

AN EVALUATION OF POTENTIAL HERBICIDES FOR USE IN SUGARBEET IN 2016

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The objective of this study was to evaluate several ‘non-sugarbeet’ herbicides available from UPI for crop safety in Roundup Ready (RR) sugarbeet.

MATERIALS AND METHODS

An experiment was conducted near Hickson, ND in 2016. Fertilizer was spread April 16 and 2.35 inches of rain over the next seven days incorporated the fertilizer. The trial site was prepared using a Kongskilde ‘s-tine’ field cultivator with rolling baskets on June 8, 2016. ‘SV36272RR’ sugarbeet, treated with NipsIt Suite, Tachigaren at 45g per unit, and Kabina at 7g per unit, was seeded in 22-inch rows at 60,560 seeds per acre on June 8 with a John Deere 1700XP 6-row planter. Preemergence (PRE) treatments were applied immediately after seeding. Rain events on June 12, 14, and 18 dropped 0.09, 0.25, and 0.90 inches of rain, respectively. Postemergence (POST) treatments were applied June 28. All herbicide treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO₂ at 40 psi to the center four rows of six row plots 35 feet in length. This trial was maintained weed free by applications of glyphosate on July 1 and August 2 and maintained disease free by applications of fungicide on July 20 (Priaxor), August 2 (Eminent), and August 17 (Headline). Sugarbeet injury was evaluated June 22, 28 and July 5, 13, 19. The trial was harvested September 12. One of the middle two rows, typically row 3, by 27 feet long was defoliated, stand was counted, and a sample of 25 pounds of sugarbeet was collected for quality analysis. The remaining beets in the harvested row were then gathered by hand and weighed.

All sugarbeet injury 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 – Hickson, ND 2016

Date	June 8	June 28
Time of Day	12:30 PM	1:00 PM
Air Temperature (F)	75	79
Relative Humidity (%)	37	32
Wind Velocity (mph)	9	2
Wind Direction	SE	W
Soil Temp. (F at 6")	60	73
Soil Moisture	Good	Fair
Cloud Cover (%)	5	5
Next Rainfall (amount)	June 12 (0.09")	July 7 (0.12")
Sugarbeet Stage	PRE	2-4 leaf

SUMMARY

Sugarbeet injury from herbicides ranged from zero to 85% in this trial (Table 2). Collide, either applied PRE or POST, gave unacceptable sugarbeet injury in this trial ranging from 55% to 85% injury. Stand loss at harvest of 81 fewer plants per 100 feet of row was also observed from PRE Collide compared to the untreated check. Collide applied PRE gave 1.2% less sugar, 1,130 less pounds extractable sucrose per acre, and 2.3% reduced purity compared to the untreated check. Collide applied POST gave 4.5 less tons of root yield, 0.6% less sugar, and 1,366 less pounds per acre extractable sucrose compared to the untreated check.

Table 2. Crop injury and yield response following application of several ‘non-sugarbeet’ herbicides in sugarbeet near Hickson, ND in 2016.

Tuckson, ND in 2016.													
			6/22	6/28	7/5	7/13	7/19	September 12					
Treatment ¹	Rate	Appl	Injury					Stand	Yield	Sugar	Ext. Sucrose	Ext. Sucrose	Purity
			-----%-----					#/100'	ton/a	%	lb/a	lb/ton	%
Untreated			0	0	0	0	0	227	23.6	15.0	5883	249	88.7
Collide	0.25 lb ai/a	A ²	85	75	65	55	55	146	21.7	13.8	4752	220	86.4
Collide	0.25 lb ai/a	B	0	0	68	75	70	209	19.1	14.4	4517	238	88.4
Ultra Blazer	0.25 lb ai/a	B	0	0	45	33	33	229	23.3	14.5	5455	234	87.3
Devrinol	1.0 lb ai/a	A	0	0	0	4	0	218	25.1	14.6	5977	238	87.8
Command	0.375 lb ai/a	A	5	8	0	3	5	219	25.7	14.8	6239	244	88.4
Prowl H ₂ O	0.75 lb ai/a	B	0	0	13	0	4	198	24.8	14.4	5812	235	87.6
LSD (0.05)			6.8	4.7	6.0	7.8	11.1	34.6	2.11	0.57	524.9	14.3	1.26

¹Common names are as follows: Ultra Blazer=acifluorfen; Collide=oxyfluorfen; Devrinol=napropamide; Command=clomazone; Prowl H₂O=pendimethalin

²Application information can be found in Table 1. A=PRE on June 8, B=POST on June 28.

Ultra Blazer gave significant sugarbeet injury at all three evaluations following an application to 2 to 4 leaf sugarbeet on June 28. Injury symptoms included growth reduction and leaf necrosis. Injury did marginally decline over evaluation timings from 45% on July 5 to 33% on July 13 and 19. Sugarbeet treated with Ultra Blazer gave 15 less pounds per ton of extractable sucrose and 1.4% reduced percent purity compared to the untreated check and showed a trend toward reduced levels of yield, percent sugar, and pounds per acre extractable sucrose when compared to the untreated check.

Devrinol and Command gave very similar results when applied PRE in sugarbeet. Devrinol gave essentially no visual injury symptoms and gave very similar results for yield and quality parameters compared to the untreated check. Command gave chlorosis and some necrosis of the oldest leaves early in the season, but the injury symptoms diminished as time progressed. Command did not significantly affect any yield or quality parameter compared to the untreated check.

Prowl H₂O gave some sugarbeet injury observed as droopy plants 7 days after application. The injury symptom disappeared as time progressed. Prowl application did not affect any sugarbeet yield or quality parameters compared to the untreated check.

CONCLUSION

Collide is not a suitable herbicide candidate for use in sugarbeet at this time. Collide applied PRE gave significant stand loss and negatively affected yield and quality. Collide applied POST also resulted in significant negative effects on sugarbeet yield and quality. Ultra Blazer showed significant sugarbeet injury in visual evaluations, but the mixed effect of this injury on yield and quality parameters may warrant further study. Devrinol, Command, and Prowl H₂O applied in sugarbeet showed good to excellent crop safety with no adverse effects on sugarbeet yield or quality and should be studied further for sugarbeet crop safety as well as weed control efficacy in the sugarbeet crop.