating date). Authority Assist, Fierce + Classic, and both Enlite treatments resulted in very good soil applied control 89-92% (6/11 rating date). The third best performing group (86-88%, 6/11 rating date) included Valor SX (2 oz & 3 oz/a), Zidua + Verdict, and Sonic/Authority First (3 oz/a). Soil applied Warrant, separated out on the low side with 73% control (6/11 rating date). Post emergent control of common lambsquarters was excellent for all sequential based treatments (PRE/POST or POST/POST). A slight reduction was observed with the POST I Marvel + Roundup PowerMax combination, possibly due to antagonism and/or late emergence of common lambsquarters seedlings.

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

Date	5/9	6/13	6/19	6/29
Treatment	PRE	POST I	POST II	POST III
Temperature (F)				
Air	60	62	86	72
Soil	60	70	77	76
Relative Humidity (%)	44	55	55	66
Wind (mph)	12	8	12	0
Soil Moisture	Adequate	Adequate	Excessive	Inadequate
Soybean				
Stage		V3	V6-R1	R2
Height (inch)		7.0	11.0	23.0
Giant Ragweed				
Weed density (ft ²)				1.0
Height (inch)		6.6	13.0	34.8
Common Lambsquarters				
Weed density (ft ²)				3.0
Height (inch)		1.7	9.3	11.5
Common Waterhemp				
Weed density (ft ²)				1.5
Height (inch)		0.8	6.5	20.5
Giant Foxtail				
Weed density (ft ²)				21.3
Height (inch)		2.0	7.8	20.8
Rainfall after each application (inch)				
Week 1	0.00	2.87	1.94	0.00
Week 2	0.05	0.00	0.00	0.96
Week 3	2.51	0.00	0.00	0.24

Common waterhemp control with the soil applied materials was excellent with the exception of the low rate of Sonic/Authority First (3 oz/a) only 71%, 6/11 rating date. Post emergent control of common waterhemp was excellent for all sequential based treatments (PRE/POST or POST/POST). A slight reduction was observed with the POST I Marvel + Roundup PowerMax combination, possibly due to antagonism and/or late emergence of common waterhemp seedlings.

Giant foxtail control within the soil applied treatments was excellent. Treatments containing acetochlor (Warrant), dimethenamid-P (Outlook, OpTill PRO and Verdict), metolachlor (Boundary and Prefix), and pyroxasulfone (Fierce and Zidua) generally performed the best. Post emergent control of giant foxtail was excellent for all sequential based treatments (PRE/POST or POST/POST). A slight reduction was observed with the POST I Marvel + Roundup PowerMax combination, possibly due to antagonism and/or late emergence of giant foxtail seedlings.

Crop response (injury) to the herbicide treatments appeared to play a significant role in grain yield in 2012. There were no detectable responses to the soil applied herbicides, however there was significant injury associated with Cobra, Flexstar GT, Harmony, and Marvel. All of these treatments had significantly higher injury and significantly lower grain yields compared to the weed free check and the highest yielding herbicide treatments regardless of the system (PRE/POST or POST/POST).

Table 2. Performance of herbicide systems for giant ragweed control in soybeans on June 11, 27, July 3, 19, and September 14, and grain yield at 13% at Rochester, MN in 2012.

