

Performance of Pyroxasulfone Herbicide Programs for Weed Control in Soybean at Rochester, MN, in 2011.

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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 6.8, O.M of 2.5%, and soil test P and K levels of 95 ppm and 225 ppm, respectively. The field was moldboard plowed in the fall, disked in the spring and field cultivated once prior to planting. The soybean variety, Pioneer 91Y90, was planted on May 16, 2011, 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) 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 8, 13, 27, July 8, 18, and September 21, 2011. Application dates, environmental conditions, and weed stages are listed below. The center two rows of each plot were machine harvested on October 3, 2011. (University of Minnesota Extension Regional Office, Rochester).

SUMMARY

Two groups of pre-emergent herbicides were readily apparent in their ability or inability to control giant ragweed. Single product pre-emergent herbicide programs did not provide adequate control of giant ragweed, average 21percent control. The same can be said for the Authority MTZ package mixture, 35 percent control on 6/13.

Pre-emergent package mixtures and tank mixes clearly offered an advantage in controlling giant ragweed. Final soil applied control from this group ranged from a low of 65 percent to a high of 92 percent. In the case of tank mixes, the addition of Classic to Fierce increased final soil applied giant ragweed control from 25 percent (6/13 rating; glyphosate applied 6/16) to 65 percent (6/27 rating; glyphosate applied 6/29). The addition of Authority First to Anthem increased final soil applied giant ragweed control from 19 percent (6/13 rating; glyphosate applied 6/16) to 77 percent (6/27 rating; glyphosate applied 6/29). Furthermore, the addition of Sharpen to Zidua increased final soil applied giant ragweed control from 20 percent (6/13 rating; glyphosate applied 6/16) to 92 percent (6/27 rating; glyphosate applied 6/29). The package mixtures; Authority First, Gangster, and Prefix provided final soil

applied giant ragweed control of 84, 80, and 86 percent, respectively (6/27 rating). Post emergent only control of giant ragweed was only slightly enhanced by the addition of Zidua (94%), and Zidua plus Extreme (97%) with Roundup PowerMax when compared to Roundup PowerMax alone (91%), 7/18 rating. Lower giant ragweed control was observed with the tank mix of Anthem and Roundup PowerMax (87%), 7/18 rating.

Common lambsquarters control was exceptional with all pre-emergent herbicides. Post emergent control of common lambsquarters was only slightly enhanced by the addition of Zidua (96%), and Zidua plus Extreme (98%) with Roundup PowerMax when compared to Roundup PowerMax alone (93%), 7/18 rating. Lower common lambsquarters control was observed with the tank mix of Warrant and Roundup PowerMax (81%), 7/18 rating.

Common waterhemp control like lambsquarters was exceptional with all pre-emergent herbicides. Post emergent control of common waterhemp was only slightly enhanced by the addition of Zidua (98%), Zidua plus Extreme (98%), and Warrant (97%) with Roundup PowerMax when compared to Roundup PowerMax alone (93%), 7/18 rating. Giant foxtail control was exceptional with all treatment pre and post.

Significant crop response was detected with two herbicide treatments; the Boundary and Sharpen tank mix applied PRE, and the Anthem and Roundup PowerMax tank mix applied POST. The injury exhibited was not visibly apparent on later rating dates.

Of significant note is the Flexstar GT treatment. We have chosen to include rating data for this treatment, however, have elected to not include the information in the narratives due to the improper exclusion of additives with this treatment. Our expectation is that with the correct additive package control numbers would be higher in most if not all cases. Extremely limited rainfall in August and September coupled with an early September frost severely impacted soybean grain yields at the Rochester location. Yield variability across plots was higher than expected. (University of Minnesota Extension Regional Office, Rochester)

