

2014 Evaluation of Herbicide Systems in Soybean at Rochester, MN

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The objective of this trial was to evaluate the performance of herbicide systems for weed control in soybean 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 Asgrow AG 2433 was planted on May 21, 2014 at a depth of 1.5 inches in 30 inch rows at a rate of 149,000 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. PRE herbicides were applied at 4 mph, 15 gpa, 40 psi, using TTI 110015 nozzles. POST I and II systemic herbicide treatments were applied at 5 mph, 15 gpa, 40 psi using TTI 11002 nozzles and POST III and IV systemic herbicide treatments were applied at 4 mph, 15 gpa, 40 psi using TTI 110015 nozzles. POST contact herbicide treatments were applied at 5 mph, 15 gpa, 40 psi using TTJ60 11002 nozzles. Evaluations of the plot were taken on June 11, 16 and 23, and July 1, 9, 14, 21 and October 6, 2014. The center two rows of each plot were machine harvested on October 21, 2014. 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 crop injury ratings are found in Tables 2 through 6 respectively. (University of Minnesota Extension Regional Office, Rochester)

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

Date	5/21	6/13	6/21	6/26	7/3
Treatment	PRE	POST I	POST II	POST III	POST IV
Temperature (F)					
Air	65	68	71	72	60
Soil	65.5	67.8	74.1	77.5	64.4
Relative Humidity (%)	52	38	81	78	72
Wind (mph)	18	12	8	10	7
Soil Moisture	Adequate	Inadequate	Excessive	Adequate	Adequate
Soybean					
Stage		V2	V3-V4	V4-V5	V7-R1
Height (inch)		4.5	8.0	11.0	11.0
Giant Ragweed					
Weed density (ft ²)			1.8		
Height (inch)		3.1	6.1	7.8	3.5
Common Lambsquarters					
Weed density (ft ²)			2.9		
Height (inch)		1.6	2.8	2.4	2.5
Common Waterhemp					
Weed density (ft ²)			2.4		
Height (inch)		1.3	3.5	3.9	1.3
Giant Foxtail					
Weed density (ft ²)			13.0		
Height (inch)		1.9	4.4	5.8	2.5
Rainfall after each application (inch)					
Week 1	0.03	5.92	0.76	1.34	0.51
Week 2	1.06	0.58	0.94	0.51	0.59
Week 3	0.04	1.12	0.68	0.59	0.0

Table 2. Performance of herbicide systems for giant ragweed control in soybeans in June, July and October 6 and grain yield at 13% at Rochester, MN in 2014.

Treatment	Rate (rate/A)	Giant Ragweed Control							Yield (bu/A)
		6/11	6/16	6/23	7/1	7/9	7/14	10/6	
Untreated		0	0	0	0	0	0	0	15.5
Weed Free		99	89	93	90	97	98	99	52.7
PRE / POST I (2" Weeds)									
Valor SX / Warrant + Roundup WeatherMax + N-Pa-K-AMS	2 oz/a / 3 pt/a + 32 oz/a + 3 qt/a	55	94	98	96	94	96	91	49.8
Verdict + Dual II Magnum / Cobra +Roundup PowerMax + COC + N-Pa-K-AMS	5 oz/a + 1.33 pt/a / 12.5 oz/a + 32 oz/a +1 pt/a + 3 qt/a	75	97	97	93	91	94	85	35.1
Verdict / Dual II Magnum + Cobra +Roundup PowerMax + COC + N-Pa-K-AMS	5 oz/a / 1.33 pt/a +12.5 oz/a + 32 oz/a +0.5 pt/a + 3 qt/a	70	97	96	92	90	87	81	32.9
PRE / POST II (4" Weeds)									
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	33	93	91	98	98	99	98	53.8
Dual II Magnum / Flexstar GT 3.5 + MSO + N-Pa-K-AMS	2 pt/a / 3.5 pt/a + 0.5% v/v + 3 qt/a	0	89	89	97	98	98	98	48.8