Treatment	Rate (rate/A)	Giant Ragweed Control (% Control)					Yield (bu/A)
		6/11	6/27	7/3	7/19	9/14	
Untreated 1		0	0	0	0	0	26
Untreated 2		0	0	0	0	0	22
Weed Free		99	100	100	100	100	46
PRE / POST I (2" Weeds)							
Valor SX / Warrant + Roundup WeatherMax + N-Pa-K-AMS	2 oz/a / 3 pt/a + 22 fl oz/a + 3 qt/a	62	96	98	98	99	46
PRE / POST II (4" Weeds)							
Authority First * / Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 22 oz/a + 3 qt/a	95	98	99	98	99	43
Authority Assist / Roundup PowerMax + N-Pa-K-AMS	9 fl oz/a / 22 fl oz/a + 3 qt/a	62	97	98	98	98	45
Prefix / Touchdown Total + N-Pa-K-AMS	1 qt/a / 24 oz/a + 3 qt/a	67	98	98	98	99	45
Boundary / Touchdown Total + N-Pa-K-AMS	1.5 pt/a / 24 oz/a + 3 qt/a	60	98	98	98	99	45
Boundary / Flexstar GT 3.5 + MSO + N-Pa-K-AMS	1.5 pt/a / 3.5 pt/a + 0.5% v/v + 3 qt/a	60	95	98	99	99	41
Fierce / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 22 fl oz/a + 3 qt/a	69	97	97	96	97	45
Valor SX / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 22 fl oz/a + 3 qt/a	58	95	97	96	97	44
Fierce + Classic / Roundup PowerMax + N-Pa-K-AMS	3 oz/a + 0.33 oz/a / 22 fl oz/a + 3 qt/a	49	95	98	98	98	45
Optil PRO (Optil + Outlook) / Roundup PowerMax + NIS + N-Pa-K-AMS	12 oz/a (2 oz/a + 10 fl oz/a) / 22 fl oz/a + 0.25% v/v + 3 qt/a	73	96	98	99	99	48
Verdict +Outlook / Roundup PowerMax + NIS + N-Pa-K-AMS	5 fl oz/a + 10 fl oz/a / 22 fl oz/a + 0.25% v/v + 3 qt/a	70	97	98	97	97	47
Zidua + Verdict / Roundup PowerMax + NIS + N-Pa-K-AMS	2 oz/a + 5 fl oz/a / 22 fl oz/a + 0.25% v/v + 3 qt/a	59	96	98	96	96	45
Sonic* / Durango DMA + N-Pa-K-AMS	3 oz/a / 24 fl oz/a + 3 qt/a	58	95	98	97	99	46
Enlite (Chlorimuron + Thifensulfuron + Flumioxazin) / Abundit S + N-Pa-K-AMS	2.8 oz/a (0.33 oz/a + 0.5 oz/a + 2 oz/a) / 32 fl oz/a + 3 qt/a	55	95	97	96	98	45
Enlite (Chlorimuron + Thifensulfuron + Flumioxazin) / Abundit S + Harmony SG +N-Pa-K-AMS	2.8 oz/a (0.33 oz/a + 0.5 oz/a + 2 oz/a) / 32 fl oz/a + 0.125 oz/a + 3 qt/a	61	94	98	97	99	39
Warrant / Roundup WeatherMax + N-Pa-K-AMS	3 pt/a / 22 fl oz/a + 3 qt/a	64	97	98	99	99	44
POST I (2" Weeds)							
Marvel + Roundup PowerMax + NIS + N-Pa-K-AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 3 qt/a	0	85	94	89	90	40
POST I (2" Weeds) / POST III							
Roundup WeatherMax + N-Pa-K-AMS / Roundup WeatherMax + N-Pa-K-AMS	22 oz/a + 3 qt/a / 22 fl oz/a + 3 qt/a	0	95	97	96	99	46
Durango DMA + FirstRate + N-Pa-K-AMS / Durango DMA + N-Pa-K-AMS	24 fl oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a	0	93	97	97	99	43
Flexstar GT 3.5 + MSO + N-Pa-K-AMS / Touchdown Total + N-Pa-K-AMS	3.5 pt/a + 0.5% v/v + 3 qt/a / 24 oz/a + 3 qt/a	0	99	98	99	99	42
Synchrony (Chlorimuron + Thifensulfuron) + Abundit S + N-Pa-K-AMS / Abundit S + N-Pa-K-AMS	0.375 oz/a (0.33 oz/a + 0.05 oz/a) + 32 fl oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	91	97	97	99	43
Roundup PowerMax + Cobra + COC + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	22 fl oz/a + 12.5 fl oz/a + 1 pt/a + 3 qt/a / 22 oz/a + 3 qt/a	0	96	98	99	99	41
LSD (P=0.10)		18	5	2	2	2	4

*AuthorityFirst and Sonic are both sulfentrazone + cloransulam package mixes marketed by FMC and Dow respectively.