Date	5/17	6/13	6/16	6/29	7/1
Treatment	PRE	POST I	POST II	POST III	POST IV
Temperature					
Air	63	67	66	74	82
Soil	63.7	61.9	66.2	69.1	81.1
Relative Humidity (%)	27	48	90	57	69
Wind (mph)	8	12	8	13	16
Soil Moisture	Adequate	Dry	Excessive	Adequate	Adequate
Soybean					
Stage		V2	V3	V5	R1
Height (inches)		5.5	6.8	9.2	10.8
Giant Ragweed					
Weed density (ft ²)		5.0			
Height (inches)		3.5	7.5	5.5	5.9
Common Lambsquarters					
Weed density (ft ²)		2.9			
Height (inches)		1.5	2.5		1.2
Common Waterhemp					
Weed density (ft ²)		3.5			
Height (inches)		1.3	2.5		2.4
Giant foxtail					
Weed density (ft ²)		0.6			
Height (inches)		2.0	4.5	5.3	
Rainfall after each application					
Week 1	1.78	3.41	2.89	0.31	0.00
Week 2	0.66	1.29	0.03	0.45	3.24
Week 3	0.04	0.31	0.31	2.79	0.01

Table 1. Evaluation of pyroxasulfone herbicide systems for giant ragweed control in soybeans on June 8, 13, 27 July 8, 18, and September 21 at Rochester, MN, in 2011.

Treatment	Rate (rate/A)	Giant Ragweed Control (% Control)						Yield (bu/A)
		6/8	6/13	6/27	7/8	7/18	9/21	
Untreated		0	0	0	0	0	0	7.4
PRE/POST II (3-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	18	19	87	81	90	80	30.4
Authority MTZ / Roundup PowerMax + AMS	16 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	40	35	95	91	93	88	37.3
Zidua / Roundup PowerMax + AMS	2.5 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	21	20	89	84	90	84	41.0
Fierce / Roundup PowerMax + AMS	3 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	28	25	94	89	93	91	36.8
PRE / POST III (3-4 inch weeds)								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	92	90	84	88	95	95	41.4
Anthem + Authority First / Roundup PowerMax + AMS	7 fl oz/a + 3.2 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	88	81	77	83	94	95	38.0
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	96	93	86	93	96	97	32.9
Gangster FR + Gangster V / Roundup PowerMax + AMS	0.4 oz wt/a + 2 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	90	88	80	86	94	95	41.4
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz wt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	97	95	92	97	97	98	39.1
Fierce + Classic / Roundup PowerMax + AMS	3 oz wt/a + 0.33 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	64	46	65	76	90	91	36.8
Boundary + Sharpen / Roundup PowerMax + AMS	1.5 pt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	97	95	92	97	98	99	31.2
POST I (3-4 inch weeds)								
Anthem + Roundup PowerMax + AMS	8 fl oz/a + 22 fl oz/a + 8.5 lb/ 100 gal			78	75	87	70	28.4
Zidua + Roundup PowerMax + AMS	2.5 oz wt/a + 22 fl oz + 8.5 lb/ 100 gal			96	93	94	90	32.9
Zidua + Extreme + NIS + AMS	2 oz wt/a + 3 pt/a + 0.125% v/v + 8.5 lb/ 100 gal			96	96	97	95	29.5
Warrant + Roundup PowerMax + AMS	3 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal			96	87	93	86	34.2
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal			94	87	91	81	31.6
POST I (3-4 inch weeds) / POST IV (3-4 inch weeds)								
Flexstar GT / Touchdown Total + AMS	3 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal			70	85	92	95	29.7
LSD (P=0.10)		4	6	5	5	2	4	8.7

Table 2. Evaluation of pyroxasulfone herbicide systems for common lambsquarters control on June 8, 13, 27, July 8, 18, and September 21 in soybeans at Rochester, MN, in 2011.

