

2023 Giant Ragweed Resistance Management Programs in Corn-Soybean Rotations

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Objectives were to achieve 95% control of giant ragweed in soybean and corn at crop canopy, showcase giant ragweed control programs from eight industry partners, and provide an unbiased evaluation of entries to allow growers to benchmark competitive performance. Growers should use the data set as a guide to visit with their crop consultants or local suppliers to determine a giant ragweed program that provides the greatest control at an economical cost based on local supplier pricing and availability of products.

MATERIALS AND METHODS

Experiments were conducted on a severe natural population of ALS and glyphosate-resistant giant ragweed near Renville, Minnesota, in 2023. Soil was a fine-textured webster-clay loam soil with 5.5% organic matter and a 6.4 soil pH. Spring tillage was a field cultivator at 3" depth. Becks 4844V2P corn was seeded 2.00 inches deep on 30-inch row spacings at 32,000 seeds per acre on May 8, emerging May 19. Preemergence herbicide treatments applied to corn on May 8, and early-postemergence treatments to V3 corn on June 1 (Table 1). Becks 1630E soybean was seeded 1.25 inches deep on 30-inch row spacings at 130,000 seeds per acre on May 16, emerging May 25. Preemergence herbicide treatments applied to soybean on May 16, and early-postemergence treatments to V1 soybean on June 6 (Table 1). All treatments applied with bicycle sprayer in 15 GPA spray solution through AIXR11002 air-induction flat fan nozzles pressurized with CO₂ at 25 psi to the center two rows of four row plots 40 feet in length. Field area had moderate to high levels of glyphosate-resistant giant ragweed.

Giant ragweed control in corn was evaluated May 22, June 1, June 8, June 16, June 29, and July 13 (Table 2). Giant ragweed control in soybean was evaluated May 30, June 13, June 20, July 4, and July 17 (Table 3). Giant ragweed evaluations were a visual estimate of percent fresh weight reduction between center two rows compared to adjacent untreated strips. Experimental design was randomized complete block with 4 replications. Data were analyzed with GLM procedure of SAS (Statistical Analysis Software 2023, version 9.4M8, SAS Institute, Inc.) at alpha=0.10 and differences are determined with 90% confidence; meaning, if the study was repeated 100 times that 90 times out of 100, we would expect statistically similar treatments (within one LSD value of each other) to remain similar.

Table 1. Application information for Renville giant ragweed control trials in 2023.

Crop	Corn		Soybean	
	A	B	A	B
Application Code				
Date	May 8	June 1	May 16	June 6
Time of Day	1:00 PM	10:00 AM	5:00 PM	10:00 AM
Air Temperature (F)	69	81	79	74
Relative Humidity (%)	51	62	43	75
Wind Velocity (mph)	5	5	10	5
Wind Direction	NW	SE	NW	SE
Soil Temp. (F at 6")	56	68	64	73
Soil Moisture	Good	Good	Good	Good
Cloud Cover (%)	5	30	100	95
Crop Growth Stage (avg)	-	V3	-	V1
Giant Ragweed Height	-	4"	-	4"

RESULTS AND DISCUSSION

GIANT RAGWEED IN CORN

Giant ragweed pressure across the study area gradually decreased from left to right; however, pressure was significant enough to collect quality data. Preemergence product control at A+14 and A+21 was low, possibly related to treatments leaching from the soil profile as a result of 3 inches of rainfall occurring within 4 days of application (Table 2). Of the 16 programs evaluated, 16, 15, 10, and 6, achieved the 95% giant ragweed control objective at B+7, B+14, B+28, and B+42, respectively. In general, giant ragweed control decreased at each post "B" application evaluation. This is likely due to the soil and photodegradation of product residuals which gradually reduces the

amount of product available to be taken up by the target weed and reducing efficacy. At corn canopy (B+42), giant ragweed control ranged from 86-100% averaging 93.3%. The greatest control was provided by treatments 1, 2, 3, 4, 9, and 10, sequentially referenced by table order. Treatments 1 and 2 were submitted by BASF; 3 and 4 by Bayer Crop Science; and, 9 and 10 by Nutrien/Loveland.

