

Novel Sorghum Herbicides for Grass Control in Fallow

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Summary

This study was conducted to compare herbicides for use in herbicide-tolerant grain sorghum for grass control in fallow. Imazamox applied preemergence (PRE) was generally the most effective herbicide regardless of weed species or evaluation date. Postemergence (POST) treatments did not control green foxtail more than 78% late in the season. Imazamox, Assure II (quizalofop), and Accent (nicosulfuron) applied PRE or early POST controlled shattercane and crabgrass 90% or more late in the season. Assure II applied late POST also controlled shattercane 93 to 95% late in the year.

Introduction

Due to a lack of registered herbicides, postemergence grass control in grain sorghum has always been challenging. However, recent advances in the development of herbicide-tolerant sorghum have led to potential new herbicides for postemergence grass control. Currently, sorghum technologies with resistance to imazamox, Accent, and Assure II are in development. The objective of this study was to evaluate herbicides for new sorghum technologies for grass control in fallow.

Materials and Methods

An experiment was conducted at the Kansas State University Southwest Research-Extension Center near Garden City, KS, to compare herbicides (Table 2) from three herbicide-tolerant sorghum technologies: imidazolinone-, ALS- and ACCase-tolerant technologies, in fallow. 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 is 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 16 and August 13, 2020. These dates were 14 days after the early postemergence treatments (14 DAB) and 26 days after the late postemergence treatments (26 DAC), respectively.

Results and Discussion

Imazamox at 6 or 9 oz/a applied PRE provided good control of green foxtail, shattercane, and crabgrass, and was among the best treatments for each of these species at both rating dates (Table 2). No POST treatment controlled green foxtail more than 78% at 26 DAC. In addition to imazamox PRE, Assure II (quizalofop) applied early postemergence (EPOST) at 10 oz/a controlled shattercane more than 90% at 14 DAB.

By 26 DAC, shattercane control exceeded 90% with either rate of imazamox PRE or EPOST, Accent (nicosulfuron) at either rate EPOST, and Assure II at either rate EPOST or late postemergence (LPOST). Early season crabgrass control was 90% or more with all PRE herbicides, Accent at both rates EPOST, and the high rate of Assure II EPOST. However, by 28 DAC, all PRE and EPOST herbicides provided similar crabgrass control. These treatments of Accent or the low rate of Assure II applied LPOST were significantly better than imazamox.

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Table 1. Application, environmental, and weed data for the sorghum herbicide fallow study

Application date	Preemergence	Early postemergence	Late postemergence
Air temperature (°F)	May 27, 2020	July 2, 2020	July 18, 2020
Relative humidity	64	74	75
Soil temperature (°F)	51	87	57
Wind speed (mph)	58	78	74
Wind direction	3 to 6	3 to 7	1 to 5
Soil moisture	North-northwest	East	South
Green foxtail	Dry	Fair	Good
Height (inches)	---	1 to 6	6 to 18
Density (plants/10 ft ²)	0	25	20
Shattercane			
Height (inches)	---	3 to 6	8 to 18
Density (plants/10 ft ²)	0	3	2
Crabgrass			
Height (inches)	---	0.5 to 1	12 to 20
Density (plants/10 ft ²)	0	1	2

Table 2. Weed control in the sorghum herbicide fallow study

Treatment ¹	Rate	Timing ²	Green foxtail		Shattercane		Crabgrass	
			14 DAB ³	26 DAC ³	14 DAB	26 DAC	14 DAB	26 DAC
	oz/a		----- % Visual -----					
Imazamox	6.0	PRE	94	88	90	93	93	90
Imazamox	9.0	PRE	98	89	100	98	96	90
Dual II Magnum	24	PRE	86	70	65	60	94	93
Warrant	64	PRE	75	58	63	60	90	89
Outlook	18	PRE	80	60	73	63	91	90
Imazamox COC	6.0 1.0%	EPOST EPOST	70	70	80	95	85	98
Imazamox COC	9.0 1.0%	EPOST EPOST	80	75	83	95	88	98
Assure II COC	6.0 1.0%	EPOST EPOST	73	65	89	100	83	98
Assure II COC	10.0 1.0%	EPOST EPOST	85	78	93	100	94	95
Accent COC AMS	0.68 1.0% 4.0	EPOST EPOST EPOST	73	53	88	98	93	100
Accent COC AMS	1.0 1.0% 4.0	EPOST EPOST EPOST	80	58	88	90	93	100
Imazamox COC	6.0 1.0%	LPOST LPOST	---	45	---	78	---	70
Imazamox COC	9.0 1.0%	LPOST LPOST	---	48	---	73	---	65
Assure II COC	6.0 1.0%	LPOST LPOST	---	45	---	93	---	70
Assure II COC	10.0 1.0%	LPOST LPOST	---	60	---	95	---	83
Accent COC AMS	0.68 1.0% 4.0	LPOST LPOST LPOST	---	35	---	55	---	45
Accent COC AMS	1.0 1.0% 4.0	LPOST LPOST LPOST	---	38	---	70	---	63
LSD (0.05)			9	14	11	13	7	14

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

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

³ 14 DAB = 14 days after the early postemergence treatments. 26 DAC = 26 days after the late postemergence treatments.



Figure 1. Untreated control.



Figure 2. Imazamox at 9 oz/a applied preemergence. Photo taken 62 days after preemergence treatment.



Figure 3. Imazamox at 9 oz/a applied early postemergence. Photo taken 26 days after early postemergence treatment.



Figure 4. Assure II at 10 oz/a applied early postemergence. Photo taken 26 days after early postemergence treatment.



Figure 5. Accent at 1 oz/a applied early postemergence. Photo taken 26 days after early postemergence treatment.