

ImiFlex Evaluation at Two Kansas Locations in Igrowth Grain Sorghum

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Summary

Herbicide-tolerant grain sorghums, such as Igrowth (imidazolinone-resistant) hybrids were recently commercialized in Kansas. Even though the active ingredient of the herbicide associated with these systems, imazamox, is used in other crops, data are needed to define best practices for use in grain sorghum. The objective of these studies was to evaluate ImiFlex (imazamox) herbicide in Igrowth grain sorghum at two Kansas locations in 2022. ImiFlex applied postemergence provided 93% volunteer corn control, and 90 to 95% johnsongrass control regardless of application timing at Garden City. At Manhattan, ImiFlex controlled Palmer amaranth 90 to 99%. Early season grain sorghum injury was 13% or less, and generally did not persist. Grain yields from ImiFlex-treated sorghum were significantly greater than yields from the nontreated controls and from treatments that did not contain ImiFlex.

Introduction

Historically, grain sorghum producers have relied on preemergence herbicides to control grass weeds in their fields because few herbicides were registered for postemergence grass control in grain sorghum and their efficacy was limited. Recent introductions of herbicide-resistant hybrids have expanded the postemergence herbicide options for grain sorghum producers. These studies focused on ImiFlex efficacy and crop response in Igrowth grain sorghum.

Procedures

Two experiments in Kansas, at Garden City and Manhattan, investigated ImiFlex herbicide for use in Igrowth grain sorghum. All herbicides were applied using either a backpack or tractor-mounted, compressed CO₂ sprayer delivering 15 to 19.4 gpa. Application information is given in Tables 1 and 2. Treatments at each location were arranged as completely randomized designs with four replications. Weed control ratings at Manhattan were taken at 18 and 42 days after the postemergence treatments (DA-B), sorghum injury was determined at 18 and 56 DA-B, and sorghum heights were taken at 28 DA-B. Weed control at Garden City was determined at 11 and 52 DA-B, and sorghum injury determined at 1 and 11 DA-B. Sorghum maturity (days to 50% pollen shed) and grain yields were also determined at Garden City.

Results

At Garden City, ImiFlex applied either preemergence (PRE) or postemergence (POST) controlled volunteer corn 65 to 75% 11 DA-B (Table 3) and volunteer corn greater

than 90% at 52 DA-B. Johnsongrass control at Garden City with any ImiFlex treatment was 90% or more regardless of rating date, and did not differ between treatments. Palmer amaranth control was 98 to 100% at Garden City (data not shown) and 90 to 99% at Manhattan, regardless of treatment (Table 4). Motif and Coyote (mesotrione)-containing treatments caused minor sorghum chlorosis at 1 DA-B at Garden City, whereas Clarity (dicamba)-containing treatments resulted in 6 to 13% sorghum epinasty at 11 DA-B (Table 5). However, sorghum recovered completely by 43 DA-B. Sorghum receiving ImiFlex plus Moccasin II Plus (*S*-metolachlor) PRE, followed by atrazine POST or Coyote (*S*-metolachlor/mesotrione) PRE, followed by ImiFlex and atrazine POST matured sooner than sorghum in the nontreated control, or grain sorghum treated with Coyote PRE followed by Clarity and atrazine POST. Yields from ImiFlex-treated grain sorghum were 34 to 46 bu/a greater than yields from the nontreated controls. Sorghum receiving other herbicides yielded comparably to the check. All ImiFlex treatments caused 5 to 13% sorghum injury 18 DA-B at Manhattan (Table 6); however, injury was less than 5% by 56 DA-B. Likewise, sorghum heights at Manhattan did not differ between treatments at 28 DA-B.

