Glufosinate Products and Timings for Efficacy in Corn

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Summary

This study compared several glufosinate-containing herbicides for efficacy in Enlist corn. Treatments were applied at several application timings, including preemergence (PRE), early postemergence (EPOST), postemergence (POST), and late postemergence (LPOST). All herbicides controlled velvetleaf, Venice mallow, and Russian thistle well late in the season. Atrazine PRE followed by Surmise 5, Zalo plus S-metolachlor EPOST, and Zalo EPOST followed by Zalo POST were less effective on Palmer amaranth and kochia than other herbicides by season's end. For green foxtail, only Zalo plus S-metolachlor EPOST and the atrazine followed by Surmise treatments provided less than 95% control.

Introduction

Several new products are coming onto the market that contain glufosinate, a nonselective herbicide that can be used in glufosinate-resistant corn. Zalo combines glufosinate with quizalofop, a grass herbicide that can be sprayed in corn containing the Enlist trait. Liberty Ultra is a new formulation of glufosinate that contains a greater concentration of the herbicidally active isomer per gallon, allowing for a 25% reduction in the amount of product used. This study was conducted to compare several glufosinate-based herbicides at various timings for efficacy in corn.

Experimental Procedures

An experiment compared several glufosinate-containing products (Zalo, Liberty Ultra, and Surmise 5) at several application timings 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 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 Ulysses silt loam having 2.7% organic matter, pH of 7.9, and cation exchange capacity (CEC)of 28.4. Visual weed control was determined on June 12 and July 8, 2024. These dates were 1 day after the POST (C) treatments (1 DAC) and 14 days after the LPOST (D) treatments (14 DAD), respectively.

Results and Discussion

Generally, atrazine applied PRE followed by Surmise 5 and Callisto LPOST was the least effective herbicide on the weed species tested, especially early in the season (Tables 2 and 3). All other treatments provided good control of Palmer amaranth, Russian thistle, velvetleaf, and Venice mallow at 1 DAC. Surtain applied PRE followed by Liberty Ultra and Status was less effective on green foxtail (85%) than S-metolachlor

PRE followed by Zalo plus S-metolachlor EPOST (100%) at 1 DAC. Zalo applied PRE, EPOST, and/or POST provided the best kochia control early in the season. By 14 DAD, no differences between herbicides were observed for velvetleaf, Venice mallow, or Russian thistle. Kochia and Palmer amaranth control at 14 DAD was best (89% to 100%) when S-metolachlor PRE was followed by Zalo EPOST, or when Surtain, Resicore, or Storen were applied PRE. Green foxtail control was 95% or more late in the season with all herbicides except Zalo plus S-metolachlor EPOST or Atrazine PRE followed by Surmise 5 LPOST.

Acknowledgments

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Table 1. Application, environmental, and plant information for the glufosinate corn trial

Application timing	Preemergence	Early POST[1]	Post-emergence	Late POST
Application date	May 3, 2024	June 4, 2024	June 11, 2024	June 24, 2024
Air temperature (F)	61	72	82	71
Relative humidity (%)	53	100	53	76
Soil temperature (F)	60	70	70	75
Wind speed (mph)	6 to 10	2 to 5	3 to 7	1 to 4
Wind direction	Southeast	East	Southwest	South
Soil moisture	Dry	Wet	Good	Fair
Corn				
Height (in.)	---	4 to 7	8 to 12	16 to 28
Leaves (no.)	0	3 to 4	4 to 5	6 to 7
Kochia				
Height (in.)	---	1 to 4	2 to 6	2 to 6
Density (plants/ft^2)	0	2.5	1.5	1.5
Velvetleaf				
Height (in.)	---	1 to 3	4 to 7	---
Density (plants/ft^2)	0	0.3	0.1	0
Russian thistle				
Height (in.)	---	2 to 5	3 to 6	1 to 2
Density (plants/ft^2)	0	0.3	0.1	0.1
Venice mallow				
Height (in.)	---	1 to 3	---	---
Density (plants/ft^2)	0	0.2	0	0
Palmer amaranth				
Height (in.)	---	0.5 to 2	1 to 3	1 to 3
Density (plants/ft^2)	0	1	0.1	0.1
Green foxtail				
Height (in.)	---	0.5 to 2	1 to 4	1 to 5
Density (plants/ft^2)	0	1	1	0.1

[1] POST is postemergence.