Gangster V / Ganster FR / Roundup PowerMax + N-Pa-K-AMS	2 oz/a + 0.4 oz/a / 32 oz/a + 3 qt/a	87	94	94	97	97	97	97	49.1
Fierce / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 32 oz/a + 3 qt/a	83	94	93	98	96	97	96	48.1
Valor SX / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 32 fl oz/a + 3 qt/a	82	94	94	97	98	98	98	48.3
Fierce + Classic / Roundup PowerMax + N-Pa-K-AMS	3 oz/a + 0.33 oz/a / 32 oz/a + 3 qt/a	74	91	89	96	96	97	95	55.3
Verdict +Outlook / Roundup PowerMax + NIS + N-Pa-K-AMS	5 fl oz/a + 10 fl oz/a / 32 fl oz/a + 0.25% v/v + 3 qt/a	75	92	91	93	92	93	87	47.7
Zidua + Verdict / Roundup PowerMax + NIS + N-Pa-K-AMS	2 oz/a + 5 oz/a / 32 oz/a + 0.25% v/v + 3 qt/a	63	90	88	95	93	93	87	47.2
Sonic* / Durango DMA + N-Pa-K-AMS	3 oz/a / 24 fl oz/a + 3 qt/a	76	93	91	94	93	94	92	50.8
Sonic* / Durango DMA +FirstRate + N-Pa-K-AMS	3 oz/a / 32 oz/a + 0.3 oz/a +3 qt/a	70	93	90	96	98	98	98	52.7
Enlite (chlorimuron + thifensulfuron + flumioxazin) / Abundit Extra + 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	70	93	91	97	97	96	97	47.3
Enlite (chlorimuron + thifensulfuron + flumioxazin) / Abundit Extra + 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	76	93	87	97	95	96	95	49.9
Warrant / Roundup WeatherMax + N-Pa-K-AMS	3 pt/a / 32 fl oz/a + 3 qt/a	15	88	85	94	94	96	94	45.3
PRE / POST III (3-5" weed regrowth)									
Authority First / Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 32 oz/a +3 qt/a	89	95	95	94	97	97	97	46.9
Authority First / Anthem + Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 8 oz/a + 32 oz/a +3 qt/a	91	95	94	94	98	97	97	49.0
Optill Pro (Optill + Outlook) / Roundup PowerMax + NIS + N-Pa-K-AMS	12 oz/a (2 oz/a + 10 oz/a) / 32 oz/a + 0.25% v/v + 3 qt/a	80	93	91	93	96	96	96	51.6
Sonic* / Durango DMA + N-Pa-K-AMS	4.5 oz/a / 32 oz/a + 3 qt/a	82	94	92	93	96	96	96	49.1
PRE / POST I (2" Weeds) / POST IV (2-3" weed regrowth)									
Verdict / Dual II Magnum + Cobra + Roundup PowerMax + COC + N-Pa-K-AMS / Cobra + COC + N-Pa-K-AMS	5 oz/a / 1.33 pt/a + 12.5 oz/a +32 oz/a + 0.5 pt/a + 3 qt/a / 12.5 oz/a + 0.5 pt/a + 3 qt/a	68	95	96	90	99	99	98	43.1
POST I (2" Weeds)									
Roundup PowerMax + N-Pa-K-AMS	32 oz/a + 3 qt/a	0	83	91	87	83	84	76	35.9
POST I (2" Weeds) / POST IV (2-3" weed regrowth)									
Roundup PowerMax + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	32 oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	92	94	91	96	98	98	46.8
Synchrony (chlorimuron + thifensulfuron) + Abundit S + N-Pa-K-AMS / Abundit Extra + N-Pa-K-AMS	0.375 oz/a (0.32 oz/a + 0.05 oz/a) + 32 fl oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	89	95	93	97	99	98	50.0
Roundup PowerMax + Cobra + COC + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	32 fl oz/a + 12.5 oz/a + 1 pt/a + 3 qt/a / 32 oz/a + 3 qt/a	0	94	95	91	97	98	98	48.7
POST II (4" Weeds)									
Dual II Magnum + Flexstar GT 3.5 + NIS + N-Pa-K-AMS	10 oz/a + 3.5 pt/a + 0.25% v/v + 3 qt/a	0	0	83	95	96	97	97	48.7
LSD (P=0.10)		12	4	5	4	3	3	4	5.5 (P=.20)

Table 3. Performance of herbicide systems for common lambsquarters control in soybeans in June, July and October 6 and grain yield at 13% at Rochester, MN in 2014.

