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Split Applications of Coyote and Lumax for Efficacy in Grain Sorghum

R.S. Currie and P.W. Geier

Summary

In an effort to determine the efficacy of herbicide application timing in sorghum, full herbicide rates were applied 14 days preplant, and compared with split applications of half rates applied at two timings. Generally, weed control was best when half of the labeled rates were applied 14 days preplant followed by the other half preemergence, compared to full rates applied 14 days preplant. However, control of velvetleaf and common sunflower was excellent (95% or more) regardless of when the treatments were applied. Grain sorghum yields were similar among all herbicide treatments, and each treatment increased yield from 2 to 2.5-fold relative to the nontreated controls.

Introduction

Applying preemergence herbicides prior to planting a crop may have several benefits. These applications may be done at a time when fieldwork is not as busy. Preemergence herbicides could also be mixed with burndown herbicides to control emerged weeds thus saving time and equipment costs. However, all preemergence herbicides have a limited persistence in the soil, and this length of weed control begins as soon as they are applied. The objective of this study was to compare full herbicide rates applied 14 days preplant to split applications of half rates applied at two timings, for efficacy in sorghum.

Experimental Procedures

An experiment was conducted at the Kansas State University Southwest Research-Extension Center near Garden City, KS, to compare single and sequential applications of mesotrione-based herbicides in grain sorghum. Treatments were applied at full rates 14 days preplant (DPP), or as split applications with half the rate applied 14 DPP and the other half applied preemergence (PRE). All treatments were applied using a tractor-mounted, compressed CO_2 sprayer delivering 19.4 GPA at 4.2 mph and 30 psi. Application and environmental information are shown in Table 1. Natural weed populations were supplemented by overseeding the experimental area with domesticated sunflower to simulate common sunflower. Plots were 10 × 35 feet and arranged in a randomized complete block with four replications. Soil was a Ulysses silt loam with pH 7.9 and 3.4% organic matter. Visual weed control was estimated on July 12 and August 13, 2018. These dates were 41 and 73 days after sorghum planting (DAP). Sorghum yields were determined on October 29, 2018, by mechanically harvesting the center two rows of each plot and adjusting grain weights to 14.0% moisture.

Results and Discussion

All herbicides controlled velvetleaf and common sunflower similarly (95% or more) at 41 and 73 DAT, and did not differ between treatments (data not shown). Palmer amaranth control at 41 DAP was greater than 95% when the split application of Coyote (*S*-metolachlor/mesotrione) plus atrazine was applied 14 DPP and PRE, and when the full rate of Lumax (*S*-metolachlor/mesotrione/atrazine) was applied PRE (Table 2). The split application of Coyote plus atrazine was more efficacious at this date than the full rate applied PRE. By 73 DAP, the split application of the three-way premix Lumax controlled Palmer amaranth better than any of the 14 DPP treatments alone. The split application of Lumax controlled kochia better than the single preplant application of the same herbicide at 41 and 73 DAP, while no differences occurred between the single and split applications of Coyote plus atrazine. Both herbicide combinations evaluated in this study controlled puncturevine more effectively when applied as split applications compared to single applications. Although differences between herbicides and application timings were not significant for green foxtail control at 41 DAP, the split application of Lumax provided better foxtail control than either single application at 73 DAP. Grain sorghum yields were similar among the herbicides evaluated, but all herbicides increased yields 40 to 51 bu/a compared to the nontreated controls (data not shown).

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Table 1. Application information

Application timing	14 days preplant	Preemergence
Application date	May 18, 2018	June 5, 2018
Air temperature (°F)	66	67
Relative humidity (%)	74	68
Soil temperature (°F)	67	69
Wind speed (mph)	4 to 6	5 to 8
Wind direction	South-southeast	South
Soil moisture	Fair	Good

Table 2. Efficacy of Coyote and Lumax application timings in sorghum

			Palmer amaranth		Kochia		Puncturevine		Green foxtail	
Treatment	Rate	Timing[a]	37 DAP[b]	69 DAP	37 DAP	69 DAP	37 DAP	69 DAP	37 DAP	69 DAP
	qt/a									
Coyote	2.0	14 DPP	86	81	88	78	63	48	81	73
Atrazine	0.65	14 DPP								
Coyote	1.0	14 DPP	98	89	95	85	78	68	88	78
Atrazine	0.325	14 DPP								
Coyote	1.0	PRE								
Atrazine	0.325	PRE								
Lumax	2.5	14 DPP	96	86	85	78	65	55	88	75
Lumax	1.25	14 DPP	94	95	96	90	73	75	78	85
Lumax	1.25	PRE								
LSD (0.05)			8	8	9	8	7	13	NS	8

[a]14 DPP = 14 days preplant. PRE = preemergence.
[b]DAP = days after sorghum planting.

Figure 1. Untreated control.

Figure 2. Coyote 2.0 qt/a plus atrazine 0.65 qt/a applied 14 days preplant, picture taken 49 days after preplant application.

Figure 3. Coyote 1.0 qt/a plus atrazine 0.325 qt/a applied 14 days preplant followed by Coyote 1.0 qt/a plus atrazine 0.325 qt/a applied preemergence, picture taken 35 days after preemergence treatment.

Figure 4. Lumax 2.5 qt/a applied 14 days preplant, picture taken 49 days after preplant application

Figure 5. Lumax 1.25 qt/a applied 14 days preplant followed by Lumax 1.25 qt/a applied preemergence, picture taken 35 days after preemergence treatment.