Table 2. Efficacy of glufosinate products on kochia, velvetleaf, and Venice mallow in corn

			Kochia		Velvetleaf		Venice mallow	
Treatment[1]	**Rate**	**Timing[2]**	**1 DAC[3]**	**14 DAD[3]**	**1 DAC**	**14 DAD**	**1 DAC**	**14 DAD**
	oz/a		% Visual					
Zalo	32	EPOST	86	84	100	100	95	100
COC	1.0%	EPOST						
AMS	3 lb	EPOST						
Zalo	32	POST						
COC	1.0%	POST						
AMS	3 lb	POST						
Zalo	32	EPOST	91	80	100	100	98	100
S-metolachlor	21	EPOST						
COC	1.0%	EPOST						
AMS	3 lb	EPOST						
S-metolachlor	21	PRE	95	89	100	100	100	100
Zalo	32	EPOST						
S-metolachlor	21	EPOST						
COC	1.0%	EPOST						
AMS	3 lb	EPOST						
Surtain	14	PRE	80	89	100	100	100	100
Liberty Ultra	24	LPOST						
Status	5.0	LPOST						
AMS	0.1 lb	LPOST						
Atrazine	32	PRE	43	78	45	100	73	98
Surmise 5	16.4	LPOST						
Callisto	3.0	LPOST						
AMS	0.1 lb	LPOST						
Resicore	80	PRE	75	90	100	100	100	100
Enlist Duo	76	LPOST						
Zidua SC	3.0	LPOST						
AMS	3 lb	LPOST						
Storen	77	PRE	81	90	100	100	98	100
Atrazine	32	LPOST						
Glyphosate	28	LPOST						
AMS	3 lb	LPOST						
LSD (0.05)			6	5	4	NSD	11	NSD

[1] COC is crop oil concentrate, AMS is ammonium sulfate.
[2] PRE is preemergence, EPOST is early postemergence, POST is postemergence, and LPOST is late postemergence.
[3] DAC is days after the postemergence treatment, DAD is days after the late postemergence treatments.

Table 2. Efficacy of glufosinate products on Palmer amaranth, Russian thistle, and green foxtail in corn

			Palmer amaranth		Russian thistle		Green foxtail	
Treatment[1]	**Rate**	**Timing[2]**	**1 DAC[3]**	**14 DAD[3]**	**1 DAC**	**14 DAD**	**1 DAC**	**14 DAD**
	oz/a		% Visual					
Zalo	32	EPOST	100	91	100	100	90	95
COC	1.0%	EPOST						
AMS	3 lb	EPOST						
Zalo	32	POST						
COC	1.0%	POST						
AMS	3 lb	POST						
Zalo	32	EPOST	100	91	98	94	96	84
S-metolachlor	21	EPOST						
COC	1.0%	EPOST						
AMS	3 lb	EPOST						
S-metolachlor	21	PRE	100	99	100	100	100	100
Zalo	32	EPOST						
S-metolachlor	21	EPOST						
COC	1.0%	EPOST						
AMS	3 lb	EPOST						
Surtain	14	PRE	100	100	98	96	85	96
Liberty Ultra	24	LPOST						
Status	5.0	LPOST						
AMS	0.1 lb	LPOST						
Atrazine	32	PRE	53	88	70	98	50	81
Surmise 5	16.4	LPOST						
Callisto	3.0	LPOST						
AMS	0.1 lb	LPOST						
Resicore	80	PRE	100	100	100	100	93	100
Enlist Duo	76	LPOST						
Zidua SC	3.0	LPOST						
AMS	3 lb	LPOST						
Storen	77	PRE	93	98	80	95	94	100
Atrazine	32	LPOST						
Glyphosate	28	LPOST						
AMS	3 lb	LPOST						
LSD (0.05)			9	8	20	NSD	12	5

[1] COC is crop oil concentrate, AMS is ammonium sulfate.
[2] PRE is preemergence, EPOST is early postemergence, POST is postemergence, and LPOST is late postemergence.
[3] DAC is days after the postemergence treatment, DAD is days after the late postemergence treatments