Treatment	Rate	Common Lambsquarters Control							Yield
		6/11	6/16	6/23	7/1	7/9	7/14	10/6	
	(rate/A)	(% Control)							(bu/A)
Untreated		0	0	0	0	0	0	0	15.5
Weed Free		99	100	99	98	100	100	100	52.7
PRE / POST I (2" Weeds)									
Valor SX / Warrant + Roundup WeatherMax + N-Pa-K-AMS	2 oz/a / 3 pt/a + 32 oz/a + 3 qt/a	98	99	99	98	98	98	98	49.8
Verdict + Dual II Magnum / Cobra +Roundup PowerMax + COC + N-Pa-K-AMS	5 oz/a + 1.33 pt/a / 12.5 oz/a + 32 oz/a +1 pt/a + 3 qt/a	98	99	99	99	98	98	96	35.1
Verdict / Dual II Magnum + Cobra +Roundup PowerMax + COC + N-Pa-K-AMS	5 oz/a / 1.33 pt/a +12.5 oz/a + 32 oz/a +0.5 pt/a + 3 qt/a	98	99	99	99	99	98	96	32.9
PRE / POST II (4" Weeds)									
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	99	99	99	99	99	99	99	53.8
Dual II Magnum / Flexstar GT 3.5 + MSO + N-Pa-K-AMS	2 pt/a / 3.5 pt/a + 0.5% v/v + 3 qt/a	94	94	97	99	99	99	98	48.8
Gangster V / Ganster FR / Roundup PowerMax + N-Pa-K-AMS	2 oz/a + 0.4 oz/a / 32 oz/a + 3 qt/a	99	99	99	99	99	99	99	49.1
Fierce / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 32 oz/a + 3 qt/a	99	99	99	99	99	99	99	48.1
Valor SX / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 32 fl oz/a + 3 qt/a	99	99	99	99	99	99	99	48.3
Fierce + Classic / Roundup PowerMax + N-Pa-K-AMS	3 oz/a + 0.33 oz/a / 32 oz/a + 3 qt/a	99	99	99	99	99	99	99	55.3
Verdict +Outlook / Roundup PowerMax + NIS + N-Pa-K-AMS	5 fl oz/a + 10 fl oz/a / 32 fl oz/a + 0.25% v/v + 3 qt/a	97	98	97	99	98	96	95	47.7
Zidua + Verdict / Roundup PowerMax + NIS + N-Pa-K-AMS	2 oz/a + 5 oz/a / 32 oz/a + 0.25% v/v + 3 qt/a	98	97	98	98	99	97	93	47.2
Sonic* / Durango DMA + N-Pa-K-AMS	3 oz/a / 24 fl oz/a + 3 qt/a	99	99	99	99	99	99	99	50.8
Sonic* / Durango DMA +FirstRate + N-Pa-K-AMS	3 oz/a / 32 oz/a + 0.3 oz/a +3 qt/a	99	99	99	99	99	99	99	52.7
Enlite (chlorimuron + thifensulfuron + flumioxazin) / Abundit Extra + 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	99	99	99	99	99	99	99	47.3
Enlite (chlorimuron + thifensulfuron + flumioxazin) / Abundit Extra + 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	99	99	99	99	99	99	99	49.9
Warrant / Roundup WeatherMax + N-Pa-K-AMS	3 pt/a / 32 fl oz/a + 3 qt/a	95	97	96	98	98	98	96	45.3
PRE / POST III (3-5" weed regrowth)									
Authority First / Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 32 oz/a +3 qt/a	99	99	99	99	99	99	99	46.9
Authority First / Anthem + Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 8 oz/a + 32 oz/a +3 qt/a	99	99	99	99	99	99	99	49.0
Optill Pro (Optill + Outlook) / Roundup PowerMax + NIS + N-Pa-K-AMS	12 oz/a (2 oz/a + 10 oz/a) / 32 oz/a + 0.25% v/v + 3 qt/a	99	98	99	99	99	99	99	51.6
Sonic* / Durango DMA + N-Pa-K-AMS	4.5 oz/a / 32 oz/a + 3 qt/a	99	99	99	99	99	99	99	49.1
