

Performance of Pyroxasulfone Herbicide Programs for Weed Control in Soybean at Rochester, MN, in 2012.

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The objective of this trial was to evaluate the performance of pyroxasulfone herbicide programs 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 2.3%, and soil test P and K levels of 41 ppm and 126 ppm, respectively. The field was moldboard plowed in the fall, disked in the spring and field cultivated once prior to planting. The soybean variety, Stine 19RA02, was planted on May 9, 2012, at a depth of 1.5 inches in 30 inch rows at a rate of 165,900 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 plots were taken on June 11, 18, 27, July 3 and 19, and September 14, 2012. The center two rows of each plot were machine harvested on October 3, 2012. 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 in Tables 2 through 6, respectively. (University of Minnesota Extension Regional Office, Rochester).

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

Date	5/9	6/12	6/19
Treatment	PRE	POST I	POST II
Temperature			
Air	60	64	78
Soil	62.4	71.8	73.4
Relative Humidity (%)	40	44	68
Wind (mph)	9	15	5
Soil Moisture	Normal	Normal	Wet
Soybean			
Stage		V4	V5
Height (inches)		5.0	11.0
Giant Ragweed			
Weed density (ft ²)			1.5
Height (inches)		5.75	7.5
Common Lambsquarters			
Weed density (ft ²)			5.3
Height (inches)		2.9	8.1
Common Waterhemp			
Weed density (ft ²)			6.8
Height (inches)		2.9	6.5
Giant foxtail			
Weed density (ft ²)			36.5
Height (inches)		3.5	4.75
Rainfall after each application			
Week 1	0.00	0.93	1.94
Week 2	0.05	1.94	0.00
Week 3	2.51	0.00	0.00

SUMMARY:

The best soil applied giant ragweed control was achieved with package mixes containing cloransulam-methyl (FirstRate) or tank mixes containing FirstRate. Soil applied OpTill PRO also provided very good giant ragweed control. Package mixes and tank mixes containing saflufenacil (Sharpen) improved giant ragweed control as did the Prefix treatment. Post emergent giant ragweed control was diminished when Marvel and Anthem were tank mixed with Roundup PowerMax with NIS and AMS, and when Marvel was tank mixed with Roundup PowerMax with MSO and AMS.

OpTill PRO and the Authority First plus Python tank mix offered statistically superior common lambsquarters control compared to other soil applied treatments. The next highest level of control was achieved with the remaining Authority package mixes and with the Zidua plus Valor SX tank mix. Post emergent common lambsquarters control was diminished when Marvel and Anthem were tank mixed with Roundup PowerMax with NIS and AMS, and when Marvel was tank mixed with Roundup PowerMax with MSO and AMS.

Lower rates of soil applied Authority First products, Anthem and OpTill PRO provided slightly reduced control of common waterhemp when compared to the 6.4oz rate of Authority First, and other soil applied treatments. All of the total post programs provided reduced control of common waterhemp when compared to the PRE / POST systems.

Similarly, all of the total post programs provided reduced control of giant foxtail when compared to the PRE / POST systems.

Significant crop response was measured for both the PRE / POST and total POST systems. Extremely high levels of injury were observed in the Marvel treatments applied on June 12 (POST I). Reduced grain yields were also observed from these treatments.

Table 2. Evaluation of pyroxasulfone herbicide systems for giant ragweed control in soybeans on June 11, 18, 27, July 3, 19, and September 14 at Rochester, MN, in 2012.