Treatment ^a	Rate oz/A* or fl oz/A	App. Code ^b	Giant Ragweed Control					
			A+14 ^c	A+21	B+7	B+14	B+28	B+42
			-----%-----					
Verdict / Status+RUII+AMS ^d	15 / 5*+32	A / B	40	55	100	100	98	99
Verdict / Status+RUII+AAAtrex+Callisto+COC+AMS	15 / 5*+32+16+3	A / B	46	55	100	99	100	100
Harness Max+DiFlexx / Laudis+AAAtrex+RU3+AMS+HSMOC	40+10 / 3+16+30	A / B	53	53	99	98	95	95
TripleFlex II+Harness / DiFlexx+Laudis+RU3+AMS+HSMOC	32+16 / 8+3+30	A / B	55	53	100	99	95	96
Surpass NXT / Kyro+AAAtrex+RU3+COC+Amsol	32 / 45+16+30+2.5%	A / B	43	35	99	96	91	87
Surpass NXT / Resicore XL+AAAtrex+RU3+COC+Amsol	32 / 45+16+30+2.5%	A / B	24	15	98	97	93	90
Anthem Maxx+Callisto+AAAtrex / Status+RUII+AMS	4.5+5.5+32 / 5*+32	A / B	38	54	100	98	97	94
Anthem Maxx+Callisto+AAAtrex+RUII+AMS+COC	4+3+32+32	B	5	0	96	99	95	93
Fortitri+Sinder 3L / Rifle+Missile	21+2 / 8+0.25%	A / B	58	70	99	100	97	99
Fortitri+Sinder 3L+Infuse / Rifle+Carabiner 4SC+Missile	21+2+24 / 8+3+0.25%	A / B	63	71	100	100	98	100
Calibra / AAAtrex+Acuron GT+AMS	64 / 16+60	A / B	13	38	97	97	93	90
Acuron / Acuron+RUII+AMS	48 / 48+32	A / B	3	28	96	95	90	86
Harness / AAAtrex+Maverick+RU3+AMS+HSMOC	44 / 16+14+30	A / B	40	33	96	97	93	90
DiFlexx+AAAtrex+Maverick+RU3+AMS+HSMOC	8+16+24+30	B	20	15	100	99	96	94
Trisidual+Interlock / Charger Max+Sterling Blue+Cornerstone 5 Plus+AMS+StrikeLock	32+4 / 16+6+32+8	A / B	20	48	98	90	88	86
Verdict / Acuron+RU3+AMS	18 / 48+30	A / B	68	70	100	98	97	94
LSD (0.1)			19	18	2	2	4	6

^aPRE treatment applications contained no additional adjuvants.

^bApplication codes refer to the information in Table 1.

^cA+[#] or B+[#]=Days after “A” or “B” application.

^dAMS=Class Act NG 2.5% v/v; RU2/3=Roundup 2/3; COC=Crop Oil Concentrate 1% v/v; HSMOC=Destiny HC 0.5% v/v.

GIANT RAGWEED IN SOYBEAN

Giant ragweed pressure across the study area gradually decreased from left to right; however, pressure was significant enough to collect quality data. Preemergence product control at A+14 was low, possibly related to treatments residuals not having an activating rainfall (Table 3). Of the 20 programs evaluated, 12, 12, 14, and 13, achieved the 95% giant ragweed control objective at B+7, B+14, B+28, and B+42, respectively. In general, giant ragweed control remained consistent at each post “B” application evaluation. This is likely due to lack of rainfall, less than 2 inches from “A” application to last evaluation, for giant ragweed to germinate and, the deaccelerated soil degradation of the herbicide due to less microbe activity in a dry soil. When small rainfall events occurred, giant ragweed and product activation likely occurred simultaneously providing good control of post-application flushes. At soybean canopy (B+42), giant ragweed control ranged from 50-100% averaging 91.8% with a median of 96.5% as the lower four treatments largely impacted the average. Control of all treatments was statistically similar with the exception of the first four as sequentially referenced by table order.