PRE / POST I (2" Weeds) / POST IV (2-3" weed regrowth)									
Verdict / Dual II Magnum + Cobra + Roundup PowerMax + COC + N-Pa-K-AMS / Cobra + COC + N-Pa-K-AMS	5 oz/a / 1.33 pt/a + 12.5 oz/a +32 oz/a + 0.5 pt/a + 3 qt/a / 12.5 oz/a + 0.5 pt/a + 3 qt/a	98	99	99	99	99	97	95	43.1
POST I (2" Weeds)									
Roundup PowerMax + N-Pa-K-AMS	32 oz/a + 3 qt/a	0	96	97	88	83	89	82	35.9
POST I (2" Weeds) / POST IV (2-3" weed regrowth)									
Roundup PowerMax + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	32 oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	98	97	92	99	98	98	46.8
Synchrony (chlorimuron + thifensulfuron) + Abundit S + N-Pa-K-AMS / Abundit Extra + N-Pa-K-AMS	0.375 oz/a (0.32 oz/a + 0.05 oz/a) + 32 fl oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	98	99	99	99	99	99	50.0
Roundup PowerMax + Cobra + COC + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	32 fl oz/a + 12.5 oz/a + 1 pt/a + 3 qt/a / 32 oz/a + 3 qt/a	0	99	98	94	99	99	97	48.7
POST II (4" Weeds)									
Dual II Magnum + Flexstar GT 3.5 + NIS + N-Pa-K-AMS	10 oz/a + 3.5 pt/a + 0.25% v/v + 3 qt/a	0	0	97	99	99	98	98	48.7
LSD (P=0.10)	2	2	1	1	1	1	2	4	5.5 (P=.20)

Table 4. Performance of herbicide systems for common waterhemp control in soybeans on June 11, 16 and 23, July 1, 9, and 14, and October 6 and grain yield at 13% at Rochester, MN in 2014.

Treatment	Rate (rate/A)	Common Waterhemp Control (% Control)							Yield (bu/A)
		6/11	6/16	6/23	7/1	7/9	7/14	10/6	
Untreated		0	0	0	0	0	0	0	15.5
Weed Free		99	100	99	99	100	100	100	52.7
PRE / POST I (2" Weeds)									
Valor SX / Warrant + Roundup WeatherMax + N-Pa-K-AMS	2 oz/a / 3 pt/a + 32 oz/a + 3 qt/a	99	99	99	99	99	99	99	49.8
Verdict + Dual II Magnum / Cobra +Roundup PowerMax + COC + N-Pa-K-AMS	5 oz/a + 1.33 pt/a / 12.5 oz/a + 32 oz/a +1 pt/a + 3 qt/a	98	99	99	99	99	98	98	35.1
Verdict / Dual II Magnum + Cobra +Roundup PowerMax + COC + N-Pa-K-AMS	5 oz/a / 1.33 pt/a +12.5 oz/a + 32 oz/a +0.5 pt/a + 3 qt/a	97	99	99	99	99	99	99	32.9
PRE / POST II (4" Weeds)									
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	98	99	99	99	99	99	99	53.8
Dual II Magnum / Flexstar GT 3.5 + MSO + N-Pa-K-AMS	2 pt/a / 3.5 pt/a + 0.5% v/v + 3 qt/a	98	99	99	99	99	99	99	48.8
Gangster V / Ganster FR / Roundup PowerMax + N-Pa-K-AMS	2 oz/a + 0.4 oz/a / 32 oz/a + 3 qt/a	99	99	99	99	99	99	99	49.1
Fierce / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 32 oz/a + 3 qt/a	99	99	99	99	99	99	99	48.1
Valor SX / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 32 fl oz/a + 3 qt/a	99	99	99	99	99	99	99	48.3
Fierce + Classic / Roundup PowerMax + N-Pa-K-AMS	3 oz/a + 0.33 oz/a / 32 oz/a + 3 qt/a	99	99	99	99	99	99	99	55.3