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Table 1. Application and plant information for the ImiFlex grain sorghum trial at Garden City, KS

Application timing	Preemergence	Postemergence
Application date	June 11, 2022	June 27, 2022
Air temperature, °F	80	70
Relative humidity, %	80	33
Soil temperature, °F	71	68
Wind speed, mph	3 to 5	5 to 10
Wind direction	South	South-southwest
Soil moisture	Good	Good
Grain sorghum		
Leaves, no.	0	4 to 5
Volunteer corn		
Height, inches	---	3 to 6
Johnsongrass		
Height, inches	---	2 to 5
Palmer amaranth		
Height, inches	---	1 to 3

Table 2. Application and plant information for ImiFlex grain sorghum trial in Manhattan, KS

Application timing	Preemergence	Postemergence
Application date	June 17, 2022	July 8, 2022
Air Temperature, °F	100	81
Relative humidity, %	51	78
Soil temperature, °F	90	83
Wind speed, mph	1 to 5	1 to 4
Wind direction	East-northeast	North-northwest
Soil moisture	Good	Fair
Grain sorghum		
Leaves, no.	---	6 to 7
Palmer amaranth		
Height, inches	---	1 to 3

Table 3. Weed control at Garden City, KS, in the Igrowth grain sorghum study

Treatment	Rate	Timing ¹	Volunteer corn		Johnsongrass	
			11 DA-B ²	52 DA-B	11 DA-B	52 DA-B
			----- % Visual -----			
ImiFlex	9.0	PRE	73	83	100	95
Moccasin II Plus	21	PRE				
Atrazine	32	POST				
Crop oil concentrate	1.0%	POST				
ImiFlex	9.0	PRE	68	83	100	93
Motif	6.0	PRE				
Atrazine	32	POST				
Crop oil concentrate	1.0%	POST				
ImiFlex	9.0	PRE	65	83	95	93
Moccasin II Plus	21	PRE				
Motif	6.0	POST				
Atrazine	1.0	POST				
Crop oil concentrate	1.0%	POST				
Moccasin II Plus	21	PRE	75	93	95	93
Motif	6.0	PRE				
ImiFlex	6.0	POST				
Atrazine	1.0	POST				
Crop oil concentrate	1.0%	POST				
Urea-ammonium nitrate	2.5%	POST				
Moccasin II Plus	21	PRE	75	93	100	90
Motif	6.0	PRE				
ImiFlex	6.0	POST				
Clarity	6.0	POST				
Atrazine	32	POST				
Nonionic surfactant	0.25%	POST				
Urea-ammonium nitrate	2.5%	POST				
Moccasin II Plus	21	PRE	0	0	0	0
Atrazine	32	PRE				
Clarity	6.0	POST				
Nonionic surfactant	0.25%	POST				
Urea-ammonium nitrate	2.5%	POST				
Coyote	64	PRE	0	0	0	0
Clarity	6.0	POST				
Atrazine	32	POST				
Nonionic surfactant	0.25%	POST				
Urea-ammonium nitrate	2.5%	POST				
LSD (0.05)			10	11	5	10

¹ PRE = preemergence. POST = postemergence.

² DA-B = days after the postemergence treatments.

Table 4. Palmer amaranth control with ImiFlex in grain sorghum, Manhattan, KS, 2022

Treatment	Rate oz/a	Timing ¹	----- % Visual -----	
			18 DA-B ²	42 DA-B
Nontreated check	---	---	---	---
Moccasin II Plus	1.33 pt	PRE	90	96
Atrazine	32	PRE		
ImiFlex	6.0	POST		
Nonionic surfactant	0.5%	POST		
Urea-ammonium nitrate	1.0%	POST		
Moccasin II Plus	1.33 pt	PRE	96	97
Atrazine	32	PRE		
Huskie	16	POST		
Nonionic surfactant	0.5%	POST		
Urea-ammonium nitrate	1.0%	POST		
Moccasin II Plus	1.33 pt	PRE	94	97
Atrazine	32	PRE		
Huskie	16	POST		
ImiFlex	6.0	POST		
Nonionic surfactant	0.5%	POST		
Urea-ammonium nitrate	1.0%	POST		
Moccasin II Plus	1.33 pt	PRE	97	99
Atrazine	32	PRE		
Huskie	16	POST		
ImiFlex	6.0	POST		
Atrazine	16	POST		
Nonionic surfactant	0.5%	POST		
Urea-ammonium nitrate	1.0%	POST		
LSD (0.05)			NS	NS

¹ PRE = preemergence. POST = postemergence.