Treatment ^a	Rate oz/A* or fl oz/A	App. Code ^b	Giant Ragweed Control				
			A+14 ^c	B+7	B+14	B+28	B+42
			-----%-----				
Zidua Pro / Liberty+Dry AMS	6 / 32+3lb/A	A / B	13	91	85	81	81
Zidua Pro / Liberty+Outlook+Select 2EC	6 / 32+10+8	A / B	0	93	89	83	85
Auth. First / War. Ultra+RU3+AMS ^d	6.45* / 48+30	A / B	5	79	59	53	50
Auth. First / War.+RU3+Liberty+AMS	6.45* / 48+30+32	A / B	8	84	84	73	75
Sonic / Enlist One+Liberty+Amsol	5* / 32+32+2.5%	A / B	13	99	99	98	98
Kyber / Enlist One+Liberty+Amsol	16 / 32+32+2.5%	A / B	15	99	100	99	98
Auth. First / Enlist One+RUII+Anthem Maxx+AMS	6.4* / 32+32+4	A / B	5	100	97	99	99
Auth. First+Metribuzin 75 DF / Enlist One+RUII+Anthem Maxx+AMS	6.4*+6* / 32+32+4	A / B	13	100	100	100	99
Tribal / Enlist One+Mad Dog+Missile	72 / 32+36+0.25%	A / B	18	100	99	100	100
Tribal+Infuse / Enlist One+Mad Dog+Missile	72+32 / 32+36+0.25%	A / B	5	99	98	98	98
Prefix / Enlist One+Sequence+AMS	32 / 32+48	A / B	13	99	96	98	99
Tendovo / Enlist One+Sequence+AMS	48 / 32+48	A / B	0	99	98	99	98
Fierce MTZ / Enlist One+Perpetuo+RU3+AMS	16 / 32+6+30	A / B	0	100	98	98	97
Fierce MTZ / Enlist One+Resource+RU3+AMS	16 / 32+4+30	A / B	8	100	99	98	98
Dimetric Charged+Interlock / Enlist One+ Liberty+Cornerstone 5+StrikeLock+AMS	12+4 / 32+ 32+32+12	A / B	10	100	97	96	93
Presidual+Interlock / Enlist One+ Liberty+Cornerstone 5+StrikeLock+AMS	24+4 / 32+ 32+32+12	A / B	0	100	96	96	95
Auth. MTZ+Valor SX+War.+Sharpen / Enlist One+Interlock	9*+1.5*+32+1 / 32+4	A / B	5	88	94	97	95
Auth. MTZ+Valor SX+War.+FirstRate / Enlist One+Interlock	9*+1.5*+32+0.3* / 32+4	A / B	10	71	91	95	96
Auth. MTZ+Valor SX+War.+Sharpen+ FirstRate / Enlist One+Interlock	9*+1.5*+32+1+ 0.3* / 32+4	A / B	8	83	86	91	91
Tendovo+Valor SX+War.+Sharpen+ FirstRate / Enlist One+Interlock	48+1.5*+32+1+ 0.3* / 32+4	A / B	10	83	85	91	91
LSD (0.1)			13	12	8	8	10

^aPRE treatment applications contained no additional adjuvants.

^bApplication codes refer to the information in Table 1.

^cA+[#] or B+[#]=Days after “A” or “B” application.

^dAMS=Class Act NG 2.5%v/v; RU2/3=Roundup 2/3; War=Warrant; COC=Crop Oil Conc. 1%v/v; HSMOC=Destiny HC 0.5%v/v.

CONCLUSION

Giant ragweed population was excellent for evaluations. Three inches of rainfall occurred within 4 days after corn preemergence application, while only 2 inches of rain occurred from preemergence application to last evaluation in soybean. Although, ragweed population and study vicinity were similar, the environment impact on the studies was largely different. In both cases, preemergence treatments had little initial impact, and inclusion of residual herbicides with post-emergence activity applied at the “B” applications were important. In the corn study, the added residual was necessary due to the likely washout of the preemergence residual products, while in the soybean the post-emergence activity from contact and systemic products was critical for eliminating the emerged giant ragweed that came through non-activated preemergence residuals. In both crops there is a plethora of programs demonstrated to assist growers that choose to use the data set as a guide to visit with their crop consultants or local suppliers and determine a giant ragweed program that provides the greatest control at an economical cost based on local supplier pricing and availability of products.

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