Verdict +Outlook / Roundup PowerMax + NIS + N-Pa-K-AMS	5 fl oz/a + 10 fl oz/a / 32 fl oz/a + 0.25% v/v + 3 qt/a	98	98	99	99	98	97	96	47.7
Zidua + Verdict / Roundup PowerMax + NIS + N-Pa-K-AMS	2 oz/a + 5 oz/a / 32 oz/a + 0.25% v/v + 3 qt/a	98	99	99	99	99	99	98	47.2
Sonic* / Durango DMA + N-Pa-K-AMS	3 oz/a / 24 fl oz/a + 3 qt/a	98	99	99	99	99	99	99	50.8
Sonic* / Durango DMA +FirstRate + N-Pa-K-AMS	3 oz/a / 32 oz/a + 0.3 oz/a +3 qt/a	99	99	99	99	99	99	99	52.7
Enlite (chlorimuron + thifensulfuron + flumioxazin) / Abundit Extra + 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	98	99	99	99	99	99	99	47.3
Enlite (chlorimuron + thifensulfuron + flumioxazin) / Abundit Extra + 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	99	99	99	99	99	99	99	49.9
Warrant / Roundup WeatherMax + N-Pa-K-AMS	3 pt/a / 32 fl oz/a + 3 qt/a	98	99	99	99	99	98	99	45.3
PRE / POST III (3-5" weed regrowth)									
Authority First / Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 32 oz/a +3 qt/a	99	99	99	99	99	99	99	46.9
Authority First / Anthem + Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 8 oz/a + 32 oz/a +3 qt/a	99	99	99	99	99	99	99	49.0
Optill Pro (Optill + Outlook) / Roundup PowerMax + NIS + N-Pa-K-AMS	12 oz/a (2 oz/a + 10 oz/a) / 32 oz/a + 0.25% v/v + 3 qt/a	99	99	99	99	99	98	97	51.6
Sonic* / Durango DMA + N-Pa-K-AMS	4.5 oz/a / 32 oz/a + 3 qt/a	99	99	99	99	99	99	99	49.1
PRE / POST I (2" Weeds) / POST IV (2-3" weed regrowth)									
Verdict / Dual II Magnum + Cobra + Roundup PowerMax + COC + N-Pa-K-AMS / Cobra + COC + N-Pa-K-AMS	5 oz/a / 1.33 pt/a + 12.5 oz/a +32 oz/a + 0.5 pt/a + 3 qt/a / 12.5 oz/a + 0.5 pt/a + 3 qt/a	98	99	99	99	99	99	99	43.1
POST I (2" Weeds)									
Roundup PowerMax + N-Pa-K-AMS	32 oz/a + 3 qt/a	0	99	98	94	87	91	87	35.9
POST I (2" Weeds) / POST IV (2-3" weed regrowth)									
Roundup PowerMax + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	32 oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	99	99	96	99	98	99	46.8
Synchrony (chlorimuron + thifensulfuron) + Abundit S + N-Pa-K-AMS / Abundit Extra + N-Pa-K-AMS	0.375 oz/a (0.32 oz/a + 0.05 oz/a) + 32 fl oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	99	99	98	99	99	98	50.0
Roundup PowerMax + Cobra + COC + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	32 fl oz/a + 12.5 oz/a + 1 pt/a + 3 qt/a / 32 oz/a + 3 qt/a	0	99	99	98	99	99	98	48.7
POST II (4" Weeds)									
Dual II Magnum + Flexstar GT 3.5 + NIS + N-Pa-K-AMS	10 oz/a + 3.5 pt/a + 0.25% v/v + 3 qt/a	0	0	99	99	99	99	99	48.7
LSD (P=0.10)		1	0.4	0.4	1	1	1	1	5.5 (P=.20)

Table 5. Performance of herbicide systems for grass control in soybeans on June, July, and October 6 and grain yield at 13% at Rochester, MN in 2014.