Treatment	Rate (rate/A)	Common Lambsquarters Control						Yield (bu/A)
		9/8	6/13	6/27	7/8	7/18	9/21	
Untreated		0	0	0	0	0	0	7.4
PRE/POST II (3-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	98	99	30.4
Authority MTZ / Roundup PowerMax + AMS	16 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	37.3
Zidua / Roundup PowerMax + AMS	2.5 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	98	98	98	41.0
Fierce / Roundup PowerMax + AMS	3 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	36.8
PRE / POST III (3-4 inch weeds)								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	41.4
Anthem + Authority First / Roundup PowerMax + AMS	7 fl oz/a + 3.2 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	38.0
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	32.9
Gangster FR + Gangster V / Roundup PowerMax + AMS	0.4 oz wt/a + 2 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	98	99	99	41.4
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz wt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	39.1
Fierce + Classic / Roundup PowerMax + AMS	3 oz wt/a + 0.33 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	36.8
Boundary + Sharpen / Roundup PowerMax + AMS	1.5 pt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	31.2
POST I (3-4 inch weeds)								
Anthem + Roundup PowerMax + AMS	8 fl oz/a + 22 fl oz/a + 8.5 lb/ 100 gal			98	92	92	89	28.4
Zidua + Roundup PowerMax + AMS	2.5 oz wt/a + 22 fl oz + 8.5 lb/ 100 gal			99	97	96	97	32.9
Zidua + Extreme + NIS + AMS	2 oz wt/a + 3 pt/a + 0.125% v/v + 8.5 lb/ 100 gal			98	98	98	99	29.5
Warrant + Roundup PowerMax + AMS	3 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal			74	76	81	75	34.2
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal			97	91	93	83	31.6
POST I (3-4 inch weeds) / POST IV (3-4 inch weeds)								
Flexstar GT / Touchdown Total + AMS	3 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal			90	95	97	96	29.7
	LSD (P=0.10)	1	1	2	2	2	3	8.7

Table 3. Evaluation of pyroxasulfone herbicide systems for common waterhemp control in soybeans on June 8, 13, 27, July 8, 18, and September 21 at Rochester, MN, in 2011.

Treatment	Rate (rate/A)	Common Waterhemp Control						Yield (bu/A)
		6/8	6/13	6/27	7/8	7/18	9/21	
Untreated		0	0	0	0	0	0	7.4
PRE/POST II (3-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	30.4
Authority MTZ / Roundup PowerMax + AMS	16 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	37.3
Zidua / Roundup PowerMax + AMS	2.5 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	41.0
Fierce / Roundup PowerMax + AMS	3 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	36.8
PRE / POST III (3-4 inch weeds)								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	41.4
Anthem + Authority First / Roundup PowerMax + AMS	7 fl oz/a + 3.2 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	38.0
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	32.9
Gangster FR + Gangster V / Roundup PowerMax + AMS	0.4 oz wt/a + 2 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	41.4
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz wt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	39.1
Fierce + Classic / Roundup PowerMax + AMS	3 oz wt/a + 0.33 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	36.8
Boundary + Sharpen / Roundup PowerMax + AMS	1.5 pt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	31.2
POST I (3-4 inch weeds)								
Anthem + Roundup PowerMax + AMS	8 fl oz/a + 22 fl oz/a + 8.5 lb/ 100 gal			91	84	93	87	28.4
Zidua + Roundup PowerMax + AMS	2.5 oz wt/a + 22 fl oz + 8.5 lb/ 100 gal			99	99	98	98	32.9
Zidua + Extreme + NIS + AMS	2 oz wt/a + 3 pt/a + 0.125% v/v + 8.5 lb/ 100 gal			99	97	98	97	29.5
Warrant + Roundup PowerMax + AMS	3 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal			98	90	95	87	34.2
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal			98	85	88	82	31.6
POST I (3-4 inch weeds) / POST IV (3-4 inch weeds)								
Flexstar GT / Touchdown Total + AMS	3 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal			73	99	99	99	29.7
LSD (P=0.10)		1	0	2	3	1	3	8.7

Table 4. Evaluation of pyroxasulfone herbicide systems for giant foxtail control in soybeans on June 8, 13, 27, July 8, 18, and September 21 at Rochester, MN, in 2011.

