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2022 WESTERN KANSAS AGRICULTURAL RESEARCH

Single and Split Herbicide Applications for Efficacy in Corn

R.S. Currie and P.W. Geier

Summary

The objective of this study was to compare season-long weed control from single and sequential herbicide applications in corn. Control of all weed species was generally good (90% or more) early in the season regardless of preemergence (PRE) herbicide. However, Russian thistle and Palmer amaranth control was best later in the season when a PRE herbicide was followed by a postemergence (POST) treatment. While all herbicide treatments increased yields compared to the untreated control, yields were greatest when Lumax EZ PRE (atrazine/mesotrione/metolachlor) was followed by Acuron (atrazine/ bicyclopyrone/mesotrione/metolachlor) and glyphosate POST.

Introduction

Early season weed control is important to reduce competition during crop establishment. Typically, this is accomplished with burndown herbicides or tillage prior to planting and application of residual herbicides near planting time. Delaying a portion of the residual herbicide until after the crop emerges can extend the weed-free period later into the growing season. The objective of this study was to compare single application preemergence herbicides with split applications for season-long efficacy in corn.

Experimental Procedures

An experiment was conducted to compare residual herbicides applied in single or split applications for efficacy in corn. All herbicides were applied using a tractor-mounted, compressed CO_2 sprayer delivering 19.4 gpa at 30 psi and 4.1 mph. 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 7.5. Visual weed control estimates were determined on May 28 and July 19, 2021. These dates were 28 days after the preemergence treatments (28 DA-A), and 46 days after the postemergence treatments (46 DA-B), respectively. Corn chlorosis was evaluated on June 6 and June 18, 2021, which was 3 and 15 days after the postemergence treatments (DA-B). Yields were determined on October 5, 2021, by mechanically harvesting the center two rows of each plot and adjusting grain weights to 15.5% moisture.

Results and Discussion

Sunflower control was 90% or more regardless of herbicide or application timing, and did not differ (data not shown). Kochia and Russian thistle control were similar among all preemergence (PRE) herbicide treatments at 26 DA-A (Table 2). By 46 DA-B,

control of each of these weed species was complete with all PRE followed by postemergence (POST) herbicides. Similarly, Palmer amaranth control with all sequential treatments was 95 to 98% at 46 DA-B. Although minor corn chlorosis was evident with most POST herbicides at 3 DA-B, visual injury did not persist (Table 3). All herbicides increased grain yields 71 to 104 bu/a compared to the untreated control. Lumax EZ PRE followed by Acuron plus glyphosate resulted in the highest yields, and was better than any herbicide treatment applied PRE alone.

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Table 1. Application, environmental, and weed data for the single and split application study

Application timing	Preemergence	Postemergence
Application date	April 30, 2021	June 3, 2021
Air temperature (°F)	63	86
Relative humidity	37	32
Soil temperature (°F)	52	70
Wind speed (mph)	2 to 5	0 to 2
Wind direction	West	South
Soil moisture	Good	Good
Corn		
Height (inches)	---	6 to 9
Leaves (no.)	0	3 to 4
Kochia		
Height (inches)	---	1 to 2
Density (plants/ft^2)	0	0.5
Russian thistle		
Height (inches)	---	1 to 3
Density (plants/ft^2)	0	1
Palmer amaranth		
Height (inches)	---	1 to 3
Density (plants/ft^2)	0	1
Common sunflower		
Height (inches)	---	3 to 5
Density (plants/ft^2)	0	0.5

Table 2. Weed control with single and split herbicide applications in corn

			Kochia		Russian thistle		Palmer amaranth	
Treatment[1]	**Rate**	**Timing[2]**	**28 DA-A[3]**	**46 DA-B[3]**	**28 DA-A**	**46 DA-B**	**28 DA-A**	**46 DA-B**
	qt/a		% Visual					
Lumax EZ	2.7	PRE	100	85	96	80	100	75
Acuron	3.0	PRE	100	100	100	90	100	85
Atrazine	0.5	PRE						
Lumax EZ	1.35	PRE	100	100	98	100	98	96
Acuron	1.5	POST						
Glyphosate	0.84	POST						
AMS	1%	POST						
Bicep Lite II Magnum	1.5	PRE	100	100	90	100	93	98
Halex GT	1.8	POST						
Atrazine	0.5	POST						
Glyphosate	0.84	POST						
NIS	0.25%	POST						
AMS	1%	POST						
Bicep Lite II Magnum	1.1	PRE	99	100	90	100	85	95
Bicep Lite II Magnum	1.5	POST						
Glyphosate	0.84	POST						
AMS	1%	POST						
Acuron	1.5	PRE	98	100	98	100	98	96
Acuron	1.5	POST						
Glyphosate	0.84	POST						
AMS	1%	POST						
Resicore	1.25	PRE	96	100	93	100	95	98
Resicore	1.25	POST						
Glyphosate	0.84	POST						
AMS	1%	POST						
LSD (0.05)			NS	6	NS	5	7	7

[1] AMS = ammonium sulfate. NIS = nonionic surfactant.
[2] PRE = preemergence. POST = postemergence.
[3] 28 DA-A = 28 days after the preemergence applications. 46 DA-B = 46 days after the postemergence treatments.

Table 3. Crop response to the single and split herbicide applications in corn

			Chlorosis		
Treatment[1]	**Rate**	**Timing[2]**	**3 DA-B[3]**	**15 DA-B[3]**	**Yield**
	qt/a		---------- % Visual ----------		bu/a
Nontreated control			0	0	6.8
Lumax EZ	2.7	PRE	0	0	78.1
Acuron	3.0	PRE	0	0	91.1
Atrazine	0.5	PRE			
Lumax EZ	1.35	PRE	4	0	111.6
Acuron	1.5	POST			
Glyphosate	0.84	POST			
AMS	1%	POST			
Bicep Lite II Magnum	1.5	PRE	4	0	98.6
Halex GT	1.8	POST			
Atrazine	0.5	POST			
Glyphosate	0.84	POST			
NIS	0.25%	POST			
AMS	1%	POST			
Bicep Lite II Magnum	1.1	PRE	8	0	102.3
Bicep Lite II Magnum	1.5	POST			
Glyphosate	0.84	POST			
AMS	1%	POST			
Acuron	1.5	PRE	5	0	96.2
Acuron	1.5	POST			
Glyphosate	0.84	POST			
AMS	1%	POST			
Resicore	1.25	PRE	1	0	96.8
Resicore	1.25	POST			
Glyphosate	0.84	POST			
AMS	1%	POST			
LSD (0.05)			3	NS	20.4

[1] AMS = ammonium sulfate. NIS = nonionic surfactant.
[2] PRE = preemergence. POST = postemergence.
[3] DA-B = days after the postemergence treatments.

Figure 1. Untreated control.

Figure 2. Lumax EZ 2.7 qt/a applied preemergence. Photo taken 61 days after preemergence application.

Figure 3. Acuron 3.0 qt/a plus atrazine 0.5 qt/a applied preemergence. Photo taken 61 days after preemergence application.

Figure 4. Acuron 1.5 qt/a applied preemergence followed by Acuron 1.5 qt/a plus glyphosate 0.84 qt/a postemergence. Photo taken 27 days after postemergence application.

Figure 5. Resicore 1.25 qt/a applied preemergence followed by Resicore 1.25 qt/a plus glyphosate 0.84 qt/a postemergence. Photo taken 27 days after postemergence application.