

A SYSTEMS APPROACH FOR COMMON LAMBSQUARTERS AND KOCHIA CONTROL IN CORN IN A SUGARBEET ROTATION IN 2016 AT BARNEY, ND

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The objective of this study was to demonstrate a weed control system in corn using herbicides with a site of action different than EPSP synthase inhibitor (glyphosate) and have rotation flexibility with sugarbeet as a rotational crop the following season.

MATERIALS AND METHODS

An experiment was conducted near Barney, ND in 2016. The trial site was prepared using a Kongskilde ‘s-tine’ field cultivator with rolling baskets on May 4, 2016. ‘DKC38-04 RIB’ Dekalb corn was seeded in 22-inch rows at 32,000 seeds per acre on May 4 with a John Deere 1700XP 6-row planter. Preemergence (PRE) treatments were applied May 4. Postemergence (POST) treatments were applied June 2 and 21. All herbicide treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO₂ at 30 psi to the center four rows of six row plots 30 feet in length. Corn injury and common lambsquarters, kochia, and redroot pigweed control were evaluated June 1, July 1, and September 7.

All corn injury and weed control evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications for each trial. Data were analyzed with the ANOVA procedure of ARM, version 2016.4 software package.

Table 1. Application Information – Barney, ND 2016

Application	A	B	C
Date	May 4	June 2	June 21
Time of Day	1:00 PM	9:00 AM	3:30 PM
Air Temperature (F)	69	59	83
Relative Humidity (%)	24	60	32
Wind Velocity (mph)	7	6	7
Wind Direction	NNW	NW	W
Soil Temp. (F at 6")	59	54	70
Soil Moisture	Good	Good	Fair
Cloud Cover (%)	0	10	30
Next Rainfall (amount)	May 11	June 3	June 22
Corn Stage	PRE	V6	V8
Common Lambsquarters	-	3 inch	1 inch
Kochia	-	2 inch	3 inch
Redroot Pigweed	-	2 inch	1 inch

SUMMARY

Corn injury from herbicides was generally minimal in this trial (Table 2). All treatments, except three, gave 15% or less corn injury on July 1. The three treatments that gave greater than 15% injury actually showed 30% to 38% injury. These three treatments were PRE Harness+Sharpen, PRE Harness fb Widematch, and PRE Sharpen fb Widematch. This injury may have been more attributed to weed competition rather than herbicide injury. Common lambsquarters control on July 1 for these three treatments ranged from 13% to 35%. The extensive competition from weeds caused the corn to be shorter and thereby appear injured. All herbicides used in these treatments are labeled for use on corn and are generally safe.

Table 2. Corn injury and weed control from herbicides at Barney, ND in 2016.

Treatment	Rate	Appl ¹	June 1	-----July 1-----			-----Sept 7-----		
			colq ² % cntl	corn % inj	colq % cntl	kocz % cntl	colq % cntl	rrpw % cntl	kocz % cntl
Harness + Sharpen	32 + 2.5 fl oz + fl oz	A	65	38	13	65	0	0	0
Harness + Clarity	32 + 16 fl oz + fl oz	A	80	5	65	100	60	100	100
Widematch ³	16 fl oz	B							
Harness + AAtrex	32 + 12 fl oz + fl oz	A	55	5	80	98	80	100	100
Status ⁴	3.5 oz	B							
Harness	32 fl oz	A	28	10	80	88	80	98	91
Status ⁴	3.5 oz	B							
Harness	32 fl oz	A	38	38	33	100	0	0	0
Widematch ³	16 fl oz	B							
Harness	32 fl oz	A	30	10	70	78	63	100	90
Buctril ³	24 fl oz	B							
Sharpen	2.5 fl oz	A	30	8	78	95	80	98	93
Status ⁴	3.5 oz	B							
Sharpen	2.5 fl oz	A	43	30	35	95	0	0	0
Widematch ³	16 fl oz	B							
Verdict + AAtrex	13 + 12 fl oz + fl oz	A	58	8	83	95	86	96	98
Status ⁴	3.5 oz	B							
Verdict	13 fl oz	A	70	5	78	93	89	98	93
Status ⁴	3.5 oz	B							
Sharpen	2 fl oz	A	33	3	88	93	90	100	95
Warrant + Status +	48 + 3.5 fl oz + oz	B							
RU PowerMax ⁵	32 fl oz	B							
Laudis + AAtrex ⁴	3 + 12 fl oz + fl oz	B	0	8	75	93	76	98	98
Status+PowerMax ⁵	3.5 + 28 oz + fl oz	BC	0	5	95	95	100	100	100
Widematch	16 fl oz	BC	0	15	95	100	100	100	100
Status+PowerMax ⁵	3.5 + 28 oz + fl oz	BC							
LSD (0.05)			16.3	10.6	7.5	15.6	7.2	4.3	9.7

¹Appl refers to application information in Table 1. A=PRE, B=POST applied June 14, C=POST applied June 23

²colq=common lambsquarters; kocz=kochia; rrpw=redroot pigweed

³Indicates addition of Prefer 90 Non-ionic Surfactant (NIS) at 0.25% v/v. Product provided by West Central Inc.