Table 3. Performance of herbicide systems for common lambsquarters control in soybeans on June 11, 27, July 3, 19, and September 14, and grain yield at 13% at Rochester, MN, in 2012.

Treatment	Rate (rate/A)	Common Lambsquarters Control (% Control)					Yield (bu/A)
		6/11	6/27	7/3	7/19	9/14	
Untreated 1		0	0	0	0	0	25.8
Untreated 2		0	0	0	0	0	22.0
Weed Free		99	100	100	100	100	46.1
PRE / POST I (2" Weeds)							
Valor SX / Warrant + Roundup WeatherMax + N-Pa-K-AMS	2 oz/a / 3 pt/a + 22 fl oz/a + 3 qt/a	86	90	94	90	99	45.5
PRE / POST II (4" Weeds)							
Authority First* / Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 22 oz/a + 3 qt/a	96	99	99	99	99	43.4
Authority Assist / Roundup PowerMax + N-Pa-K-AMS	9 fl oz/a / 22 fl oz/a + 3 qt/a	92	99	99	99	99	44.8
Prefix / Touchdown Total + N-Pa-K-AMS	1 qt/a / 24 oz/a + 3 qt/a	84	99	99	99	99	45.3
Boundary / Touchdown Total + N-Pa-K-AMS	1.5 pt/a / 24 oz/a + 3 qt/a	84	99	99	98	98	44.8
Boundary / Flextar GT 3.5 + MSO + N-Pa-K-AMS	1.5 pt/a / 3.5 pt/a + 0.5% v/v + 3 qt/a	84	99	99	99	99	41.3
Fierce / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 22 fl oz/a + 3 qt/a	87	99	99	99	99	45.2
Valor SX / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 22 fl oz/a + 3 qt/a	88	99	99	99	99	43.6
Fierce + Classic / Roundup PowerMax + N-Pa-K-AMS	3 oz/a + 0.33 oz/a / 22 fl oz/a + 3 qt/a	89	99	99	99	99	44.9
Optil PRO (Optil + Outlook) / Roundup PowerMax + NIS + N-Pa-K-AMS	12 oz/a (2 oz/a + 10 fl oz/a) / 22 fl oz/a + 0.25% v/v + 3 qt/a	87	99	99	99	99	47.8
Verdict +Outlook / Roundup PowerMax + NIS + N-Pa-K-AMS	5 fl oz/a + 10 fl oz/a / 22 fl oz/a + 0.25% v/v + 3 qt/a	82	99	99	99	99	46.7
Zidua + Verdict / Roundup PowerMax + NIS + N-Pa-K-AMS	2 oz/a + 5 fl oz/a / 22 fl oz/a + 0.25% v/v + 3 qt/a	86	99	99	99	98	44.7
Sonic* / Durango DMA + N-Pa-K-AMS	3 oz/a / 24 fl oz/a + 3 qt/a	88	99	99	99	99	46.2
Enlite (Chlorimuron + Thifensulfuron + Flumioxazin) / Abundit S + N-Pa-K-AMS	2.8 oz/a (0.33 oz/a + 0.5 oz/a + 2 oz/a) / 32 fl oz/a + 3 qt/a	90	98	99	99	99	45.3
Enlite (Chlorimuron + Thifensulfuron + Flumioxazin) / Abundit S + Harmony SG +N-Pa-K-AMS	2.8 oz/a (0.33 oz/a + 0.5 oz/a + 2 oz/a) / 32 fl oz/a + 0.125 oz/a + 3 qt/a	92	99	99	99	99	39.0
Warrant / Roundup WeatherMax + N-Pa-K-AMS	3 pt/a / 22 fl oz/a + 3 qt/a	73	99	99	99	99	44.0
POST I (2" Weeds)							
Marvel + Roundup PowerMax + NIS + N-Pa-K-AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 3 qt/a	0	91	90	82	82	39.7
POST I (2" Weeds) / POST III							
Roundup WeatherMax + N-Pa-K-AMS / Roundup WeatherMax + N-Pa-K-AMS	22 oz/a + 3 qt/a / 22 fl oz/a + 3 qt/a	0	84	98	98	98	46.4
Durango DMA + FirstRate + N-Pa-K-AMS / Durango DMA + N-Pa-K-AMS	24 fl oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a	0	93	98	99	99	42.7
Flexstar GT 3.5 + MSO + N-Pa-K-AMS / Touchdown Total + N-Pa-K-AMS	3.5 pt/a + 0.5% v/v + 3 qt/a / 24 oz/a + 3 qt/a	0	95	97	99	99	41.5
Synchrony (Chlorimuron + Thifensulfuron) + Abundit S + N-Pa-K-AMS / Abundit S + N-Pa-K-AMS	0.375 oz/a (0.33 oz/a + 0.05 oz/a) + 32 fl oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	91	98	99	99	42.6
Roundup PowerMax + Cobra + COC + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	22 fl oz/a + 12.5 fl oz/a + 1 pt/a + 3 qt/a / 22 oz/a + 3 qt/a	0	81	98	99	98	40.7
LSD (P=0.10)		4	4	1	2	2	4