² DA-B = days after the postemergence treatments.

Table 5. Grain sorghum response to ImiFlex at Garden City, KS, 2022

Treatment	Rate	Timing ¹	Chlorosis Epinasty		Maturity	Yield
			1 DA-B ²	11 DA-B		
	oz/a		-----% Visual -----		DAP ³	bu/a
Nontreated check	---	---	0	0	64	39.5
ImiFlex	9.0	PRE	3	1	63	85.3
Moccasin II Plus	21	PRE				
Atrazine	32	POST				
Crop oil concentrate	1.0%	POST				
ImiFlex	9.0	PRE	9	0	63	80.6
Motif	6.0	PRE				
Atrazine	32	POST				
Crop oil concentrate	1.0%	POST				
ImiFlex	9.0	PRE	5	0	62	76.9
Moccasin II Plus	21	PRE				
Motif	6.0	POST				
Atrazine	32	POST				
Crop oil concentrate	1.0%	POST				
Moccasin II Plus	21	PRE	4	0	62	73.8
Motif	6.0	PRE				
ImiFlex	6.0	POST				
Atrazine	32	POST				
Crop oil concentrate	1.0%	POST				
Urea-ammonium nitrate	2.5%	POST				
Moccasin II Plus	21	PRE	6	13	63	80.9
Motif	6.0	PRE				
ImiFlex	6.0	POST				
Clarity	6.0	POST				
Atrazine	32	POST				
Nonionic surfactant	0.25%	POST				
Urea-ammonium nitrate	2.5%	POST				
Moccasin II Plus	21	PRE	0	10	63	48.4
Atrazine	32	PRE				
Clarity	6.0	POST				
Nonionic surfactant	0.25%	POST				
Urea-ammonium nitrate	2.5%	POST				
Coyote	64	PRE	8	6	64	38.9
Clarity	6.0	POST				
Atrazine	32	POST				
Nonionic surfactant	0.25%	POST				
Urea-ammonium nitrate	2.5%	POST				
LSD (0.05)			5	3	1.5	13.8

¹ PRE = preemergence. POST = postemergence.

² DA-B = days after the postemergence treatments.

³ DAP = days after planting.

Table 6. Grain sorghum response to ImiFlex at Manhattan KS, 2022

Treatment	Rate oz/a	Timing ¹	Injury		Height
			18 DA-B ²	56 DA-B	28 DA-B
			-----% Visual -----		inches
Nontreated check	---	---	0	0	29
Moccasin II Plus	1.33 pt	PRE	10	1	31
Atrazine	32	PRE			
ImiFlex	6.0	POST			
Nonionic surfactant	0.5%	POST			
Urea-ammonium nitrate	1.0%	POST			
Moccasin II Plus	1.33 pt	PRE	10	3	32
Atrazine	32	PRE			
Huskie	16	POST			
Nonionic surfactant	0.5%	POST			
Urea-ammonium nitrate	1.0%	POST			
Moccasin II Plus	1.33 pt	PRE	5	4	32
Atrazine	32	PRE			
Huskie	16	POST			
ImiFlex	6.0	POST			
Nonionic surfactant	0.5%	POST			
Urea-ammonium nitrate	1.0%	POST			
Moccasin II Plus	1.33 pt	PRE	13	4	31
Atrazine	32	PRE			
Huskie	16	POST			
ImiFlex	6.0	POST			
Atrazine	16	POST			
Nonionic surfactant	0.5%	POST			
Urea-ammonium nitrate	1.0%	POST			
LSD (0.05)			NS	NS	NS

¹ PRE = preemergence. POST = postemergence.

² DA-B = days after the postemergence treatments.