Treatment	Rate	Grass Control							Yield
		6/11	6/16	6/23	7/1	7/9	7/14	10/6	
	(rate/A)	(% Control)							(bu/A)
Untreated		0	0	0	0	0	0	0	15.5
Weed Free		99	100	100	99	100	100	100	52.7
PRE / POST I (2" Weeds)									
Valor SX / Warrant + Roundup WeatherMax + N-Pa-K-AMS	2 oz/a / 3 pt/a + 32 oz/a + 3 qt/a	98	99	99	98	98	98	98	49.8
Verdict + Dual II Magnum / Cobra +Roundup PowerMax + COC + N-Pa-K-AMS	5 oz/a + 1.33 pt/a / 12.5 oz/a + 32 oz/a +1 pt/a + 3 qt/a	99	99	99	99	99	98	96	35.1
Verdict / Dual II Magnum + Cobra +Roundup PowerMax + COC + N-Pa-K-AMS	5 oz/a / 1.33 pt/a +12.5 oz/a + 32 oz/a +0.5 pt/a + 3 qt/a	96	98	99	99	98	97	97	32.9
PRE / POST II (4" Weeds)									
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	99	99	99	99	99	99	99	53.8
Dual II Magnum / Flexstar GT 3.5 + MSO + N-Pa-K-AMS	2 pt/a / 3.5 pt/a + 0.5% v/v + 3 qt/a	97	99	99	99	99	99	99	48.8
Gangster V / Ganster FR / Roundup PowerMax + N-Pa-K-AMS	2 oz/a + 0.4 oz/a / 32 oz/a + 3 qt/a	98	97	97	99	99	97	97	49.1
Fierce / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 32 oz/a + 3 qt/a	99	99	99	99	99	98	98	48.1
Valor SX / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 32 fl oz/a + 3 qt/a	98	97	97	99	98	98	98	48.3
Fierce + Classic / Roundup PowerMax + N-Pa-K-AMS	3 oz/a + 0.33 oz/a / 32 oz/a + 3 qt/a	98	97	99	99	99	97	98	55.3
Verdict +Outlook / Roundup PowerMax + NIS + N-Pa-K-AMS	5 fl oz/a + 10 fl oz/a / 32 fl oz/a + 0.25% v/v + 3 qt/a	99	98	98	99	98	97	96	47.7
Zidua + Verdict / Roundup PowerMax + NIS + N-Pa-K-AMS	2 oz/a + 5 oz/a / 32 oz/a + 0.25% v/v + 3 qt/a	98	98	98	99	98	97	96	47.2
Sonic* / Durango DMA + N-Pa-K-AMS	3 oz/a / 24 fl oz/a + 3 qt/a	93	94	95	99	97	97	97	50.8
Sonic* / Durango DMA +FirstRate + N-Pa-K-AMS	3 oz/a / 32 oz/a + 0.3 oz/a +3 qt/a	96	96	95	98	99	98	98	52.7
Enlite (chlorimuron + thifensulfuron + flumioxazin) / Abundit Extra + 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	98	97	96	99	97	97	97	47.3
Enlite (chlorimuron + thifensulfuron + flumioxazin) / Abundit Extra + 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	97	97	99	98	98	95	49.9
Warrant / Roundup WeatherMax + N-Pa-K-AMS	3 pt/a / 32 fl oz/a + 3 qt/a	96	98	97	98	98	98	97	45.3
PRE / POST III (3-5" weed regrowth)									
Authority First / Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 32 oz/a +3 qt/a	94	92	95	96	98	98	98	46.9
Authority First / Anthem + Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 8 oz/a + 32 oz/a +3 qt/a	98	97	97	97	99	99	98	49.0
