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Efficacy of KFD-365-02 Rates and Mixtures in Imidazolinone-Tolerant Grain Sorghum

R.S. Currie and P.W. Geier

Summary

This study compared various tank mixes of generic *S*-metolachlor/mesotrione and imazamox for weed control in imidazolinone-tolerant grain sorghum. All herbicides provided more than 90% control of Russian thistle, velvetleaf, and green foxtail, and kochia control late in the season was 85% or more. Puncturevine control late in the season was 80 to 90% with all herbicides except Coyote followed by KFD-365-02 and by KFD-365-02 at 6 oz/a plus atrazine followed by 2,4-D. Only Coyote followed by KFD-365-02 plus atrazine or 2,4-D controlled Palmer amaranth more than 78% late.

Introduction

Postemergence grass weed control in grain sorghum is one of the toughest challenges producers face. Until recently, only atrazine and quinclorac have been labeled for grass control in sorghum, but herbicide-resistant sorghum hybrids are in development. Igrowth sorghum has been bred with resistance to imazamox herbicide. The use of imazamox in sorghum can control grasses such as shattercane, seedling Johnsongrass, and foxtails. This study examined the use of imazamox (KFD-365-02) preemergence and postemergence in Igrowth sorghum.

Experimental Procedures

An experiment was conducted at the Kansas State University Southwest Research-Extension Center near Garden City, KS, to compare imazamox preemergence and postemergence with various tank mix partners for weed control in grain sorghum. All herbicides were applied using a tractor-mounted, compressed CO₂ sprayer delivering 19.4 GPA at 4.1 mph and 30 psi. 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 7.6. Visual weed control ratings were made on June 20 and July 10, 2019. These dates were 17 days after the preemergence applications (DA-B) and 19 days after the postemergence applications (DA-C), respectively.

Results and Discussion

Control of Russian thistle, velvetleaf, and green foxtail was 91% or more regardless of herbicide or evaluation date (data not shown). Palmer amaranth control at 17 DA-B and 19 DA-C was best when Coyote (*S*-metolachlor/mesotrione) was applied 20 days preplant (DPP) followed by KFD-365-02 with atrazine or 2,4-D postemergence

(POST) (Table 2). The lack of Palmer amaranth control from POST applications of KFD-365-02 was due to resistance of the weed biotype to imidazolinone herbicides. Most herbicides controlled kochia 88 to 96% at 17 DA-B; KFD-365-02 at 6 or 9 oz/a PRE followed by atrazine POST did not. By 19 DA-C, no difference occurred among herbicides for kochia control. Similarly, puncturevine control at 17 DA-B was similar among herbicide treatments. By 19 DA-C, puncturevine control was 80% or more with all herbicides except Coyote PRE followed by KFD-356-02 POST or KFD-365-02 at 6 oz/a plus atrazine PRE followed by 2,4-D POST. No visible crop injury was observed from any treatment, and grain yields could not be determined due to the intense Palmer amaranth pressure.

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Table 1. Application information

Application timing	20 days preplant	Preemergence	Early postemergence
Application date	May 14, 2019	June 3, 2019	June 21, 2019
Air temperature (°F)	65	86	71
Relative humidity (%)	61	45	75
Soil temperature (°F)	56	83	73
Wind speed (mph)	1 to 4	8 to 11	5 to 8
Wind direction	South	South-southwest	North
Soil moisture	Good	Good	Good
Grain sorghum			
Height (inch)	0	0	1 to 3
Leaves (number)	---	---	1 to 3
Palmer amaranth			
Height (inch)	0	0	1 to 5
Density (plants/10 ft ²)	---	---	10
Kochia			
Height (inch)	0	0	1 to 3
Density (plants/10 ft ²)	---	---	8
Puncturevine			
Diameter (inch)	0	0	3 to 6
Density (plants/10 ft ²)	---	---	3
Russian thistle			
Height (inch)	0	0	1 to 3
Density (plants/10 ft ²)	---	---	2
Velvetleaf			
Height (inch)	0	0	0.5 to 2
Density (plants/10 ft ²)	---	---	5
Green foxtail			
Height (inch)	0	0	2 to 3
Density (plants/10 ft ²)	---	---	1

