

Efficacy and Crop Response with FirstAct in ACCase-Tolerant Grain Sorghum

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Summary

This research was conducted to determine the efficacy of quizalofop (FirstAct) herbicide in herbicide-tolerant grain sorghum. FirstAct herbicide was evaluated for efficacy and crop response in Double Team (ACCcase-tolerant) sorghum. All herbicides controlled Palmer amaranth 90% or more and volunteer corn 95% or more late in the season. Johnsongrass control was 86 to 91%. Minor sorghum injury early in the season did not persist. Sorghum receiving FirstAct late postemergence yielded more grain than the nontreated control or sorghum receiving Parallel Plus preemergence.

Introduction

Few postemergence options for grass control in grain sorghum exist. Consequentially, grass weeds that escape a preemergence herbicide application can cause severe yield losses. The introduction of herbicide-resistant sorghum allows producers to apply herbicides which would normally kill sorghum to control these weeds. Double Team sorghum hybrids can be treated with FirstAct herbicide to control tough grass weeds such as shattercane, sandbur, and volunteer corn. The objective of the study was to evaluate FirstAct herbicide for efficacy in Double Team grain sorghum.

Experimental Procedures

An experiment evaluated FirstAct applied late postemergence for weed control and crop response in acetyl-CoA carboxylase (ACCcase)-tolerant grain sorghum. Various broadleaf herbicides were applied early postemergence to minimize competition from broadleaf weeds. Herbicides were applied using a tractor-mounted, compressed-CO₂ sprayer delivering 19.4 gpa at 30 psi and 4.1 mph. Application information is given in Table 1. Plots, which were 10 by 35 feet, were arranged in a randomized complete block and replicated four times. Soil was a Beeler silt loam with 2.4% organic matter, pH of 7.5, and CEC of 17.8. Visual weed control was assessed on July 13 and September 1, 2022. These dates were 8 and 58 days after the late postemergence (DA-C) treatments, respectively. Crop injury was visually rated on July 13 and 27, 2022, which was 8 and 22 DA-C. Sorghum yields were determined October 31, 2022, by mechanically harvesting the center two rows of each plot and adjusting grain moisture to 14.0%.

Results and Discussion

Palmer amaranth control was 90% or more regardless of herbicide treatment or evaluation date (data not shown). FirstAct applied late postemergence controlled volunteer corn and johnsongrass 73 to 80% within 8 days of application (Table 2). Corn control

was 95% or more with FirstAct by 58 DA-C. Johnsongrass control was slightly lower at 58 DA-C, 86 to 91% regardless of postemergence treatment. The early postemergence treatments of Clarity (dicamba) and Kochiavore (2,4-D/bromoxynil/fluroxypyr) caused 3 to 15% sorghum epinasty at 8 and 22 DA-C (Table 3). All FirstAct treatments resulted in minor leaf necrosis at 22 DA-C. However, sorghum recovered completely later in the season. Yields from sorghum receiving FirstAct late postemergence yielded 41 to 55 bu/a more grain than the nontreated control. Sorghum treated with Parallel Plus (atrazine/metolachlor) alone preemergence yielded similarly to the nontreated control.

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Table 1. Application, environmental, and plant information for the FirstAct study in grain sorghum

Application timing	Preemergence	Early postemergence	Late postemergence
Application date	June 10, 2022	June 28, 2022	July 5, 2022
Air temperature, °F	64	72	74
Relative humidity, %	100	59	61
Soil temperature, °F	66	65	73
Wind speed, mph	2 to 4	5 to 9	1 to 5
Wind direction	North	South-southwest	South
Soil moisture	Good	Good	Good
Grain sorghum			
Height, inches	---	6 to 8	10 to 14
Leaves, no.	0	4 to 5	5 to 6
Volunteer corn			
Height, inches	---	6 to 9	8 to 12
Density, plants/ft ²	0	0.2	0.2
Johnsongrass			
Height, inches	---	2 to 6	5 to 10
Density, plants/ft ²	0	0.25	0.25
Palmer amaranth			
Height, inches	---	2 to 3	---
Density, plants/ft ²	0	0.01	0