Optill Pro (Optill + Outlook) / Roundup PowerMax + NIS + N-Pa-K-AMS	12 oz/a (2 oz/a + 10 oz/a) / 32 oz/a + 0.25% v/v + 3 qt/a	99	97	97	97	99	98	95	61.6
Sonic* / Durango DMA + N-Pa-K-AMS	4.5 oz/a / 32 oz/a + 3 qt/a	98	97	97	96	99	98	97	49.1
PRE / POST I (2" Weeds) / POST IV (2-3" weed regrowth)									
Verdict / Dual II Magnum + Cobra + Roundup PowerMax + COC + N-Pa-K-AMS / Cobra + COC + N-Pa-K-AMS	5 oz/a / 1.33 pt/a + 12.5 oz/a +32 oz/a + 0.5 pt/a + 3 qt/a / 12.5 oz/a + 0.5 pt/a + 3 qt/a	96	98	99	99	98	98	96	43.1
POST I (2" Weeds)									
Roundup PowerMax + N-Pa-K-AMS	32 oz/a + 3 qt/a	0	90	97	92	81	80	67	35.9
POST I (2" Weeds) / POST IV (2-3" weed regrowth)									
Roundup PowerMax + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	32 oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	91	96	89	97	97	96	46.8
Synchrony (chlorimuron + thifensulfuron) + Abundit S + N-Pa-K-AMS / Abundit Extra + N-Pa-K-AMS	0.375 oz/a (0.32 oz/a + 0.05 oz/a) + 32 fl oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	93	98	95	99	98	96	50.0
Roundup PowerMax + Cobra + COC + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	32 fl oz/a + 12.5 oz/a + 1 pt/a + 3 qt/a / 32 oz/a + 3 qt/a	0	95	99	95	98	98	95	48.7
POST II (4" Weeds)									
Dual II Magnum + Flexstar GT 3.5 + NIS + N-Pa-K-AMS	10 oz/a + 3.5 pt/a + 0.25% v/v + 3 qt/a	0	0	92	99	98	98	98	48.7
LSD (P=0.10)		3	4	2	2	2	4	11	5.5 (P=.20)

Table 6. Crop response to herbicide systems on June 11, 16 and 23, July 1, 9, and 14, and grain yield at 13% at Rochester, MN in 2014.

Treatment	Rate (rate/A)	Injury						Yield (bu/A)
		6/11	6/16	6/23	7/1	7/9	7/14	
Untreated		0	0	0	0	0	0	15.5
Weed Free		0	4	1	0	0	0	52.7
PRE / POST I (2" Weeds)								
Valor SX / Warrant + Roundup WeatherMax + N-Pa-K-AMS	2 oz/a / 3 pt/a + 32 oz/a + 3 qt/a	14	2	6	0	0	0	49.8
Verdict + Dual II Magnum / Cobra +Roundup PowerMax + COC + N-Pa-K-AMS	5 oz/a + 1.33 pt/a / 12.5 oz/a + 32 oz/a +1 pt/a + 3 qt/a	36	71	75	10	5	0	35.1
Verdict / Dual II Magnum + Cobra +Roundup PowerMax + COC + N-Pa-K-AMS	5 oz/a / 1.33 pt/a +12.5 oz/a + 32 oz/a +0.5 pt/a + 3 qt/a	33	71	79	20	11	0	32.9
PRE / POST II (4" Weeds)								
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	11	5	60	13	5	0	53.8
Dual II Magnum / Flexstar GT 3.5 + MSO + N-Pa-K-AMS	2 pt/a / 3.5 pt/a + 0.5% v/v + 3 qt/a	9	7	53	18	7	1	48.8
Gangster V / Ganster FR / Roundup PowerMax + N-Pa-K-AMS	2 oz/a + 0.4 oz/a / 32 oz/a + 3 qt/a	16	2	21	3	1	0	49.1
Fierce / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 32 oz/a + 3 qt/a	19	1	19	4	0	0	48.1
