

Evaluation of Herbicide Programs for Liberty Link Sweet Corn Hybrids

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Introduction

The recent introduction and availability of Liberty Link sweet corn hybrids provides growers with new options for postemergence weed control. The Liberty Link technology utilizes specially developed hybrids that are tolerant to Liberty 280 SL (glufosinate), a foliar applied, broad-spectrum herbicide with no residual control. The objective of this study was to evaluate and identify the best strategies for using Liberty 280 SL in a sweet corn weed management program.

Materials and Methods

The trial was conducted on a Toolesboro sandy loam soil with 2.5 percent organic matter and soil pH of 6.5. Ground was prepared for planting by chisel plowing and disking. Normal cultural practices were followed for fertilization, irrigation, and pest control. Syngenta BC 0805, a Liberty Link herbicide-tolerant and Attribute insect-protected hybrid was used in this study. Seed was planted at a rate of 27,700/acre in rows 30 in. apart on May 8. Trial design was a randomized complete block with three replications. Herbicide plots consisted of 6 rows 20 ft in length. Herbicide treatments were applied using a CO₂ small plot sprayer with a 4-nozzle boom calibrated to apply spray solution at 22 gallons/acre rate. Herbicide products are described in Table 1, and herbicide treatments are listed in Table 2. Crop preemergence (PRE) treatments were applied on May 14 to a damp soil surface. Early post (EPOST) treatments were applied on May 24 when sweet corn was at the V2/V3 growth stage. Late post (POST) herbicide treatments were applied on June 13 to sweet

corn at the V5/V6 growth stage. Visual ratings on weed control were taken on May 24, June 3, and at harvest on July 31 (Table 2). Main weeds present were crabgrass, yellow foxtail, carpetweed, lambsquarter, purslane, and velvetleaf. Harvest data were taken from center rows on July 31 to determine effects of herbicide treatment on sweet corn yield.

Results and Discussion

Liberty 280 SL (glufosinate) can only be used on sweet corn hybrids with the Liberty Link herbicide tolerance trait. Liberty 280 SL is a Group 10 glutamine synthesis inhibitor, which is a mode of action different from that of Roundup (glyphosate) making it useful as an alternative chemistry in weed resistance management. It can be described as a contact, burn-down herbicide with limited systemic action in the plant and no residual control. Because of these characteristics, it is most effective on annual grass and broadleaf weeds from emergence up to 3 to 6 in. tall.

Herbicide treatment yield and weed control ratings at harvest are presented in Table 2. Not surprisingly, lowest yield came from the untreated control plots, which were overgrown with weeds by harvest time. Generally, Liberty 280 SL was most effective when used in conjunction with other herbicides providing residual weed control. Treatment 6, which consisted of just an EPOST application of Liberty 280 SL, was weedy at harvest and low yielding. This resulted from a thick flush of weeds, both grass and broadleaves, that emerged right after the EPOST application. Treatment 14, which consisted of only a late POST application of Liberty 280 SL, also was fairly weedy at harvest. In this case, plots were weedy because by the time of herbicide application on June 13 many weeds had already emerged and were over 5 in. tall

preventing thorough spray coverage and good control. Decent weed control was achieved in this study by applying Liberty 280 SL twice, at both EPOST and POST (Treatment 12). Be aware, however, that the Liberty 280 SL sweet corn label allows only two applications not to exceed 40 fl oz/acre and not within 50 days of harvest.

Best yields and weed control were seen in treatments that combined Liberty 280 SL with compatible herbicides that also contributed residual weed control. Treatments 3, 4, and 5 are good examples of this approach relying on PRE herbicides for an extended period of residual weed control followed by a POST application of Liberty 280 SL to clean up weed escapes. In this study, various combinations of Atrazine 4L, Callisto, and Zidua were used for residual weed control because they have performed well in previous weed management studies. However, this is

not to say other good products don't exist or could have been used in their place. Although Treatments 3, 4, and 5 might represent the ideal strategy for achieving season-long weed control, circumstances often occur in the real world that delay the PRE herbicide application until after the sweet corn and many weeds have emerged. In these situations, the only choice is to apply herbicides EPOST as a rescue treatment (check herbicide label as not all sweet corn herbicides can be applied EPOST). The problem with applying many of our common residual herbicides EPOST to emerged corn is mediocre weed control. Group 15 herbicides (Dual II Magnum, Zidua, etc.) in particular are not effective against emerged weeds. In these situations, adding Liberty 280 SL to the EPOST application (Treatments 8, 9, 10, and 11) enhanced the burn down of emerged weeds allowing the residual herbicides to successfully provide extended control.