⁴Indicates addition of Methylated Seed Oil (MSO) at 1.5 pt/A. Product provided by Loveland.

⁵Indicates addition of Ammonium Sulfate (AMS) at 8.5 lb/100 gal + High Surfactant Methylated Seed Oil Concentrate (HSMOC) at 1.5 pt/A. N-Pak AMS and Destiny HC (HSMOC) were provided by Winfield.

Common lambsquarters control varied by herbicide treatment and evaluation timing. Lambsquarters control from PRE herbicides was evaluated June 1 and ranged from 28% to 80%. PRE Harness gave 28% to 38% lambsquarters control. PRE Sharpen at 2 or 2.5 fl oz/A gave 30% to 43% lambsquarters control. PRE Verdict gave 70% lambsquarters control. Tank mixing PRE herbicides tended to improve common lambsquarters control. PRE Verdict+AAtrex was an exception to this trend. The addition of AAtrex gave no improvement of lambsquarters control and may have caused slight antagonism. This was also observed at Moorhead in 2016. When only PRE Harness + Sharpen was applied, lambsquarters continue to germinate throughout the season and control dropped from 65% on June 1 to virtually no control on September 7. Widematch applied POST did not provide adequate lambsquarters control, and evaluations taken September

7 reflect only the strength of the PRE herbicide. A single POST application of Laudis+AAtrex gave 76% lambsquarters control at the final evaluation. However, two POST applications of Status+PowerMax or Widematch+Status+ PowerMax gave 100% lambsquarters control on September 7. Only these two treatments, both of which contained Roundup PowerMax, gave 100% lambsquarters control and demonstrate the value of glyphosate at controlling weeds.

The kochia population at this location has been documented to have some level of resistance to glyphosate. However, research at this location conducted over the last 5 years has provided mixed results when glyphosate is applied to kochia. The kochia density has also varied greatly from season to season with the density in 2016 being low to moderate. Kochia control in this trial on July 1 ranged from 65% to 100%. PRE Harness+Sharpen did not provide season-long control of kochia and gave 65% control on July 1 and 0% control on September 7. PRE Harness fb Buctril gave 78% kochia control on July 1 and PRE Harness fb Status gave 88% control. All other treatments gave greater than 90% control on July 1. The September 7 evaluation showed 90% or greater kochia control from most treatments. The three treatments that showed no kochia control were PRE Harness+Sharpen, PRE Harness fb Widematch, and PRE Sharpen fb Widematch. Widematch is usually a very good herbicide for use on kochia. The lack of observed kochia control from the two treatments containing Widematch is probably due to the heavy lambsquarters density at application and late in the season where observations may have been confounded due to the overall lack of lambsquarters control.

Redroot pigweed control was generally excellent in this trial with 11 of 14 treatments giving 96% to 100% pigweed control. The three treatments that gave no pigweed control also gave no lambsquarters or kochia control on September 7. These treatments were PRE Harness+Sharpen, PRE Harness fb Widematch, and PRE Sharpen fb Widematch. While Widematch is usually a very good herbicide for use on kochia, it is not a good herbicide for use on pigweed species. However, Harness is a very good PRE herbicide for use on pigweeds, but will rarely provide season-long control. The heavy lambsquarters density at application and late in the season may have confounded pigweed control evaluation for these three treatments.

CONCLUSIONS

Crop safety from the herbicides applied in this trial was good to excellent. Broad spectrum weed control was best achieved in this trial from two POST applications of Widematch+Status+Roundup PowerMax or Status+Roundup PowerMax. Using a PRE herbicide will generally provide a better foundation for season long weed control and reduce selection pressure on POST herbicides rather than using POST herbicides alone. However, in dry spring conditions as were seen in 2016, PRE herbicides fb a single POST application did not provide acceptable broad spectrum weed control. In these cases, a second POST application may be needed.