Valor SX / Roundup PowerMax + N-Pa-K-AMS	3 oz/a / 32 fl oz/a + 3 qt/a	15	2	19	1	1	1	48.3
Fierce + Classic / Roundup PowerMax + N-Pa-K-AMS	3 oz/a + 0.33 oz/a / 32 oz/a + 3 qt/a	19	2	18	1	0	1	55.3
Verdict +Outlook / Roundup PowerMax + NIS + N-Pa-K-AMS	5 fl oz/a + 10 fl oz/a / 32 fl oz/a + 0.25% v/v + 3 qt/a	36	5	30	10	3	0	47.7
Zidua + Verdict / Roundup PowerMax + NIS + N-Pa-K-AMS	2 oz/a + 5 oz/a / 32 oz/a + 0.25% v/v + 3 qt/a	35	2	24	9	2	0	47.2
Sonic* / Durango DMA + N-Pa-K-AMS	3 oz/a / 24 fl oz/a + 3 qt/a	9	0	11	1	0	0	50.8
Sonic* / Durango DMA +FirstRate + N-Pa-K-AMS	3 oz/a / 32 oz/a + 0.3 oz/a +3 qt/a	8	0	20	3	0	0	52.7
Enlite (chlorimuron + thifensulfuron + flumioxazin) / Abundit Extra + 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	16	1	15	1	0	0	47.3
Enlite (chlorimuron + thifensulfuron + flumioxazin) / Abundit Extra + 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	16	2	26	19	10	1	49.9
Warrant / Roundup WeatherMax + N-Pa-K-AMS	3 pt/a / 32 fl oz/a + 3 qt/a	15	4	14	2	0	1	45.3
PRE / POST III (3-5" weed regrowth)								
Authority First / Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 32 oz/a +3 qt/a	8	0	3	0	0	0	46.9
Authority First / Anthem + Roundup PowerMax + N-Pa-K-AMS	6.4 oz/a / 8 oz/a + 32 oz/a +3 qt/a	6	0	0	16	8	3	49.0
Optill Pro(Optill + Outlook) / Roundup PowerMax + NIS + N-Pa-K-AMS	12 oz/a (2 oz/a + 10 oz/a) / 32 oz/a + 0.25% v/v + 3 qt/a	29	3	8	3	0	0	51.6
Sonic* / Durango DMA + N-Pa-K-AMS	4.5 oz/a / 32 oz/a + 3 qt/a	11	0	0	0	0	0	49.1
PRE / POST I (2" Weeds) / POST IV (2-3" weed regrowth)								
Verdict / Dual II Magnum + Cobra + Roundup PowerMax + COC + N-Pa-K-AMS / Cobra + COC + N-Pa-K-AMS	5 oz/a / 1.33 pt/a + 12.5 oz/a +32 oz/a + 0.5 pt/a + 3 qt/a / 12.5 oz/a + 0.5 pt/a + 3 qt/a	35	73	76	13	60	23	43.1
POST I (2" Weeds)								
Roundup PowerMax + N-Pa-K-AMS	32 oz/a + 3 qt/a	0	0	1	0	1	0	35.9
POST I (2" Weeds) / POST IV (2-3" weed regrowth)								
Roundup PowerMax + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	32 oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	0	9	0	0	0	46.8
Synchrony (chlorimuron + thifensulfuron) + Abundit S + N-Pa-K-AMS / Abundit Extra + N-Pa-K-AMS	0.375 oz/a (0.32 oz/a + 0.05 oz/a) + 32 fl oz/a + 3 qt/a / 32 oz/a + 3 qt/a	0	10	28	6	5	1	50.0
Roundup PowerMax + Cobra + COC + N-Pa-K-AMS / Roundup PowerMax + N-Pa-K-AMS	32 fl oz/a + 12.5 oz/a + 1 pt/a + 3 qt/a / 32 oz/a + 3 qt/a	0	65	59	6	3	0	48.7
Dual II Magnum + Flexstar GT 3.5 + NIS + N-Pa-K-AMS	10 oz/a + 3.5 pt/a + 0.25% v/v + 3 qt/a	0	0	55	19	6	1	48.7
LSD (P=0.10)		5	4	5	5	4	2	5.5 (P=.20)

