Evaluating the effectiveness of the pyroxasulfone based herbicide Anthem and tank mixtures with other potential broadleaf herbicides for improved weed control in field corn

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The objective of this trial was to evaluate preemergence and postemergence proxasulfone based systems for weed control in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.7, O.M. of 2.2%, and soil test P and K levels of 38 ppm and 121 ppm, respectively. Spring fertilizer was broadcast on April 28 ahead of planting at a rate of 119-18-149-24 (N-P-K-S). The field was spring disked and field cultivated once prior to planting. The previous crop was soybean. The corn hybrid,DeKalb DKC 53-56 RIB, was planted on May 8, 2014 at a depth of 1.5 inches in 30 inch rows at a rate of 32,000 seeds per acre. A randomized complete block design was used with three replications. Preemergence (PRE) treatments were applied with a tractor-mounted sprayer delivering 15 GPA at 40 psi using TTI 110002 tips. Postemergence (POST) applications were made at 15 GPA, at 40 psi, using TTI 110015 tips. Evaluations of the plots were taken on May 30, June 9, 18, 26, and July 1st, 2014. The center two rows of each plot were machine harvested on October 29, 2014. Application dates, environmental conditions, and weed stages are listed below in Table 1. Herbicide performance for giant ragweed, common lambsquarters, common waterhemp and grasses, plus crop injury ratings can be seen in Tables 2 through 6 respectively. (University of Minnesota Extension Regional Office – Rochester)

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

Date	**5/8**	**6/3**	**6/6**
Treatment	PRE	Post I	Post II
Temperature (F)			
Air	75	68	80
Soil	63.0	73.9	81.4
Relative Humidity (%)	54	54	37
Wind (mph)	15	9	0
Soil Moisture	Normal	Normal	Normal
Corn			
Stage		V2	V4
Height (inch)		6.1	10.0
Giant Ragweed			
Weed density (ft^2)		6.8	
Height (inch)		3.75	3.4
Common Lambsquarters			
Weed density (ft^2)		5.3	
Height (inch)		2.0	1.5
Common Waterhemp			
Weed density (ft^2)		5.3	
Height (inch)		0.8	1.9
Grass			
Weed density (ft^2)		9.5	
Height (inch)		1.5	1.5
Rainfall after each application (inch)			
Week 1	1.63	0.04	0.06
Week 2	0.37	3.86	5.92
Week 3	0.03	2.48	0.58

Table 2. Evaluation of preemergence and postemergence systems for giant ragweed control in field corn on May 30 June 9, 18 and July 1, at Rochester, MN, in 2014.

Treatment	Rate	Giant Ragweed Control				Yield
		5/30	6/9	6/18	7/1	
	(rate/A)	(% Control)				(bu/A)
Untreated Check		0	0	0	0	30
PRE / POST I (V2 Corn)						
Anthem + Accolade / Roundup Power Max + N-Pa-K AMS	10 oz/a + 1.33 wt/a / 22 oz/a + 3.3 gal/100 gal	77	96	97	89	171
Anthem / Solstice + Roundup Power Max + N-Pa-K AMS	10 oz/a / 3 oz/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	72	95	97	93	158
Anthem / Solstice + Stanza + Roundup PowerMax + COC+ N-Pa-K AMS	10 oz/a / 3 oz/a + 3 wt/a + 22 oz/a + 1% v/v + 3.3 gal/ 100 gal	47	94	96	92	177
POST I (V2 Corn)						
Solstice + Roundup Power Max + COC + N-Pa-K AMS	3 oz/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	92	95	85	165
Solstice + Stanza + COC + N-Pa-K AMS	3 oz/a + 3 oz wt/a + 1% v/v + 3,3 gal/100 gal	0	83	93	88	173
Stanza + Roundup Power Max + COC + N-Pa-K AMS	3 oz wt/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	93	94	86	190
Accolade+ Roundup Power Max + COC + N-Pa-K AMS	1.33 oz wt/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	94	96	85	178
Halex GT + NIS + N-Pa-K AMS	3.6 pt/a + 0.5% v/v 3.3 gal/100 gal	0	92	95	86	175
PRE / POST II (V4 Corn)						
Anthem + Stanza / Roundup Power Max + N-Pa-K AMS	10 oz/a + 5 oz wt/a / 22 oz/a + 3.3 gal/100 gal	95	93	97	95	183
SureStart / Roundup Power Max + N-Pa-K AMS	2 pt/a / 22 oz.a + 3.3 gal/100 gal	77	81	97	89	178
Zemax / Roundup Power Max + N-Pa-K AMS	2 qt/a / 22 oz.a + 3.3 gal/100 gal	81	90	97	94	184
	LSD (P=0.10)	**7**	**4**	**2**	**3**	**17**
						(P=0.20)

Table 3. Evaluation of preemergence and postemergence systems for common lambsquarters control in field corn on May 30 June 9, 18 and July 1, at Rochester, MN, in 2014.