Treatment	Rate	Giant Foxtail Control						Yield
		6/8	6/13	6/27	7/8	7/18	9/21	
	(rate/A)	(% Control)						(bu/A)
Untreated		0	0	0	0	0	0	7.4
PRE/POST II (3-4 inch weeds)								
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	30.4
Authority MTZ / Roundup PowerMax + AMS	16 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	98	97	99	99	99	99	37.3
Zidua / Roundup PowerMax + AMS	2.5 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	41.0
Fierce / Roundup PowerMax + AMS	3 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	36.8
PRE / POST III (3-4 inch weeds)								
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	96	92	86	99	99	99	41.4
Anthem + Authority First / Roundup PowerMax + AMS	7 fl oz/a + 3.2 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	98	97	99	99	99	38.0
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	99	99	99	99	32.9
Gangster FR + Gangster V / Roundup PowerMax + AMS	0.4 oz wt/a + 2 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	92	91	85	98	99	99	41.4
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz wt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	98	99	99	99	39.1
Fierce + Classic / Roundup PowerMax + AMS	3 oz wt/a + 0.33 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	98	99	98	99	99	99	36.8
Boundary + Sharpen / Roundup PowerMax + AMS	1.5 pt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	99	99	98	99	99	99	31.2
POST I (3-4 inch weeds)								
Anthem + Roundup PowerMax + AMS	8 fl oz/a + 22 fl oz/a + 8.5 lb/ 100 gal			97	99	99	99	28.4
Zidua + Roundup PowerMax + AMS	2.5 oz wt/a + 22 fl oz + 8.5 lb/ 100 gal			99	99	98	99	32.9
Zidua + Extreme + NIS + AMS	2 oz wt/a + 3 pt/a + 0.125% v/v + 8.5 lb/ 100 gal			99	98	98	99	29.5
Warrant + Roundup PowerMax + AMS	3 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal			95	99	99	99	34.2
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal			96	91	84	85	31.6
POST I (3-4 inch weeds) / POST IV (3-4 inch weeds)								
Flexstar GT / Touchdown Total + AMS	3 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal			95	99	99	99	29.7
LSD (P=0.10)		2	2	3	1	2	1	8.7

Table 5. Percent crop injury from pyroxasulfone herbicide systems in soybeans on June 8, 13, 27, and July 18 at Rochester, MN, in 2011.

Treatment	Rate	Injury			Yield
		6/8	6/13	6/27	
	(rate/A)	Injury (%)			(bu/A)
Untreated		0	0	0	7.4
PRE/POST II (3-4 inch weeds)					
Anthem / Roundup PowerMax + AMS	8 fl oz/a / 22 fl oz.a + 8.5 lb/ 100 gal	0	0	0	30.4
Authority MTZ / Roundup PowerMax + AMS	16 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	37.3
Zidua / Roundup PowerMax + AMS	2.5 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	1	41.0
Fierce / Roundup PowerMax + AMS	3 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	36.8
PRE / POST III (3-4 inch weeds)					
Authority First / Roundup PowerMax + AMS	6.4 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	41.4
Anthem + Authority First / Roundup PowerMax + AMS	7 fl oz/a + 3.2 oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	38.0
Prefix / Roundup PowerMax + AMS	2 pt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	32.9
Gangster FR + Gangster V / Roundup PowerMax + AMS	0.4 oz wt/a + 2 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	41.4
Zidua + Sharpen / Roundup PowerMax + AMS	2.5 oz wt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	5	8	6	39.1
Fierce + Classic / Roundup PowerMax + AMS	3 oz wt/a + 0.33 oz wt/a / 22 fl oz/a + 8.5 lb/ 100 gal	0	0	0	36.8
Boundary + Sharpen / Roundup PowerMax + AMS	1.5 pt/a + 1 fl oz/a / 22 fl oz/a + 8.5 lb/ 100 gal	23	26	12	31.2
POST I (3-4 inch weeds)					
Anthem + Roundup PowerMax + AMS	8 fl oz/a + 22 fl oz/a + 8.5 lb/ 100 gal			24	28.4
Zidua + Roundup PowerMax + AMS	2.5 oz wt/a + 22 fl oz + 8.5 lb/ 100 gal			6	32.9
Zidua + Extreme + NIS + AMS	2 oz wt/a + 3 pt/a + 0.125% v/v + 8.5 lb/ 100 gal			5	29.5
Warrant + Roundup PowerMax + AMS	3 pt/a + 22 fl oz/a + 8.5 lb/ 100 gal			5	34.2
Roundup PowerMax + AMS	22 fl oz/a + 8.5 lb/ 100 gal			0	31.6
POST I (3-4 inch weeds) / POST IV (3-4 inch weeds)					
Flexstar GT / Touchdown Total + AMS	3 pt/a / 24 fl oz/a + 8.5 lb/ 100 gal			0	29.7
LSD (P=0.10)		2	3	4	8.7