

Residual Herbicides as Single and Sequential Treatments for Efficacy in Corn

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Summary

This research investigated the use of sequential applications of residual herbicides for the weed-free period in corn. The objective of the study was to compare residual herbicides as either preemergence (PRE) alone or split applications (PRE followed by postemergence). All treatments controlled Palmer amaranth, common lambsquarters, Russian thistle, and green foxtail 90% or more, and kochia 95% or more. Johnsongrass control early in the season was 91% or more regardless of treatment. However, no herbicide controlled johnsongrass as much as 80% late in the year.

Introduction

Weed free conditions during crop establishment are important to minimize competition. This is most often accomplished by applying a residual herbicide close to planting time. Delaying a portion of the residual herbicide to be applied as a postemergence (POST) treatment can increase the period of weed-free conditions and aid in controlling herbicide-resistant weeds. The objective of this study was to compare single herbicide applications and split applications for season-long efficacy in corn.

Experimental Procedures

An experiment compared residual herbicides applied preemergence or as split applications for season-long weed control in corn. Herbicides were applied using a tractor-mounted, compressed-CO₂ sprayer delivering 19.4 gpa at 30 psi and 4.1 mph. Application dates, environmental, and plant information are given in Table 1. Plots size was 10 by 35 feet, and the study was arranged as a randomized complete block replicated four times. Soil was a Beeler silt loam containing 2.4% organic matter, pH of 7.5, and CEC of 17.8. Visual weed control ratings were taken June 3 and July 27, 2022. These dates were 16 and 70 days after the postemergence treatments (DA-B), respectively.

Results and Discussion

Control of Palmer amaranth, common lambsquarters, Russian thistle, and green foxtail was 90% or more with all treatments at 16 and 70 DA-B and did not differ between herbicides (data not shown). All herbicides controlled kochia 95% or more at each rating date (Table 2). Johnsongrass control early in the season was 96% or more when Acuron GT (*S*-metolachlor/glyphosate/mesotrione/bicyclopyrone) or Acuron (*S*-metolachlor/atrazine/mesotrione/bicyclopyrone) were applied POST or when Resicore (acetochlor/clopyralid/mesotrione) was applied sequentially. However, johnsongrass control did not exceed 78% with any treatment late in the season.

Acknowledgments

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Table 1. Application, environmental, and plant information for the single and sequential herbicides in corn

Application timing	Preemergence	Postemergence
Application date	April 28, 2022	May 18, 2022
Air temperature, °F	65	67
Relative humidity, %	78	57
Soil temperature, °F	56	64
Wind speed, mph	3 to 6	0 to 3
Wind direction	Southwest	North
Soil moisture	Good	Good
Corn		
Height, inches	---	3 to 5
Leaves, no.	0	1 to 2
Kochia		
Height, inches	---	1 to 3
Density, plants/ft ²	0	0.2
Russian thistle		
Height, inches	---	1 to 4
Density, plants/ft ²	0	0.2
Palmer amaranth		
Height, inches	---	0.5 to 1.5
Density, plants/ft ²	0	0.2
Common lambsquarters		
Height, inches	---	0.5 to 2
Density, plants/ft ²	0	0.1
Green foxtail		
Height, inches	---	1 to 2
Density, plants/ft ²	0	0.1
Johnsongrass		
Height, inches	---	0.5 to 1.5
Density, plants/ft ²	0	0.2

Table 2. Weed control in the single and sequential herbicide study in corn

Treatment	Rate	Timing ¹	Kochia		Johnsongrass	
			16 DA-B ²	70 DA-B	16 DA-B	70 DA-B
			----- % Visual -----			
Lumax EZ	2.7	PRE	99	98	93	58
Atrazine	0.5	PRE				
Acuron	3.0	PRE	100	100	91	63
Atrazine	0.5	PRE				
Lumax EZ	1.35	PRE	100	100	100	78
Atrazine	0.5	PRE				
Acuron GT	3.75 pt	POST				
Atrazine	0.5	POST				
Nonionic surfactant	0.5%	POST				
Ammonium sulfate	2.0%	POST				
Bicep Lite II	1.5	PRE	100	100	100	73
Magnum	3.75 pt	POST				
Acuron GT	0.5	POST				
Atrazine	0.5%	POST				
Nonionic surfactant	2.0%	POST				
Ammonium sulfate						
Lumax EZ	2.25	PRE	100	99	100	75
Atrazine	0.5	PRE				
Acuron GT	3.75 pt	POST				
Atrazine	0.5	POST				
Nonionic surfactant	0.5%	POST				
Ammonium sulfate	2.0%	POST				
Acuron	1.5	PRE	100	100	99	75
Atrazine	0.38	PRE				
Acuron	1.5	POST				
Atrazine	0.38	POST				
Glyphosate	27 oz	POST				
Ammonium sulfate	2.0%	POST				
Resicore	1.5	PRE	100	100	96	48
Resicore	1.5	POST				
Glyphosate	27 oz	POST				
Ammonium sulfate	2.0%	POST				
Verdict	14 oz	PRE	96	95	91	45
Status	5.0 oz	POST				
Glyphosate	27 oz	POST				
Nonionic surfactant	0.5%	POST				
Ammonium sulfate	2.0%	POST				
Harness Xtra 5.6	2.3	PRE	100	100	91	40
Diflexx Duo	24 oz	POST				
Glyphosate	27 oz	POST				
Crop oil concentrate	1.0%	POST				
Urea ammonium nitrate	2.0%	POST				
LSD (0.05)			2	NS	5	9

¹ PRE = preemergence, POST = postemergence.

² DA-B = days after the postemergence treatment.



Figure 1. Untreated control.



Figure 2. Lumax EZ 2.7 qt/a plus atrazine 0.5 qt/a applied preemergence. Photo taken 83 days after the preemergence application.



Figure 3. Acuron 3.0 qt/a plus atrazine 0.5 qt/a applied preemergence. Photo taken 83 days after the preemergence application.



Figure 4. Lumax EZ 1.35 qt/a plus atrazine 0.5 qt/a applied preemergence followed by Acuron GT 3.75 pt/a plus atrazine 0.5 qt/a applied postemergence. Photo taken 63 days after the postemergence application.



Figure 5. Resicore 1.5 qt/a applied preemergence followed by Resicore 1.5 qt/a plus glyphosate 27 oz/a applied postemergence. Photo taken 63 days after the postemergence application.