Treatment	Rate	Common Lambsquarters Control				Yield
		5/30	6/9	6/18	7/1	
	(rate/A)	(% Control)				(bu/A)
Untreated Check		0	0	0	0	30
PRE / POST I (V2 Corn)						
Anthem + Accolade / Roundup Power Max + N-Pa-K AMS	10 oz/a + 1.33 wt/a / 22 oz/a + 3.3 gal/100 gal	99	99	99	99	171
Anthem / Solstice + Roundup Power Max + N-Pa-K AMS	10 oz/a / 3 oz/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	99	99	99	99	158
Anthem / Solstice + Stanza + Roundup PowerMax + COC+ N-Pa-K AMS	10 oz/a / 3 oz/a + 3 wt/a + 22 oz/a + 1% v/v + 3.3 gal/ 100 gal	99	99	99	99	177
POST I (V2 Corn)						
Solstice + Roundup Power Max + COC + N-Pa-K AMS	3 oz/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	99	99	99	165
Solstice + Stanza + COC + N-Pa-K AMS	3 oz/a + 3 oz wt/a + 1% v/v + 3,3 gal/100 gal	0	99	99	98	173
Stanza + Roundup Power Max + COC + N-Pa-K AMS	3 oz wt/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	99	99	99	190
Accolade+ Roundup Power Max + COC + N-Pa-K AMS	1.33 oz wt/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	99	99	97	178
Halex GT + NIS + N-Pa-K AMS	3.6 pt/a + 0.5% v/v 3.3 gal/100 gal	0	99	99	99	175
PRE / POST II (V4 Corn)						
Anthem + Stanza / Roundup Power Max + N-Pa-K AMS	10 oz/a + 5 oz wt/a / 22 oz/a + 3.3 gal/100 gal	99	99	99	99	183
SureStart / Roundup Power Max + N-Pa-K AMS	2 pt/a / 22 oz.a + 3.3 gal/100 gal	99	99	99	99	178
Zemax / Roundup Power Max + N-Pa-K AMS	2 qt/a / 22 oz.a + 3.3 gal/100 gal	99	99	99	99	184
	LSD (P=0.10)	**0**	**0**	**0**	**1**	**17**
						(P=0.20)

Table 4. Evaluation of preemergence and postemergence systems for common waterhemp control in field corn on May 30 June 9, 18 and July 1, at Rochester, MN, in 2014.

Treatment	Rate	Common Waterhemp Control				Yield
		5/30	6/9	6/18	7/1	
	(rate/A)	(% Control)				(bu/A)
Untreated Check		0	0	0	0	30
PRE / POST I (V2 Corn)						
Anthem + Accolade / Roundup Power Max + N-Pa-K AMS	10 oz/a + 1.33 wt/a / 22 oz/a + 3.3 gal/100 gal	99	99	99	98	171
Anthem / Solstice + Roundup Power Max + N-Pa-K AMS	10 oz/a / 3 oz/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	99	99	99	99	158
Anthem / Solstice + Stanza + Roundup PowerMax + COC+ N-Pa-K AMS	10 oz/a / 3 oz/a + 3 wt/a + 22 oz/a + 1% v/v + 3.3 gal/ 100 gal	99	99	99	99	177
POST I (V2 Corn)						
Solstice + Roundup Power Max + COC + N-Pa-K AMS	3 oz/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	99	99	97	165
Solstice + Stanza + COC + N-Pa-K AMS	3 oz/a + 3 oz wt/a + 1% v/v + 3,3 gal/100 gal	0	99	99	98	173
Stanza + Roundup Power Max + COC + N-Pa-K AMS	3 oz wt/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	99	99	98	190
Accolade+ Roundup Power Max + COC + N-Pa-K AMS	1.33 oz wt/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	99	99	95	178
Halex GT + NIS + N-Pa-K AMS	3.6 pt/a + 0.5% v/v 3.3 gal/100 gal	0	99	99	98	175
PRE / POST II (V4 Corn)						
Anthem + Stanza / Roundup Power Max + N-Pa-K AMS	10 oz/a + 5 oz wt/a / 22 oz/a + 3.3 gal/100 gal	99	99	99	98	183
SureStart / Roundup Power Max + N-Pa-K AMS	2 pt/a / 22 oz.a + 3.3 gal/100 gal	99	99	99	97	178
Zemax / Roundup Power Max + N-Pa-K AMS	2 qt/a / 22 oz.a + 3.3 gal/100 gal	99	99	99	98	184
	LSD (P=0.10)	**0**	**0**	**0.2**	**3**	**17**
						P=(0.20)

Table 5. Evaluation of preemergence and postemergence systems for Grass control in field corn on May 30 June 9, 18 and July 1, at Rochester, MN, in 2014.