Treatment	Rate (rate/A)	Giant Ragweed Control						Yield 10/3 (bu/A)
		6/11	6/18	6/27	7/3	7/19	9/14	
Untreated		0	0	0	0	0	0	16.8
PRE / POST I								
Authority First / Anthem + Roundup PowerMax + AMS	5 oz/a / 8 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	83	93	98	98	98	97	47.7
PRE / POST II								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/100 gal	86	79	97	95	99	99	54.2
Authority Assist + Sharpen / Roundup PowerMax + AMS	6 fl oz/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	43	55	98	95	98	98	53.8
Authority First + Python / Roundup PowerMax + AMS	5 oz/a + 1 oz/a / 22 fl oz/a + 8.5 lb/100 gal	81	78	98	96	98	99	52.6
Valor SX / Roundup PowerMax + AMS	3 oz/a / 22 fl oz/a + 8.5 lb/100 gal	35	56	97	96	97	99	53.7
Anthem + FirstRate / Roundup PowerMax + AMS	8 fl oz/a + 0.3 oz/a / 22 fl oz/a + 8.5 lb/100 gal	61	70	97	94	95	96	50.7
Authority First / Marvel + Roundup PowerMax + NIS + AMS	5 oz/a / 7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/100 gal	74	71	96	91	95	97	51.5
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz/a + 1 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	61	65	98	97	98	98	53.1
OpTill PRO (OpTill + Outlook) / Roundup PowerMax + AMS	12 oz/a (2 oz/a + 10 fl oz/a) / 22 fl oz/a + 8.5 lb/100 gal	69	67	96	95	98	99	49.9
Verdict + Outlook / Roundup PowerMax + AMS	5 fl oz/a + 12 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	55	51	97	94	96	97	52.0
Zidua + Valor SX / Roundup PowerMax + AMS	2.5 oz/a + 2 oz/a / 22 fl oz/a + 8.5 lb/100 gal	28	40	97	91	97	98	54.1
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	31	40	96	94	97	98	52.2
Prefix / Roundup PowerMax+ AMS	2 pt/a / 22 fl oz/a + 8.5 lb/100 gal	61	63	98	96	99	99	52.6
POST I								
Marvel + Anthem + Roundup PowerMax + NIS + AMS	7 fl oz/a + 5 fl oz/a + 22 fl oz/a + 0.25% v/v + .5 lb/100 gal	0	86	94	89	90	88	48.8
Marvel + Roundup PowerMax + NIS + AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/100 gal	0	89	95	98	95	96	48.0
Marvel + Roundup PowerMax + MSO + AMS	7 fl oz/a + 22 fl oz/a + 1.0% v/v + 8.5 lb/100 gal	0	91	97	96	91	90	43.9
Flexstar GT 3.5 + MSO + AMS	3.5 pt/a + 0.5% v/v + 8.5 lb/100 gal	0	89	99	98	98	97	51.0
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/100 gal	0	89	94	95	96	96	53.2
LSD (P=0.10)		13.4	11.9	2.1	4.8	3.0	3.3	4.2

Table 3. Evaluation of pyroxasulfone herbicide systems for common lambsquarters control in soybeans on June 11, 18, 27, July 3, 19, and September 14 at Rochester, MN, in 2012.

Treatment	Rate (rate/A)	Common Lambsquarter Control						Yield 10/3 (bu/A)
		6/11	6/18	6/27	7/3	7/19	9/14	
Untreated		0	0	0	0	0	0	16.8
PRE / POST I								
Authority First / Anthem + Roundup PowerMax + AMS	5 oz/a / 8 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	83	98	99	99	99	99	47.7
PRE / POST II								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/100 gal	81	85	99	99	99	99	54.2
Authority Assist + Sharpen / Roundup PowerMax + AMS	6 fl oz/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	85	82	99	99	99	99	53.8
Authority First + Python / Roundup PowerMax + AMS	5 oz/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	86	92	99	99	99	99	52.6
Valor SX / Roundup PowerMax + AMS	3 oz/a / 22 fl oz/a + 8.5 lb/100 gal	76	76	99	99	99	99	53.7
Anthem + FirstRate / Roundup PowerMax + AMS	8 fl oz/a + 0.3 oz/a / 22 fl oz/a + 8.5 lb/100 gal	75	79	99	99	99	99	50.7
Authority First / Marvel + Roundup PowerMax + NIS + AMS	5 oz/a / 7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/100 gal	83	84	99	99	99	99	51.5
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz/a + 1 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	79	73	99	99	99	99	53.1
OpTill PRO (OpTill + Outlook) / Roundup PowerMax + AMS	12 oz/a (2 oz/a + 10 fl oz/a) / 22 fl oz/a + 8.5 lb/100 gal	94	97	99	99	99	99	49.9
Verdict + Outlook / Roundup PowerMax + AMS	5 fl oz/a + 12 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	82	79	99	99	98	98	52.0
Zidua + Valor SX / Roundup PowerMax + AMS	2.5 oz/a + 2 oz/a / 22 fl oz/a + 8.5 lb/100 gal	86	86	99	99	99	99	54.1
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	75	68	99	99	99	99	52.2
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/100 gal	76	79	99	99	99	99	52.6
POST I								
Marvel + Anthem + Roundup PowerMax + NIS + AMS	7 fl oz/a + 5 fl oz/a + 22 fl oz/a + 0.25% v/v + .5 lb/100 gal	0	96	98	93	92	94	48.8
Marvel + Roundup PowerMax + NIS + AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/100 gal	0	96	99	98	98	97	48.0
Marvel + Roundup PowerMax + MSO + AMS	7 fl oz/a + 22 fl oz/a + 1.0% v/v + 8.5 lb/100 gal	0	98	99	97	94	91	43.9
Flexstar GT 3.5 + MSO + AMS	3.5 pt/a + 0.5% v/v + 8.5 lb/100 gal	0	98	98	97	97	96	51.0
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/100 gal	0	96	99	98	98	97	53.2
LSD (P=0.10)		7.7	10.2	0.6	1.4	1.7	2.7	4.2

Table 4. Evaluation of pyroxasulfone herbicide systems for common waterhemp control in soybeans on June 11, 18, 27, July 3, 19, and September 14 at Rochester, MN, in 2012.