Table 2. Weed control in imidazolinone-resistant sorghum

Treatment ¹	Rate	Timing ²	Palmer amaranth		Kochia		Puncturevine	
			17 DA-B ³	19 DA-C ³	17 DA-B	19 DA-C	17 DA-B	19 DA-C
	oz/a		% visual					
Glyphosate	22	PRE	---	---	---	---	---	---
AMS	1.0%	PRE						
Coyote	64	20 DPP	86	78	94	90	88	70
KFD-365-02	6	POST						
COC	1.0%	POST						
Coyote	64	20 DPP	95	96	95	95	85	83
KFD-365-02	6	POST						
Atrazine	32	POST						
COC	1.0%	POST						
Coyote	64	20 DPP	89	88	96	88	85	80
KFD-365-02	6	POST						
2,4-D amine	8	POST						
KFD-365-02	6	PRE	79	58	95	98	88	75
Atrazine	32	PRE						
Glyphosate	22	PRE						
AMS	1.0%	PRE						
2,4-D amine	8	POST						
KFD-365-02	9	PRE	76	50	95	93	98	80
Atrazine	32	PRE						
Glyphosate	22	PRE						
AMS	1.0%	PRE						
2,4-D amine	8	POST						
KFD-365-02	6	PRE	78	65	88	98	95	83
Moccasin II Plus	16	PRE						
Glyphosate	22	PRE						
AMS	1.0%	PRE						
Atrazine	32	POST						
COC	1.0%	POST						
KFD-365-02	9	PRE	73	68	88	88	95	85
Moccasin II Plus	16	PRE						
Glyphosate	22	PRE						
AMS	1.0%	PRE						
Atrazine	32	POST						
COC	1.0%	POST						
KFD-365-02	6	PRE	78	64	84	88	90	80
Glyphosate	22	PRE						
AMS	1.0%	PRE						
Atrazine	32	POST						
COC	1.0%	POST						
KFD-365-02	9	PRE	78	60	80	85	95	81
Glyphosate	22	PRE						
AMS	1.0%	PRE						
Atrazine	32	POST						
COC	1.0%	POST						

continued

Table 2. Weed control in imidazolinone-resistant sorghum

Treatment ¹	Rate	Timing ²	Palmer amaranth		Kochia		Puncturevine	
			17 DA-B ³	19 DA-C ³	17 DA-B	19 DA-C	17 DA-B	19 DA-C
	oz/a		----- % visual -----					
Moccasin II Plus	16	PRE	78	60	90	90	98	90
Glyphosate	22	PRE						
AMS	1.0%	PRE						
Atrazine	32	POST						
COC	1.0%	POST						
Moccasin II Plus	16	PRE	80	64	91	93	100	85
Atrazine	32	PRE						
Glyphosate	22	PRE						
AMS	1.0%	PRE						
KFD-365-02	6	POST						
COC	1.0%	POST						
Moccasin II Plus	16	PRE	78	65	98	100	100	90
Atrazine	32	PRE						
Glyphosate	22	PRE						
AMS	1.0%	PRE						
KFD-365-02	6	POST						
2,4-D amine	8	POST						
Moccasin II Plus	16	PRE	78	48	95	98	93	80
Atrazine	32	PRE						
Glyphosate	22	PRE						
AMS	1.0	PRE						
2,4-D amine	8	POST						
LSD (0.05)			11	17	11	NS	NS	10

¹ AMS = ammonium sulfate. COC = crop oil concentrate.² 20 DPP = 20 days preplant. PRE = preemergence. POST = early postemergence.³ 17 DA-B = 17 days after the preemergence treatments. 19 DA-C = 19 days after the early postemergence applications.



Figure 1. Untreated control.



Figure 2. Coyote 64 oz/a applied 20 days preplant followed by KFD-365-02 6 oz/a applied postemergence. Photo taken 7 days after the postemergence application.



Figure 3. Coyote 64 oz/a applied 20 days preplant followed by KFD-365-02 6 oz/a plus atrazine 32 oz/a applied postemergence. Photo taken 7 days after the postemergence application.



Figure 4. Coyote 64 oz/a applied 20 days preplant followed by KFD-365-02 6 oz/a plus 2,4-D 8 oz/a applied postemergence. Photo taken 7 days after the postemergence application.



Figure 5. Moccasin II Plus 16 oz/a plus atrazine 32 oz/a plus glyphosate 22 oz/a applied preemergence followed by KFD-365-02 6 oz/a applied postemergence. Photo taken 7 days after the postemergence application.