Table 1. Herbicide product descriptions.

Herbicide	Formulation	Company	Active ingredient	MOA Group
Armezon	2.8 SC	BASF	topramezone	27
Atrazine 4L	4 SL	MANA	atrazine	5
Callisto	4 SC	Syngenta	mesiotrione	27
Liberty 280SL	280 SL	Bayer	glufosinate	10
Zidua	85 WG	BASF	pyroxasulfone	15

Table 2. Herbicide treatment descriptions, BC 0805 sweet corn yield, and weed control ratings at harvest.

	Herbicide treatment¹	Rate per acre	Application timing²	Yield dozen ears/acre	Yield cwt/acre	Husked ear wt lbs	Grass weed control³	Broadleaf weed control³
1	Zidua	3.0 oz	PRE	2068	198.4	0.59	E	F/G
2	Zidua	3.0 oz	PRE	1980	193.5	0.58	E	F/G
	Atrazine 4L	2.0 pt	PRE					
3	Zidua	3.0 oz	PRE	2024	191.7	0.58	E	G/E
	Liberty 280SL	20 fl oz	POST					
4	Zidua	3.0 oz	PRE	2046	202.5	0.60	E	G/E
	Atrazine 4L	2.0 pt	PRE					
	Liberty 280SL	20 fl oz	POST					
5	Zidua	3.0 oz	PRE	2090	203.54	0.60	E	E
	Atrazine 4L	1.0 pt	PRE					
	Callisto	6.0 fl oz	POST					
	Liberty 280SL	20 fl oz	POST					
6	Liberty 280 SL	20 fl oz	EPOST	1804	164.5	0.55	F	P
7	Zidua	3.0 oz	EPOST	1884	179.1	0.59	F	F
	Atrazine 4L	1.0 pt	EPOST					
8	Zidua	3.0 oz	EPOST	1980	188.2	0.58	G/E	F
	Atrazine 4L	1.0 pt	EPOST					
	Liberty 280SL	20 fl oz	EPOST					
9	Zidua	3.0 oz	EPOST	2112	199.1	0.59	G/E	G/E
	Callisto	3.0 fl oz	EPOST					
	Liberty 280SL	20 fl oz	EPOST					
10	Zidua	3.0 oz	EPOST	2002	195.9	0.59	E	G
	Atrazine 4L	1.0 pt	EPOST					
	Callisto	3.0 fl oz	EPOST					
	Liberty 280SL	20 fl oz	EPOST					
11	Zidua	3.0 oz	EPOST	2244	209.1	0.56	E	E
	Atrazine 4L	1.0 pt	EPOST					
	Liberty 280SL	20 fl oz	EPOST					
	Liberty 280SL	20 fl oz	POST					
12	Liberty 280 SL	20 fl oz	EPOST	2079	187.2	0.56	G	F/G
	Liberty 280 SL	20 fl oz	POST					
13	Armezon	0.75 fl oz	POST	1980	185.9	0.57	G/E	G/E
	Atrazine 4L	1.0 pt	POST					
	Liberty 280SL	20 fl oz	POST					
14	Liberty 280SL	20 fl oz	POST	1994	168.3	0.55	F	F/G
15	Untreated			1606	141.5	0.51	P	P
	Control							
	LSD 5%			254	25.0	0.05		

¹All Liberty 280SL treatments included AMS at rate equal to 17 lb per 100 gallon.

²PRE treatments applied May 14, EPOST treatments applied May 24, POST treatments applied June 13.

³Weed control ratings: E=excellent, G=good, F=fair, P=poor.