Treatment	Rate	Grass Control				Yield
		5/30	6/9	6/18	7/1	
	(rate/A)	(% Control)				(bu/A)
Untreated Check		0	0	0	0	30
PRE / POST I (V2 Corn)						
Anthem + Accolade / Roundup Power Max + N-Pa-K AMS	10 oz/a + 1.33 wt/a / 22 oz/a + 3.3 gal/100 gal	99	99	99	99	171
Anthem / Solstice + Roundup Power Max + N-Pa-K AMS	10 oz/a / 3 oz/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	99	99	99	99	158
Anthem / Solstice + Stanza + Roundup PowerMax + COC+ N-Pa-K AMS	10 oz/a / 3 oz/a + 3 wt/a + 22 oz/a + 1% v/v + 3.3 gal/ 100 gal	99	99	98	99	177
POST I (V2 Corn)						
Solstice + Roundup Power Max + COC + N-Pa-K AMS	3 oz/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	99	96	77	165
Solstice + Stanza + COC + N-Pa-K AMS	3 oz/a + 3 oz wt/a + 1% v/v + 3,3 gal/100 gal	0	99	83	58	173
Stanza + Roundup Power Max + COC + N-Pa-K AMS	3 oz wt/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	99	98	77	190
Accolade+ Roundup Power Max + COC + N-Pa-K AMS	1.33 oz wt/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	99	96	78	178
Halex GT + NIS + N-Pa-K AMS	3.6 pt/a + 0.5% v/v 3.3 gal/100 gal	0	99	99	98	175
PRE / POST II (V4 Corn)						
Anthem + Stanza / Roundup Power Max + N-Pa-K AMS	10 oz/a + 5 oz wt/a / 22 oz/a + 3.3 gal/100 gal	99	99	99	99	183
SureStart / Roundup Power Max + N-Pa-K AMS	2 pt/a / 22 oz.a + 3.3 gal/100 gal	99	99	99	95	178
Zemax / Roundup Power Max + N-Pa-K AMS	2 qt/a / 22 oz.a + 3.3 gal/100 gal	99	99	99	99	184
	LSD (P=0.10)	**0.2**	**0**	**3**	**6**	**17**
						(P=0.20)

Table 6. Crop response caused by preemergence and postemergence herbicide systems in field corn on May 30 June 9, 18 and July 1, at Rochester, MN, in 2014.

Treatment	Rate	Injury					Yield
		5/30	6/5	6/9	6-18	7/1	
	(rate/A)	(% Injured)					(bu/A)
Untreated Check		0	0	0	0	0	30
PRE / POST I (V2 Corn)							
Anthem + Accolade / Roundup Power Max + N-Pa-K AMS	10 oz/a + 1.33 wt/a / 22 oz/a + 3.3 gal/100 gal	0	0	0	0	0	171
Anthem / Solstice + Roundup Power Max + N-Pa-K AMS	10 oz/a / 3 oz/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	50	15	7	0	158
Anthem / Solstice + Stanza + Roundup PowerMax + COC+ N-Pa-K AMS	10 oz/a / 3 oz/a + 3 wt/a + 22 oz/a + 1% v/v + 3.3 gal/ 100 gal	0	47	13	5	0	177
POST I (V2 Corn)							
Solstice + Roundup Power Max + COC + N-Pa-K AMS	3 oz/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	45	15	5	0	165
Solstice + Stanza + COC + N-Pa-K AMS	3 oz/a + 3 oz wt/a + 1% v/v + 3,3 gal/100 gal	0	40	13	5	0	173
Stanza + Roundup Power Max + COC + N-Pa-K AMS	3 oz wt/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	15	9	0	0	190
Accolade+ Roundup Power Max + COC + N-Pa-K AMS	1.33 oz wt/a + 22 oz/a + 1% v/v + 3.3 gal/100 gal	0	15	37	0	0	178
Halex GT + NIS + N-Pa-K AMS	3.6 pt/a + 0.5% v/v 3.3 gal/100 gal	0	0	3	0	0	175
PRE / POST II (V4 Corn)							
Anthem + Stanza / Roundup Power Max + N-Pa-K AMS	10 oz/a + 5 oz wt/a / 22 oz/a + 3.3 gal/100 gal	0	0	0	0	0	183
SureStart / Roundup Power Max + N-Pa-K AMS	2 pt/a / 22 oz.a + 3.3 gal/100 gal	0	0	2	0	0	178
Zemax / Roundup Power Max + N-Pa-K AMS	2 qt/a / 22 oz.a + 3.3 gal/100 gal	0	0	0	0	0	184
	LSD (P=0.10)	0	3	3	2	0	17
							P=(0.20)