

FirstAct for Efficacy in ACCase-Tolerant Grain Sorghum

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Summary

The objective of this study was to compare FirstAct with several tank mix partners for efficacy in herbicide-tolerant grain sorghum. FirstAct (quizalofop) alone or in tank mixtures controlled Johnsongrass 94% or more. However, tank mixing FirstAct with any broadleaf herbicide was generally antagonistic to Palmer amaranth control. Minor sorghum injury was 5% or less by four weeks after postemergence treatment. Sorghum yields increased with all postemergence treatments except with atrazine alone.

Introduction

Postemergence grass control in grain sorghum is currently limited to very few herbicides. Consequently, grass weeds that escape a preemergence herbicide can cause severe yield reductions. FirstAct is a grass herbicide that is studied for use in ACCase-tolerant (Double Team) grain sorghum. The objective of this study was to compare FirstAct with several tank mix partners for efficacy in herbicide-tolerant grain sorghum.

Experimental Procedures

An experiment was conducted to compare FirstAct with various tank mix partners for weed control in acetyl CoA carboxylase (ACCase)-tolerant grain sorghum. All herbicides were applied using a tractor-mounted, compressed CO₂ sprayer delivering 19.4 gpa at 30 psi and 4.1 mph. Application, environmental, and weed information are shown in Table 1. Plots were 10 by 35 feet and arranged in a randomized complete block design with four replications. Soil was a Beeler silt loam with 2.4% organic matter and pH of 7.5. Visual weed control estimates were determined on July 27 and August 24, 2021. These dates were 14 and 42 days after the postemergence treatments (DA-B), respectively. Sorghum injury response was visually estimated on July 27, August 10, and August 24, 2021 (14, 28, and 42 DA-B). Yields were determined on November 23, 2021 by mechanically harvesting the center two rows of each plot and adjusting grain weights to 14.0% moisture.

Results and Discussion

FirstAct applied at 10 oz/a applied postemergence controlled Johnsongrass 94% or more regardless of tank mix partner or rating date (Table 2). Conversely, Palmer amaranth control was generally lower with FirstAct tank mixtures compared to Huskie (bromoxynil/pyrasulfotole) plus atrazine or Kochiavore (2,4-D/bromoxynil/fluroxypyr) alone postemergence. Minor sorghum necrosis and sprawling occurred with FirstAct plus 2,4-D amine or dicamba, and with Kochiavore at 14 DA-B (Table 3).

Visual sorghum injury declined to 5% or less by 42 DA-B. Grain yields increased 34 to 64 bu/a with all postemergence treatments except atrazine alone. The highest yields occurred when FirstAct alone or FirstAct plus dicamba were applied postemergence.

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Table 1. Application, environmental, and weed data for the ACCase-tolerant sorghum trial in Kansas

Application timing	Preemergence	Postemergence
Application date	June 17, 2021	July 13, 2021
Air temperature (°F)	73	75
Relative humidity	47	61
Soil temperature (°F)	76	73
Wind speed (mph)	2 to 5	1 to 4
Wind direction	South	South
Soil moisture	Good	Good
Grain sorghum		
Height (inches)	---	12 to 18
Leaves (no.)	0	8 to 9
Palmer amaranth		
Height (inches)	---	6 to 10
Density (plants/ft ²)	0	0.3
Johnsongrass		
Height (inches)	---	6 to 15
Density (plants/ft ²)	0	0.5

Table 2. Weed control in the FirstAct sorghum study

Treatment ¹	Rate	Timing ²	Johnsongrass		Palmer amaranth	
			14 DA-B ³	42 DA-B	14 DA-B	42 DA-B
	oz/a		----- % Visual -----			
Parallel Plus	32	PRE	99	100	0	0
FirstAct	10	POST				
COC	1%	POST				
Parallel Plus	32	PRE	99	98	68	73
FirstAct	10	POST				
Huskie	16	POST				
COC	1%	POST				
Parallel Plus	32	PRE	98	94	68	74
FirstAct	10	POST				
2,4-D amine	16	POST				
COC	1%	POST				
Parallel Plus	32	PRE	99	100	60	87
FirstAct	10	POST				
Dicamba	8	POST				
COC	1%	POST				
Parallel Plus	32	PRE	99	98	75	78
FirstAct	10	POST				
Bromoxynil	16	POST				
COC	1%	POST				
Parallel Plus	32	PRE	0	0	85	95
Huskie	16	POST				
Atrazine	16	POST				
NIS	0.25%	POST				
Parallel Plus	32	PRE	0	0	95	93
Kochiavore	24	POST				
Parallel Plus	32	PRE	0	0	71	72
Atrazine	16	POST				
COC	1%	POST				
Coyote	64	PRE	0	29	98	100
Atrazine	16	POST				
COC	1%	POST				
LSD (0.05)			4	10	17	13

¹ COC = crop oil concentrate. NIS = nonionic surfactant.

² PRE = preemergence. POST = postemergence.

³ DA-B = days after the postemergence treatments.

Table 3. Crop response to FirstAct in the ACCase-tolerant sorghum study

Treatment ¹	Rate	Timing ²	Necrosis		Sprawl		Sorghum yield
			14 DA-B ³	28 DA-B	14 DA-B	28 DA-B	
	lb/a		----- % Visual -----				bu/a
Parallel Plus	32	PRE	0	0	0	0	44.9
Parallel Plus	32	PRE	0	0	0	0	107.9
FirstAct	10	POST					
COC	1%	POST					
Parallel Plus	32	PRE	0	1	3	0	93.0
FirstAct	10	POST					
Huskie	16	POST					
COC	1%	POST					
Parallel Plus	32	PRE	13	0	11	0	94.5
FirstAct	10	POST					
2,4-D amine	16	POST					
COC	1%	POST					
Parallel Plus	32	PRE	6	0	6	0	109.0
FirstAct	10	POST					
Dicamba	8	POST					
COC	1%	POST					
Parallel Plus	32	PRE	0	0	0	0	91.6
FirstAct	10	POST					
Bromoxynil	16	POST					
COC	1%	POST					
Parallel Plus	32	PRE	0	3	0	0	93.7
Huskie	16	POST					
Atrazine	16	POST					
NIS	0.25%	POST					
Parallel Plus	32	PRE	15	1	10	5	78.6
Kochiavore	24	POST					
Parallel Plus	32	PRE	0	0	0	0	65.4
Atrazine	16	POST					
COC	1%	POST					
Coyote	64	PRE	0	0	0	0	91.2
Atrazine	16	POST					
COC	1%	POST					
LSD (0.05)			2	3	5	2	25.1

¹ COC = crop oil concentrate. NIS = nonionic surfactant.

² PRE = preemergence. POST = postemergence.

³ DA-B = days after the postemergence treatments.



Figure 1. Parallel Plus 32 oz/a applied preemergence. Photo taken 54 days after preemergence application.



Figure 2. Parallel Plus 32 oz/a applied preemergence followed by FirstAct 10 oz/a applied postemergence. Photo taken 28 days after postemergence application.



Figure 3. Parallel Plus 32 oz/a applied preemergence followed by FirstAct 10 oz/a plus Huskie 16 oz/a applied postemergence. Photo taken 28 days after postemergence application.



Figure 4. Parallel Plus 32 oz/a applied preemergence followed by FirstAct 10 oz/a plus dicamba 8 oz/a applied postemergence. Photo taken 28 days after postemergence application.



Figure 5. Parallel Plus 32 oz/a applied preemergence followed by atrazine 16 oz/a applied postemergence. Photo taken 28 days after postemergence application.