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Zest Application Timings for Efficacy in Grain Sorghum

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Abstract

This study was conducted to compare Zest (nicosulfuron) herbicide at two rates and two application timings for efficacy in grain sorghum. Palmer amaranth control was best when a preemergence (PRE) herbicide was followed by a late postemergence (LPOST) treatment. Zest at 0.67 or 1.33 oz/a provided the best velvetleaf and shattercane control. Either rate of Zest applied early postemergence (EPOST) controlled green foxtail more than 90%, but the higher rate was required for greater than 90% control when applications were delayed until LPOST.

Keywords

herbicide-resistant grain sorghum, herbicide tolerance

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Zest Application Timings for Efficacy in Grain Sorghum

R.S. Currie and P.W. Geier

Summary

This study was conducted to compare Zest (nicosulfuron) herbicide at two rates and two application timings for efficacy in grain sorghum. Palmer amaranth control was best when a preemergence (PRE) herbicide was followed by a late postemergence (LPOST) treatment. Zest at 0.67 or 1.33 oz/a provided the best velvetleaf and shattercane control. Either rate of Zest applied early postemergence (EPOST) controlled green foxtail more than 90%, but the higher rate was required for greater than 90% control when applications were delayed until LPOST.

Introduction

Zest (nicosulfuron) is an acetolactase synthase-inhibiting (ALS) herbicide used in corn to control grasses and small seeded broadleaf weeds. Grain sorghum would normally be severely injured by Zest, but ALS-tolerant grain sorghum has been under development for several years. The potential to use Zest postemergence in grain sorghum would allow growers another option for controlling troublesome weeds such as shattercane, Johnsongrass, and foxtail species. The objective of this study was to compare Zest at two rates and two application timings for weed control in ALS-tolerant grain sorghum.

Materials and Methods

An experiment was conducted at the Kansas State University Southwest Research-Extension Center near Garden City, KS, to compare Zest at two rates and two application timings for efficacy in acetolactase synthase-tolerant grain sorghum. All herbicides (Table 2) 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 Ulysses silt loam with 3.4% organic matter and pH of 7.9. Visual weed control was determined on July 6, 2020, which was 10 days after the early postemergence treatments (10 DAB); and again on August 4, 2020, which was 28 days after the late postemergence treatments (28 DAC).

Results and Discussion

Common sunflower control was similar among all herbicides tested, and was 90% or more regardless of rating date (data not shown). Late-season Palmer amaranth control was best when Cinch ATZ (*S*-metolachlor/atrazine) was applied PRE and followed by Zest plus atrazine LPOST, but did not exceed 75% (Table 2). The poor Palmer amaranth control with the postemergence treatments was the result of the

weed biotype being resistant to ALS (Zest) and triazine (atrazine) herbicides. Zest plus atrazine applied EPOST or LPOST controlled velvetleaf 88 to 93% regardless of rate at 28 DAC. Green foxtail control at 10 DAB was best when Cinch ATZ PRE was applied alone or followed by Zest at 1.33 oz/a plus atrazine EPOST. Either rate of Zest applied EPOST and Zest at 1.33 oz/a applied LPOST were the only treatments to control green foxtail more than 90% at 28 DAC. Cinch ATZ applied PRE controlled shattercane the best at 10 DAB. However, Zest at both rates and application timings provided complete shattercane control later in the season.

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Table 1. Application, environmental, and weed data for the Zest in sorghum trial

Application timing	Preemergence	Early postemergence	Late postemergence
Application date	June 3, 2020	June 26, 2020	July 7, 2020
Air temperature (°F)	73	84	76
Relative humidity	44	41	62
Soil temperature (°F)	73	72	77
Wind speed (mph)	3 to 7	2 to 6	3 to 7
Wind direction	Northwest	West-southwest	South
Soil moisture	Dry	Good	Good
Grain sorghum			
Height (inches)	---	4 to 6	6 to 9
Leaves (no.)	0	3 to 5	4 to 6
Palmer amaranth			
Height (inches)	---	1 to 4	2 to 7
Density (plants/10 ft ²)	0	20	10
Velvetleaf			
Height (inches)	---	5 to 5	4 to 6
Density (plants/10 ft ²)	0	5	1
Green foxtail			
Height (inches)	---	1 to 3	1 to 4
Density (plants/10 ft ²)	0	5	3
Shattercane			
Height (inches)	---	3 to 5	4 to 6
Density (plants/10 ft ²)	0	3	2

Table 2. Weed control with Zest in grain sorghum

Treatment ¹	Rate	Timing ²	Palmer amaranth		Velvetleaf		Green foxtail		Shattercane	
			10	28	10	28	10	28	10	28
			DAB ³	DAC ³	DAB	DAC	DAB	DAC	DAB	DAC
	oz/a		----- % Visual -----							
Cinch ATZ	32	PRE	79	55	85	78	85	73	95	88
Cinch ATZ	32	PRE	68	75	75	88	78	93	75	100
Zest	0.67	LPOST								
Atrazine	24	LPOST								
COC	2.0%	LPOST								
AMS	1.94%	LPOST								
Cinch ATZ	32	PRE	75	65	83	93	80	91	83	100
Zest	1.33	LPOST								
Atrazine	24	LPOST								
COC	2.0%	LPOST								
AMS	1.94%	LPOST								
Zest	0.67	EPOST	55	23	61	88	70	83	73	100
Atrazine	24	EPOST								
COC	2.0%	EPOST								
AMS	1.94%	EPOST								
Zest	1.33	EPOST	55	35	70	95	70	98	73	100
Atrazine	24	EPOST								
COC	2.0%	EPOST								
AMS	1.94%	EPOST								
LSD (0.05)			9	9	14	11	6	7	14	4

¹ COC = crop oil concentrate. AMS = ammonium sulfate.

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

³ 10 DAB = 10 days after the early postemergence treatments. 28 DAC = 28 days after the late postemergence treatments.



Figure 1. Untreated control.



Figure 2. Cinch ATZ applied preemergence. Photo taken 55 days after the preemergence treatment.



Figure 3. Cinch ATZ applied preemergence followed by Zest 0.67 oz/a plus atrazine 24 oz/a late postemergence. Photo taken 21 days after the late postemergence treatment.



Figure 4. Cinch ATZ applied preemergence followed by Zest 1.33 oz/a plus atrazine 24 oz/a late postemergence. Photo taken 21 days after the late postemergence treatment.



Figure 5. Zest 0.67 oz/a plus atrazine 24 oz/a early postemergence. Photo taken 32 days after the early postemergence treatment.



Figure 6. Zest 1.33 oz/a plus atrazine 24 oz/a early postemergence. Photo taken 32 days after the early postemergence treatment.