Treatment	Rate (rate/A)	Common Waterhemp Control						Yield 10/3 (bu/A)
		6/11	6/18	6/27	7/3	7/19	9/14	
Untreated		0	0	0	0	0	0	16.8
PRE / POST I								
Authority First / Anthem + Roundup PowerMax + AMS	5 oz/a / 8 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	97	98	98	97	96	95	47.7
PRE / POST II								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/100 gal	97	89	99	99	99	99	54.2
Authority Assist + Sharpen / Roundup PowerMax + AMS	6 fl oz/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	98	96	99	99	99	99	53.8
Authority First + Python / Roundup PowerMax + AMS	5 oz/a + 1 oz/a / 22 fl oz/a + 8.5 lb/100 gal	97	83	99	99	99	99	52.6
Valor SX / Roundup PowerMax + AMS	3 oz/a / 22 fl oz/a + 8.5 lb/100 gal	97	91	99	99	98	99	53.7
Anthem + FirstRate / Roundup PowerMax + AMS	8 fl oz/a + 0.3 oz/a / 22 fl oz/a + 8.5 lb/100 gal	92	75	99	99	99	99	50.7
Authority First / Marvel + Roundup PowerMax + NIS + AMS	5 oz/a / 7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/100 gal	95	79	99	99	98		51.5
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz/a + 1 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	98	86	99	99	99	99	53.1
OpTill PRO (OpTill + Outlook) / Roundup PowerMax + AMS	12 oz/a (2 oz/a + 10 fl oz/a) / 22 fl oz/a + 8.5 lb/100 gal	97	83	99	99	98	99	49.9
Verdict + Outlook / Roundup PowerMax + AMS	5 fl oz/a + 12 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	97	86	99	99	99	99	52.0
Zidua + Valor SX / Roundup PowerMax + AMS	2.5 oz/a + 2 oz/a / 22 fl oz/a + 8.5 lb/100 gal	98	96	99	99	99	99	54.1
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	93	71	99	99	99	99	52.2
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/100 gal	98	94	99	99	99	99	52.6
POST I								
Marvel + Anthem + Roundup PowerMax + NIS + AMS	7 fl oz/a + 5 fl oz/a + 22 fl oz/a + 0.25% v/v + .5 lb/100 gal	0	99	99	90	91	91	48.8
Marvel + Roundup PowerMax + NIS + AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/100 gal	0	95	97	91	88	88	48.0
Marvel + Roundup PowerMax + MSO + AMS	7 fl oz/a + 22 fl oz/a + 1.0% v/v + 8.5 lb/100 gal	0	99	97	89	85	85	43.9
Flexstar GT 3.5 + MSO + AMS	3.5 pt/a + 0.5% v/v + 8.5 lb/100 gal	0	94	98	94	93	94	51.0
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/100 gal	0	94	96	91	90	91	53.2
LSD (P=0.10)		2.7	9.3	0.9	2.8	3.6	3.8	4.2

Table 5. Evaluation of pyroxasulfone herbicide systems for giant foxtail control in soybeans on June 11, 18, 27, July 3, 19, and September 14 at Rochester, MN, in 2012.