*AuthorityFirst and Sonic are both sulfentrazone + cloransulam package mixes marketed by FMC and Dow, respectively.

Table 4. Performance of herbicide systems for common waterhemp control in soybeans on June 11, 27, July 3, 19, and September 14, and grain yield at 13% at Rochester, MN, in 2012.

Treatment	Rate (rate/A)	Common Waterhemp Control					Yield (bu/A)
		6/11	6/27	7/3	7/19	9/14	
		(% Control)					
Untreated 1		0	0	0	0	0	25.8
Untreated 2		0	0	0	0	0	22.0
Weed Free		99	100	100	100	100	46.1
PRE / POST I (2" Weeds)							
Valor SX / Warrant + Roundup WeatherMax + N-Pa-K-AMS	2 oz/a / 3 pt/a + 22 fl oz/a + 3 qt/a	95	99	99	99	99	45.5
PRE / POST II (4" Weeds)							
Authority First* / Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 22 oz/a + 3 qt/a	98	99	99	99	99	43.4
Authority Assist / Roundup PowerMax + N-Pa-K-AMS	9 fl oz/a / 22 fl oz/a + 3 qt/a	93	99	99	99	99	44.8
Prefix / Touchdown Total + N-Pa-K-AMS	1 qt/a / 24 oz/a + 3 qt/a	98	99	99	99	99	45.3
Boundary / Touchdown Total + N-Pa-K-AMS	1.5 pt/a / 24 oz/a + 3 qt/a	93	99	99	99	99	44.8
Boundary / Flextar GT 3.5 + MSO + N-Pa-K-AMS	1.5 pt/a / 3.5 pt/a + 0.5% v/v + 3 qt/a	96	99	99	99	99	41.3
Fierce / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 22 fl oz/a + 3 qt/a	99	99	99	99	99	45.2
Valor SX / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 22 fl oz/a + 3 qt/a	86	99	99	99	99	43.6
Fierce + Classic / Roundup PowerMax + N-Pa-K-AMS	3 oz/a + 0.33 oz/a / 22 fl oz/a + 3 qt/a	98	99	99	99	99	44.9
Optil PRO (Optil + Outlook) / Roundup PowerMax + NIS + N-Pa-K-AMS	12 oz/a (2 oz/a + 10 fl oz/a) / 22 fl oz/a + 0.25% v/v + 3 qt/a	96	99	99	99	99	47.8
Verdict +Outlook / Roundup PowerMax + NIS + N-Pa-K-AMS	5 fl oz/a + 10 fl oz/a / 22 fl oz/a + 0.25% v/v + 3 qt/a	93	99	99	98	98	46.7
Zidua + Verdict / Roundup PowerMax + NIS + N-Pa-K-AMS	2 oz/a + 5 fl oz/a / 22 fl oz/a + 0.25% v/v + 3 qt/a	97	99	99	99	99	44.7
Sonic* / Durango DMA + N-Pa-K-AMS	3 oz/a / 24 fl oz/a + 3 qt/a	71	99	99	99	99	46.2
Enlite (Chlorimuron + Thifensulfuron + Flumioxazin) / Abundit S + N-Pa-K-AMS	2.8 oz/a (0.33 oz/a + 0.5 oz/a + 2 oz/a) / 32 fl oz/a + 3 qt/a	97	99	99	99	99	45.3
Enlite (Chlorimuron + Thifensulfuron + Flumioxazin) / Abundit S + Harmony SG +N-Pa-K-AMS	2.8 oz/a (0.33 oz/a + 0.5 oz/a + 2 oz/a) / 32 fl oz/a + 0.125 oz/a + 3 qt/a	98	99	99	99	99	39.0
Warrant / Roundup WeatherMax + N-Pa-K-AMS	3 pt/a / 22 fl oz/a + 3 qt/a	97	99	99	99	99	44.0
POST I (2" Weeds)							
Marvel + Roundup PowerMax + NIS + N-Pa-K-AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 3 qt/a	0	96	99	95	94	39.7
POST I (2" Weeds) / POST III							
Roundup WeatherMax + N-Pa-K-AMS / Roundup WeatherMax + N-Pa-K-AMS	22 oz/a + 3 qt/a / 22 fl oz/a + 3 qt/a	0	98	99	99	99	46.4
Durango DMA + FirstRate + N-Pa-K-AMS / Durango DMA + N-Pa-K-AMS	24 fl oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a	0	97	99	99	99	42.7
Flexstar GT 3.5 + MSO + N-Pa-K-AMS / Touchdown Total + N-Pa-K-AMS	3.5 pt/a + 0.5% v/v + 3 qt/a / 24 oz/a + 3 qt/a	0	98	99	99	99	41.5
Synchrony (Chlorimuron + Thifensulfuron) + Abundit S + N-Pa-K-AMS / Abundit S + N-Pa-K-AMS	0.375 oz/a (0.33 oz/a + 0.05 oz/a) + 32 fl oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	99	99	99	99	42.6
Roundup PowerMax + Cobra + COC + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	22 fl oz/a + 12.5 fl oz/a + 1 pt/a + 3 qt/a / 22 oz/a + 3 qt/a	0	99	99	99	99	40.7
LSD (P=0.10)		8	1	1	1	1	4

