

Comparison of Preemergence Herbicides for Residual Weed Control in Grain Sorghum

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Summary

Herbicides were studied to determine preemergence efficacy in grain sorghum. Velvetleaf and quinoa control did not differ between herbicides late in the season, and no treatment controlled puncturevine more than 81%. The three-way mixture of Callisto, atrazine, and Dual Magnum controlled Palmer amaranth and green foxtail as well as or better than any herbicide tested, whereas most herbicides controlled kochia 88% or more. Compared to the nontreated controls, all herbicides increased sorghum yield 46–146% except Callisto alone at 6 oz/a.

Introduction

Early season weed control in grain sorghum is essential to preserve crop yield. With limited choices for postemergence weed control, especially grass control, an effective preemergence herbicide is vital to allow the sorghum time to emerge and become competitive. The objective of this study was to compare various herbicides for preemergence efficacy in grain sorghum.

Experimental Procedures

An experiment conducted at the Kansas State University Southwest Research-Extension Center near Garden City, KS, evaluated various preemergence herbicide treatments for residual efficacy in grain sorghum. All herbicides were applied the day after sorghum planting using a tractor-mounted, compressed CO₂ sprayer delivering 19.4 GPA at 30 psi and 4.2 mph. Application and environmental information is shown in Table 1. To supplement natural weed populations, the experimental area was overseeded with quinoa to simulate common lambsquarters. Plots were 10 × 35 feet and arranged in a randomized complete block replicated four times. Soil was Ulysses silt loam with pH 7.9 and 3.4% organic matter. Visual weed control was determined on June 27 and August 15, 2018, which corresponded to 33 and 82 days after treatment (DAT). Sorghum yields were determined October 29, 2018, by mechanically harvesting the center two rows of each plot and adjusting grain weights to 14.0% moisture.

Results and Discussion

Velvetleaf control was 95–100% and 88–100% at 33 and 82 DAT, respectively, and did not differ among herbicides (data not shown). Bicep Lite II Magnum (*S*-metolachlor/atrazine) at 1.5 qt/a and Warrant (acetochlor) at 2.0 qt/a controlled quinoa 93 and 88% at 33 DAT, which was slightly less than herbicides that provided 100% control

(data not shown). However, by 82 DAT, quinoa control did not differ between treatments. Palmer amaranth at 33 DAT was more than 88% controlled with Degree Xtra (acetochlor/atrazine), Halex GT (*S*-metolachlor/mesotrione/glyphosate) plus atrazine, and Callisto (mesotrione) plus atrazine plus Dual Magnum (*S*-metolachlor) (Table 2). By 82 DAT, only Halex GT plus atrazine and Callisto plus atrazine and Dual Magnum controlled Palmer amaranth 85% or more. These three-way mixes, along with Verdict (saflufenacil/dimethenamid) plus Outlook (dimethenamid) generally provided the best puncturevine control at 33 and 82 DAT. However, puncturevine control did not exceed 81% with any treatment by 82 DAT. Warrant alone was the only treatment to provided less than 93% kochia control at 33 DAT. At 82 DAT, kochia control was 88% or more with all herbicides except Warrant, Dual Magnum, Stalwart C (metolachlor), and Callisto, each applied alone. Green foxtail control was less than 80% with atrazine alone, Callisto alone, and the tank mixture of Callisto and atrazine early in the season. Foxtail control declined by 82 DAT such that only Verdict plus Outlook and Callisto plus atrazine plus Dual Magnum were the only herbicides to provide 80% or more control. All herbicides except Callisto alone increased sorghum yield compared to the nontreated controls (Table 3). Yields were improved the most when Degree Xtra, Callisto plus atrazine plus Dual Magnum, and Halex GT plus atrazine were applied.

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned. Persons using such products assume responsibility for their use in accordance with current label directions of the manufacturer.

Table 1. Application information

Application date	May 25, 2018
Air temperature (°F)	72
Relative humidity (%)	67
Soil temperature (°F)	67
Wind speed (mph)	2 to 5
Wind direction	Southeast
Soil moisture	Good

Table 2. Preemergence herbicides efficacy in sorghum

Treatment	Rate per acre	Palmer amaranth		Puncturevine		Kochia		Green foxtail	
		33 DAT ^a	82 DAT	33 DAT	82 DAT	33 DAT	82 DAT	33 DAT	82 DAT
		----- % Visual -----							
Atrazine	1.0 qt	68	45	60	45	100	88	65	58
Bicep II Magnum	1.6 qt	83	75	70	63	98	95	80	75
Bicep Lite II Magnum	1.5 qt	80	70	75	55	95	95	80	73
Degree Xtra	2.25 qt	88	80	73	68	99	88	83	75
Dual Magnum	1.5 pt	75	78	70	53	93	78	80	70
Stalwart C	1.47 pt	70	60	63	50	93	80	85	68
Warrant	2.0 qt	70	60	65	58	85	80	80	65
Verdict	10 oz	80	78	83	73	100	91	90	88
Outlook	10 oz								
Callisto	6.0 oz	70	60	63	58	100	75	65	55
Callisto	6.0 oz	83	73	85	60	100	98	74	68
Atrazine	1.0 qt								
Callisto	6.0 oz	96	96	88	80	100	99	80	80
Atrazine	1.0 qt								
Dual Magnum	1.5 pt								
Halex GT	6.0 pt	93	85	84	81	100	98	84	79
Nonionic surfactant	0.25%								
Atrazine	1.0 qt								
LSD (0.05)		12	12	7	10	9	12	10	8

^aDAT is days after herbicide treatment.

Table 3. Sorghum yield following preemergence herbicide application

Treatment	Rate	Sorghum yield
	per acre	bu/a
Atrazine	1.0 qt	56.5
Bicep II Magnum	1.6 qt	72.7
Bicep Lite II Magnum	1.5 qt	69.1
Degree Xtra	2.25 qt	86.6
Dual Magnum	1.5 pt	70.3
Stalwart C	1.47 pt	55.5
Warrant	2.0 qt	56.4
Verdict	10 oz	76.3
Outlook	10 oz	
Callisto	6.0 oz	51.8
Callisto	6.0 oz	73.0
Atrazine	1.0 qt	
Callisto	6.0 oz	93.2
Atrazine	1.0 qt	
Dual Magnum	1.5 pt	
Halex GT	6.0 pt	78.8
Nonionic surfactant	0.25 %	
Atrazine	1.0 qt	
Untreated	---	37.9
LSD (0.05)		14.8

**Figure 1. Untreated control.**



Figure 2. Bicep II Magnum 1.6 qt/a applied preemergence, picture taken 42 days after application.



Figure 3. Degree Xtra 2.25 qt/a applied preemergence, picture taken 42 days after application.



Figure 4. Callisto 6.0 oz/a plus atrazine 1.0 qt/a plus Dual Magnum 1.5 pt/a applied pre-emergence, picture taken 42 days after application.



Figure 5. Halex GT 3.6 pt/a plus atrazine 1.0 qt/a applied preemergence, picture taken 42 days after application.