Treatment	Rate	Giant Foxtail Control						Yield 10/3
		6/11	6/18	6/27	7/3	7/19	9/14	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	16.8
PRE / POST I								
Authority First / Anthem + Roundup PowerMax + AMS	5 oz/a / 8 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	92	98	99	99	99	99	47.7
PRE / POST II								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/100 gal	90	89	99	99	99	99	54.2
Authority Assist + Sharpen / Roundup PowerMax + AMS	6 fl oz/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	90	89	99	99	99	99	53.8
Authority First + Python / Roundup PowerMax + AMS	5 oz/a + 1 oz/a / 22 fl oz/a + 8.5 lb/100 gal	91	87	99	99	98	99	52.6
Valor SX / Roundup PowerMax + AMS	3 oz/a / 22 fl oz/a + 8.5 lb/100 gal	80	74	99	99	96	97	53.7
Anthem + FirstRate / Roundup PowerMax + AMS	8 fl oz/a + 0.3 oz/a / 22 fl oz/a + 8.5 lb/100 gal	93	92	99	99	99	99	50.7
Authority First / Marvel + Roundup PowerMax + NIS + AMS	5 oz/a / 7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/100 gal	87	82	99	97	97	97	51.5
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz/a + 1 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	95	93	99	99	99	99	53.1
OpTill PRO (OpTill + Outlook) / Roundup PowerMax + AMS	12 oz/a (2 oz/a + 10 fl oz/a) / 22 fl oz/a + 8.5 lb/100 gal	90	91	99	99	98	98	49.9
Verdict + Outlook / Roundup PowerMax + AMS	5 fl oz/a + 12 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	90	92	99	99	97	98	52.0
Zidua + Valor SX / Roundup PowerMax + AMS	2.5 oz/a + 2 oz/a / 22 fl oz/a + 8.5 lb/100 gal	95	93	99	99	99	99	54.1
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	95	91	99	99	98	98	52.2
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/100 gal	94	93	99	99	98	99	52.6
POST I								
Marvel + Anthem + Roundup PowerMax + NIS + AMS	7 fl oz/a + 5 fl oz/a + 22 fl oz/a + 0.25% v/v + .5 lb/100 gal	0	98	98	90	91	93	48.8
Marvel + Roundup PowerMax + NIS + AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/100 gal	0	97	98	94	93	94	48.0
Marvel + Roundup PowerMax + MSO + AMS	7 fl oz/a + 22 fl oz/a + 1.0% v/v + 8.5 lb/100 gal	0	97	98	85	81	81	43.9
Flexstar GT 3.5 + MSO + AMS	3.5 pt/a + 0.5% v/v + 8.5 lb/100 gal	0	97	98	93	90	91	51.0
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/100 gal	0	97	95	86	84	87	53.2
LSD (P=0.10)		3.4	4.8	0.8	3.3	3.4	3.5	4.2

Table 6. Soybean response to pyroxasulfone herbicide systems on June 11, 18, 27, and July 3 at Rochester, MN, in 2012.

Treatment	Rate (rate/A)	Injury (% Control)				Yield 10/3 (bu/A)
		6/11	6/18	6/27	7/3	
Untreated		0	0	0	0	16.8
PRE / POST I						
Authority First / Anthem + Roundup PowerMax + AMS	5 oz/a / 8 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	13	43	13	8	47.7
PRE / POST II						
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/100 gal	15	0	0	0	54.2
Authority Assist + Sharpen / Roundup PowerMax + AMS	6 fl oz/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	19	0	1	0	53.8
Authority First + Python / Roundup PowerMax + AMS	5 oz/a + 1 oz/a / 22 fl oz/a + 8.5 lb/100 gal	14	0	0	0	52.6
Valor SX / Roundup PowerMax + AMS	3 oz/a / 22 fl oz/a + 8.5 lb/100 gal	11	0	0	0	53.7
Anthem + FirstRate / Roundup PowerMax + AMS	8 fl oz/a + 0.3 oz/a / 22 fl oz/a + 8.5 lb/100 gal	11	0	4	0	50.7
Authority First / Marvel + Roundup PowerMax + NIS + AMS	5 oz/a / 7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/100 gal	11	0	24	25	51.5
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz/a + 1 fl oz/a + 22 fl oz/a + 8.5 lb/100 gal	16	0	0	0	53.1
OpTill PRO (OpTill + Outlook) / Roundup PowerMax + AMS	12 oz/a (2 oz/a + 10 fl oz/a) / 22 fl oz/a + 8.5 lb/100 gal	18	0	0	0	49.9
Verdict + Outlook / Roundup PowerMax + AMS	5 fl oz/a + 12 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	18	0	0	0	52.0
Zidua + Valor SX / Roundup PowerMax + AMS	2.5 oz/a + 2 oz/a / 22 fl oz/a + 8.5 lb/100 gal	13	0	0	0	54.1
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/100 gal	10	0	3	0	52.2
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/100 gal	13	0	4	0	52.6
POST I						
Marvel + Anthem + Roundup PowerMax + NIS + AMS	7 fl oz/a + 5 fl oz/a + 22 fl oz/a + 0.25% v/v + .5 lb/100 gal	0	70	33	23	48.8
Marvel + Roundup PowerMax + NIS + AMS	7 fl oz/a + 22 fl oz/a + 0.25% v/v + 8.5 lb/100 gal	0	60	28	15	48.0
Marvel + Roundup PowerMax + MSO + AMS	7 fl oz/a + 22 fl oz/a + 1.0% v/v + 8.5 lb/100 gal	0	73	39	18	43.9
Flexstar GT 3.5 + MSO + AMS	3.5 pt/a + 0.5% v/v + 8.5 lb/100 gal	0	45	13	9	51.0
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/100 gal	0	0	0	0	53.2
LSD (P=0.10)		4.3	2.8	2.8	3.0	4.2