Table 5. Performance of herbicide systems for giant foxtail control in soybeans on June 11, 27, July 3, 19, and September 14, and grain yield at 13% at Rochester, MN, in 2012.

Treatment	Rate (rate/A)	Giant Foxtail Control (% Control)					Yield (bu/A)
		6/11	6/27	7/3	7/19	9/14	
Untreated 1		0	0	0	0	0	25.8
Untreated 2		0	0	0	0	0	22.0
Weed Free		99	100	100	100	100	46.1
PRE / POST I (2" Weeds)							
Valor SX / Warrant + Roundup WeatherMax + N-Pa-K-AMS	2 oz/a / 3 pt/a + 22 fl oz/a + 3 qt/a	92	99	99	99	99	45.5
PRE / POST II (4" Weeds)							
Authority First* / Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 22 oz/a + 3 qt/a	91	99	99	99	99	43.4
Authority Assist / Roundup PowerMax + N-Pa-K-AMS	9 fl oz/a / 22 fl oz/a + 3 qt/a	96	99	99	99	99	44.8
Prefix / Touchdown Total + N-Pa-K-AMS	1 qt/a / 24 oz/a + 3 qt/a	98	99	99	99	99	45.3
Boundary / Touchdown Total + N-Pa-K-AMS	1.5 pt/a / 24 oz/a + 3 qt/a	97	99	99	99	99	44.8
Boundary / Flextar GT 3.5 + MSO + N-Pa-K-AMS	1.5 pt/a / 3.5 pt/a + 0.5% v/v + 3 qt/a	97	99	99	99	99	41.3
Fierce / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 22 fl oz/a + 3 qt/a	97	99	99	99	99	45.2
Valor SX / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 22 fl oz/a + 3 qt/a	90	99	99	99	99	43.6
Fierce + Classic / Roundup PowerMax + N-Pa-K-AMS	3 oz/a + 0.33 oz/a / 22 fl oz/a + 3 qt/a	97	98	99	99	99	44.9
Optil PRO (Optil + Outlook) / Roundup PowerMax + NIS + N-Pa-K-AMS	12 oz/a (2 oz/a + 10 fl oz/a) / 22 fl oz/a + 0.25% v/v + 3 qt/a	95	99	99	99	99	47.8
Verdict +Outlook / Roundup PowerMax + NIS + N-Pa-K-AMS	5 fl oz/a + 10 fl oz/a / 22 fl oz/a + 0.25% v/v + 3 qt/a	93	99	99	99	98	46.7
Zidua + Verdict / Roundup PowerMax + NIS + N-Pa-K-AMS	2 oz/a + 5 fl oz/a / 22 fl oz/a + 0.25% v/v + 3 qt/a	97	99	99	99	99	44.7