Table 2. Weed control in the FirstAct ACCase sorghum trial

Treatment ¹	Rate oz/a	Timing ²	Volunteer corn		Johnsongrass	
			8 DA-C ³	58 DA-C	8 DA-C	58 DA-C
			----- % Visual -----			
Parallel Plus	32	PRE	0	0	0	0
Parallel Plus	32	PRE	75	100	75	89
Clarity	8.0	EPOST				
FirstAct	10.0	LPOST				
COC	1.0%	LPOST				
Parallel Plus	32	PRE	78	100	78	90
Bromoxynil	16	EPOST				
Atrazine	32	EPOST				
FirstAct	10.0	LPOST				
COC	1.0%	LPOST				
Parallel Plus	32	PRE	78	100	75	89
Huskie	16	EPOST				
Atrazine	32	EPOST				
FirstAct	10.0	LPOST				
COC	1.0%	LPOST				
Parallel Plus	32	PRE	73	95	78	86
Kochiavore	24	EPOST				
FirstAct	10.0	LPOST				
COC	1.0%	LPOST				
Parallel Plus	32	PRE	75	100	75	88
Atrazine	32	EPOST				
COC	1.0%	EPOST				
FirstAct	10.0	LPOST				
COC	1.0%	LPOST				
Lumax EZ	2.7 qt	PRE	80	100	78	91
FirstAct	10.0	LPOST				
COC	1.0%	LPOST				
LSD (0.05)			8	4	8	9

¹ COC = crop oil concentrate.

² PRE = preemergence. EPOST = early postemergence. LPOST = late postemergence.

³ DA-C = days after the late postemergence treatments.

Table 3. Crop response in the FirstAct ACCase sorghum trial

Treatment	Rate	Timing ¹	Epinasty		Necrosis	Grain yield
			8 DA-C ²	22 DA-C	22 DA-C	
	oz/a		-----% Visual -----			bu/a
Nontreated control	---	---	0	0	0	12.2
Parallel Plus	32	PRE	0	0	0	11.2
Parallel Plus	32	PRE	3	4	5	65.7
Clarity	8.0	EPOST				
FirstAct	10.0	LPOST				
COC	1.0%	LPOST				
Parallel Plus	32	PRE	0	0	6	54.6
Bromoxynil	16	EPOST				
Atrazine	32	EPOST				
FirstAct	10.0	LPOST				
COC	1.0%	LPOST				
Parallel Plus	32	PRE	0	0	6	60.1
Huskie	16	EPOST				
Atrazine	32	EPOST				
FirstAct	10	LPOST				
COC	1.0%	LPOST				
Parallel Plus	32	PRE	15	13	6	57.2
Kochiavore	24	EPOST				
FirstAct	10.0	LPOST				
COC	1.0%	LPOST				
Parallel Plus	32	PRE	0	0	5	52.9
Atrazine	32	EPOST				
COC	1.0%	EPOST				
FirstAct	10.0	LPOST				
COC	1.0%	LPOST				
Lumax EZ	2.7 qt	PRE	0	0	5	67.2
FirstAct	10.0	LPOST				
COC	1.0%	LPOST				
LSD (0.05)			2	3	3	17.0

¹ PRE = preemergence. EPOST = early postemergence. LPOST = late postemergence.

² DA-C = days after the late postemergence treatments.



Figure 1. Nontreated control.



Figure 2. Parallel Plus 32 oz/a applied preemergence followed by Clarity 8.0 oz/a applied early postemergence and FirstAct 10 oz/a applied late postemergence. Photo taken 58 days after the late postemergence application.



Figure 3. Parallel Plus 32 oz/a applied preemergence followed by Huskie 16 oz/a plus atrazine 32 oz/a applied early postemergence and FirstAct 10 oz/a applied late postemergence. Photo taken 58 days after the late postemergence application.



Figure 4. Parallel Plus 32 oz/a applied preemergence followed by atrazine 32 oz/a applied early postemergence and FirstAct 10 oz/a applied late postemergence. Photo taken 58 days after the late postemergence application.



Figure 5. Lumax EZ 2.7 qt/a applied preemergence followed by FirstAct 10 oz/a applied late postemergence. Photo taken 58 days after the late postemergence application.