Single and Split Applications for Herbicide Efficacy in Corn

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Summary

This study investigated the use of residual herbicides as single or sequential applications for efficacy in corn. All preemergence (PRE) herbicides provided good control of Palmer amaranth and green foxtail early in the season. Storen plus atrazine PRE and all PRE followed by postemergence (POST) treatments controlled Palmer amaranth best later in the season. Lumax EZ plus atrazine and Zidua SC plus Callisto PRE were the only treatments to provide less than 90% green foxtail control later in the year. Late-season Johnsongrass control was best with sequential applications of Acuron or Storen (90 to 96%).

Introduction

The use of residual herbicides early during crop establishment is an important component for preserving yield later in the season. If part of that residual herbicide can be applied later with a planned POST application, the weed-free period can be extended, allowing the crop to become established and better compete for resources. The objective of this trial was to compare single and sequential applications of residual herbicides for efficacy and crop yield in corn.

Experimental Procedures

An experiment compared the use of residual herbicides as either a single or as sequential applications for weed control in corn. 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 plant information is shown in Table 1. Plots were 10 by 35 ft and arranged in a randomized complete block design replicated four times. Soil was Beeler silt loam having 2.4% organic matter, pH of 7.5, and CEC of 17.8. Visual weed control was determined on May 29 and July 10, 2023. These dates were 24 days after the preemergence applications (24 DAA) and 42 days after the POST applications (42 DAB), respectively. Corn yields were determined on October 9, 2023, by mechanically harvesting the center two rows of each plot and adjusting grain moistures to 15.5%.

Results and Discussion

All herbicides provided excellent control of kochia and Russian thistle regardless of evaluation date (data not shown). Likewise, all PRE herbicides controlled Palmer amaranth and green foxtail 98% or more at 24 DAA (Table 2). By 42 DAB, Lumax EZ, Acuron, or Storen applied as sequential treatments controlled Palmer amaranth 90 to

96%, whereas the PRE treatments of Storen or Acuron provided 85% to 89% control. Only Lumax EZ plus atrazine PRE and Zidua SC plus Callisto PRE provided less than 90% green foxtail control at 42 DAB. Johnsongrass control ranged from 70% to 88% at 24 DAA. By 42 DAB, sequential applications of Acuron or Storen were the only treatments to control johnsongrass by as much as 90%. Of the PRE-only treatments, Storen plus atrazine and Zidua SC plus atrazine were more effective on Johnsongrass late in the season than the other treatments. All herbicide-treated corn yielded more grain than nontreated corn. However, corn receiving sequential applications of Lumax EZ, Acuron, or Storen produced the highest yields.

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Table 1. Application, environmental, and plant information in the single and split application study in corn

Application timing	Preemergence	Postemergence
Application date	May 5, 2023	May 29, 2023
Air temperature (F)	62	67
Relative humidity (%)	86	75
Soil temperature (F)	60	62
Wind speed (mph)	4 to 7	3 to 6
Wind direction	East-southeast	South
Soil moisture	Good	Good
Corn		
Height (inches)	---	5 to 7
Leaves (no.)	0	2 to 3
Russian-thistle		
Height (inches)	---	1 to 4
Density (plants/ft^2)	0	0.1
Palmer amaranth		
Height (inches)	---	0.25 to 1
Density (plants/ft^2)	0	0.2
Johnsongrass		
Height (inches)	---	1 to 3
Density (plants/ft^2)	0	0.5
Kochia		
Height (inches)	---	0.5 to 2
Density (plants/ft^2)	0	0.1
Green foxtail		
Height (inches)	---	0.5 to 1
Density (plants/ft^2)	0	0.1

Table 2. Weed control and grain yield in the single and split application study in corn

Treatment	Rate	Timing[1]	Palmer amaranth		Green foxtail		Johnsongrass		Corn yield
			24 DAA[2]	42 DAB[2]	24 DAA	42 DAB	24 DAA	42 DAB	
	qt/a		% Visual						bu/a
Untreated	---	---	---	---	---	---	---	---	23.1
Lumax EZ	2.7	PRE	100	73	100	83	75	58	55.4
Atrazine	0.5	PRE							
Acuron	3.0	PRE	100	85	100	98	78	60	70.8
Atrazine	0.5	PRE							
Storen	2.1	PRE	100	89	100	90	85	80	85.6
Atrazine	1.25	PRE							
Lumax EZ	1.35	PRE	100	90	100	100	70	88	113.8
Atrazine	0.25	PRE							
Lumax EZ	1.35	POST							
Atrazine	0.25	POST							
Glyphosate	25 oz	POST							
Ammonium sulfate	2.5 %	POST							
Acuron	1.5	PRE	100	93	98	100	75	90	122.5
Atrazine	0.25	PRE							
Acuron	1.5	POST							
Atrazine	0.25	POST							
Glyphosate	25 oz	POST							
Ammonium sulfate	2.5 %	POST							
Storen	1.05	PRE	100	96	100	100	80	96	138.2
Atrazine	0.63	PRE							
Storen	1.05	POST							
Atrazine	0.63	POST							
Glyphosate	25 oz	POST							
Ammonium sulfate	2.5 %	POST							
Zidua SC	3.5 oz	PRE	98	75	98	83	88	73	105.6
Atrazine	1.25	PRE							
Degree Xtra	3.0	PRE	100	80	100	90	78	55	75.2
Callisto	5.0 oz	PRE							
Bicep Lite II Magnum	1.67	PRE	100	65	100	95	78	55	53.3
Callisto	5.0 oz	PRE							
LSD (0.05)			NS	6	NS	12	10	9	27.9

[1] PRE = preemergence. POST = postemergence.
[2] DAA = days after the preemergence application. DAB is days after the postemergence application.