Sonic* / Durango DMA + N-Pa-K-AMS	3 oz/a / 24 fl oz/a + 3 qt/a	90	99	99	99	99	46.2
Enlite (Chlorimuron + Thifensulfuron + Flumioxazin) / Abundit S + N-Pa-K-AMS	2.8 oz/a (0.33 oz/a + 0.5 oz/a + 2 oz/a) / 32 fl oz/a + 3 qt/a	92	99	99	98	99	45.3
Enlite (Chlorimuron + Thifensulfuron + Flumioxazin) / Abundit S + Harmony SG +N-Pa-K-AMS	2.8 oz/a (0.33 oz/a + 0.5 oz/a + 2 oz/a) / 32 fl oz/a + 0.125 oz/a + 3 qt/a	94	99	99	98	99	39.0
Warrant / Roundup WeatherMax + N-Pa-K-AMS	3 pt/a / 22 fl oz/a + 3 qt/a	97	99	99	99	99	44.0
POST I (2" Weeds)							
Marvel + Roundup PowerMax + NIS + N-Pa-K-AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 3 qt/a	0	93	95	91	92	39.7
POST I (2" Weeds) / POST III							
Roundup WeatherMax + N-Pa-K-AMS / Roundup WeatherMax + N-Pa-K-AMS	22 oz/a + 3 qt/a / 22 fl oz/a + 3 qt/a	0	93	98	99	98	46.4
Durango DMA + FirstRate + N-Pa-K-AMS / Durango DMA + N-Pa-K-AMS	24 fl oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a	0	95	98	99	99	42.7
Flexstar GT 3.5 + MSO + N-Pa-K-AMS / Touchdown Total + N-Pa-K-AMS	3.5 pt/a + 0.5% v/v + 3 qt/a / 24 oz/a + 3 qt/a	0	98	99	99	99	41.5
Synchrony (Chlorimuron + Thifensulfuron) + Abundit S + N-Pa-K-AMS / Abundit S + N-Pa-K-AMS	0.375 oz/a (0.33 oz/a + 0.05 oz/a) + 32 fl oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	94	98	99	99	42.6
Roundup PowerMax + Cobra + COC + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	22 fl oz/a + 12.5 fl oz/a + 1 pt/a + 3 qt/a / 22 oz/a + 3 qt/a	0	95	99	99	99	40.7
LSD (P=0.10)		4	2	1	1	1	4

Table 6. Performance of herbicide systems for injury in soybeans on June 11, 27, and July 3, and grain yield at 13% at Rochester, MN, in 2012.

Treatment	Rate	Injury			Yield 10/10/ (bu/A)
		6/11	6/27	7/3	
	(rate/A)	(% Control)			
Untreated 1		0	0	0	25.8
Untreated 2		0	0	0	22.0
Weed Free		0	0	0	46.1
PRE / POST I (2" Weeds)					
Valor SX / Warrant + Roundup WeatherMax + N-Pa-K-AMS	2 oz/a / 3 pt/a + 22 fl oz/a + 3 qt/a	0	0	0	45.5
PRE / POST II (4" Weeds)					
Authority First* / Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 22 oz/a + 3 qt/a	0	0	0	43.4
Authority Assist / Roundup PowerMax + N-Pa-K-AMS	9 fl oz/a / 22 fl oz/a + 3 qt/a	0	0	0	44.8
Prefix / Touchdown Total + N-Pa-K-AMS	1 qt/a / 24 oz/a + 3 qt/a	0	0	0	45.3
Boundary / Touchdown Total + N-Pa-K-AMS	1.5 pt/a / 24 oz/a + 3 qt/a	0	0	0	44.8
Boundary / Flextar GT 3.5 + MSO + N-Pa-K-AMS	1.5 pt/a / 3.5 pt/a + 0.5% v/v + 3 qt/a	0	24	6	41.3
Fierce / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 22 fl oz/a + 3 qt/a	0	0	0	45.2
Valor SX / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 22 fl oz/a + 3 qt/a	0	0	3	43.6
Fierce + Classic / Roundup PowerMax + N-Pa-K-AMS	3 oz/a + 0.33 oz/a / 22 fl oz/a + 3 qt/a	0	0	1	44.9
Optil PRO (Optil + Outlook) / Roundup PowerMax + NIS + N-Pa-K-AMS	12 oz/a (2 oz/a + 10 fl oz/a) / 22 fl oz/a + 0.25% v/v + 3 qt/a	0	0	0	47.8
Verdict +Outlook / Roundup PowerMax + NIS + N-Pa-K-AMS	5 fl oz/a + 10 fl oz/a / 22 fl oz/a + 0.25% v/v + 3 qt/a	0	1	0	46.7
Zidua + Verdict / Roundup PowerMax + NIS + N-Pa-K-AMS	2 oz/a + 5 fl oz/a / 22 fl oz/a + 0.25% v/v + 3 qt/a	0	0	0	44.7
Sonic* / Durango DMA + N-Pa-K-AMS	3 oz/a / 24 fl oz/a + 3 qt/a	0	0	0	46.2
Enlite (Chlorimuron + Thifensulfuron + Flumioxazin) / Abundit S + N-Pa-K-AMS	2.8 oz/a (0.33 oz/a + 0.5 oz/a + 2 oz/a) / 32 fl oz/a + 3 qt/a	0	0	0	45.3
Enlite (Chlorimuron + Thifensulfuron + Flumioxazin) / Abundit S + Harmony SG +N-Pa-K-AMS	2.8 oz/a (0.33 oz/a + 0.5 oz/a + 2 oz/a) / 32 fl oz/a + 0.125 oz/a + 3 qt/a	0	31	25	39.0
Warrant / Roundup WeatherMax + N-Pa-K-AMS	3 pt/a / 22 fl oz/a + 3 qt/a	0	0	0	44.0
POST I (2" Weeds)					
Marvel + Roundup PowerMax + NIS + N-Pa-K-AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 3 qt/a	0	34	9	39.7
POST I (2" Weeds) / POST III					
Roundup WeatherMax + N-Pa-K-AMS / Roundup WeatherMax + N-Pa-K-AMS	22 oz/a + 3 qt/a / 22 fl oz/a + 3 qt/a	0	0	0	46.4
Durango DMA + FirstRate + N-Pa-K-AMS / Durango DMA + N-Pa-K-AMS	24 fl oz/a + 0.3 oz/a + 3 qt/a / 24 oz/a + 3 qt/a	0	3	0	42.7
Flexstar GT 3.5 + MSO + N-Pa-K-AMS / Touchdown Total + N-Pa-K-AMS	3.5 pt/a + 0.5% v/v + 3 qt/a / 24 oz/a + 3 qt/a	0	11	1	41.5
Synchrony (Chlorimuron + Thifensulfuron) + Abundit S + N-Pa-K-AMS / Abundit S + N-Pa-K-AMS	0.375 oz/a (0.33 oz/a + 0.05 oz/a) + 32 fl oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	13	1	42.6
Roundup PowerMax + Cobra + COC + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	22 fl oz/a + 12.5 fl oz/a + 1 pt/a + 3 qt/a / 22 oz/a + 3 qt/a	0	35	13	40.7
	LSD (P=0.10)	0	3	2	4