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Efficacy of Anthem, Anthem ATZ, Solstice, Keystone NXT, Corvus, and Surestart II in Glyphosate-Resistant Irrigated Corn

R. Currie and P. Geier

Summary

The best treatments provided excellent green foxtail, crabgrass, or shattercane control. All treatments dramatically increased corn yield compared to the control.

Introduction

The herbicide pyroxasulfone was first discovered by the Kumiai Corporation more than a decade ago. The compound has been researched at this location during this period, and past publications have reported on it with the Kumiai experimental number KIH-485. Unlike almost all current herbicides, the Kumiai Corporation markets this patent herbicide compound jointly with the BASF, FMC, and Valent Corporations. Each company markets a tank mix of pyroxasulfone with one or more of its own compounds to augment weed control. A comparison of pyroxasulfone to a broad range of other established herbicide tank mixes is needed. This study's objective was to compare the weed control of Anthem (pyroxasulfone+fluthiacet-methyl), Anthem ATZ (pyroxasulfone+fluthiacet-methyl +atrazine), Keystone NXT (acetochlor+atrazine), Surestart II (acetochlor+clopyralid+flumetsulam), Corvus (isoxaflutole+thiencarbazone-methyl), Solstice (mesotrione+fluthiacet-methyl), Hornet (flumetsulam+clopyralid), and glyphosate.

Procedures

An experiment at the Kansas State University Southwest Research-Extension Center in Garden City, Kansas, determined the efficacy of Anthem, Anthem ATZ, Solstice, Keystone NXT, and Surestart II in irrigated corn. Herbicides were applied at preemergence, early postemergence, or preemergence followed by postemergence sequential treatments. The entire experimental area was overseeded with a mixture of shattercane (rox orange), green foxtail, and crabgrass seed. The kochia, Palmer amaranth, and Russian thistle populations were natural infestations.

Table 1 shows application dates and information. Glyphosate-resistant corn was planted May 21, 2014. Preemergence herbicides were applied using a tractor-mounted, CO₂-pressurized sprayer delivering 20 gpa at 4.1 mph and 30 psi. Early postemergence and postemergence treatments were applied with a CO₂-pressurized backpack sprayer

calibrated to deliver 20 gpa at 3.0 mph and 27 psi. Soil was a Ulysses silt loam with 1.4% organic matter, pH of 8.0, and cation exchange capacity of 18.4. Plots were 10 by 35 feet arranged in a randomized complete block with four replications. Visual weed control was determined on August 20, 2014, which was 91, 68, and 48 days after preemergence, early postemergence and postemergence applications, respectively. Corn yields were determined October 30, 2014, by mechanically harvesting the center two rows of each plot and adjusting grain to 15.5% moisture content.

Results and Discussion

All treatments provided excellent kochia and Russian thistle control (Table 2). Because kochia pressure was very light, results should be used only to confirm conclusions from other studies and not as the only data when making herbicide selections for kochia control. Treatments that provided 85, 95, 93, or 95 percent control of Palmer amaranth, green foxtail, crabgrass, or shattercane, respectively, were not statistically superior to the best treatments. All treatments dramatically increased corn yield compared to the control. Treatments that elevated yield above 127.7 bu/a were not statistically superior to the best treatments.

Table 1. Application information.

Application timing	Preemergence	Early postemergence	Postemergence
Application date	May 21, 2014	June 13, 2014	July 3, 2014
Air temperature (F)	78	60	66
Relative humidity (%)	44	60	64
Soil temperature (F)	52	45	52
Wind speed (mph)	8 to 11	4 to 6	3 to 5
Wind direction	Northeast	South	South
Soil moisture	Good	Good	Good

Table 2. Weed control with Anthem, Anthem ATZ, Solstice, Keystone NXT, and SureStart II in irrigated corn.

Trt.	Herbicide ¹	Rate	Timing ²	% Control						Yield ⁹
				91 Days after planting						
				SASKR ³	KCHSC ⁴	AMAPA ⁵	SETVI ⁶	DIGSS ⁷	SORVU ⁸	
1	Anthem ATZ	32 oz	A	100	100	96	98	94	98	102.5
	Balance Flexx	2 oz	A							
2	Anthem ATZ	32 oz	A	100	100	100	100	99	100	141.9
	Glyphosate+AMS	32 oz	C							
3	Corvus	4 oz	A	100	100	97	100	96	100	135.4
	Glyphosate+AMS	32 oz	C							
4	Harness Xtra 6.0	2 qt	A	100	100	99	100	97	100	131.0
	Glyphosate+AMS	32 oz	C							
5	Anthem	8 oz	A	100	100	100	100	98	98	130.7
	Solstice	2.5 oz	C							
	Atrazine	16 oz	C							
	Glyphosate+AMS	32 oz	C							
6	Anthem	6 oz	A	99	100	91	100	98	100	128.7
	Solstice	2.5 oz	C							
	Atrazine	16 oz	C							
	Glyphosate+AMS	32 oz	C							
7	Anthem ATZ	24 oz	A	100	100	100	100	98	100	134.7
	Solstice	2.5 oz	C							
	Atrazine	16 oz	C							
	Glyphosate+AMS	32 oz	C							
8	Anthem ATZ	16 oz	A	100	100	98	100	95	100	127.7
	Solstice	2.5 oz	C							
	Atrazine	16 oz	C							
	Glyphosate+AMS	32 oz	C							
9	Anthem ATZ	16 oz	B	100	100	92	100	91	100	121.2
	Glyphosate+AMS	32 oz	B							
	COC	1%	B							
10	Solstice	2.5 oz	B	100	100	97	100	91	100	128.5
	Anthem	4 oz	B							
	Glyphosate+AMS	32 oz	B							
	COC	1%	B							
11	Solstice	2.5 oz	B	100	100	93	100	80	100	122.1
	Atrazine	16 oz	B							
	Glyphosate+AMS	32 oz	B							
	COC	1%	B							
12	Solstice	2.5 oz	B	100	100	85	81	76	100	137.4
	Glyphosate+AMS	32 oz	B							
	COC	1%	B							
13	Status	5 oz	B	100	100	75	84	78	100	121.8
	Glyphosate+AMS	32 oz	B							
14	Keystone NXT	2 qt	A	100	100	83	80	73	75	92.8
	Hornet WDG	4 oz	A							

continued

Table 2. Weed control with Anthem, Anthem ATZ, Solstice, Keystone NXT, and SureStart II in irrigated corn.

Trt.	Herbicide ¹	Rate	Timing ²	% Control						Yield ⁹
				91 Days after planting						
				SASKR ³	KCHSC ⁴	AMAPA ⁵	SETVI ⁶	DIGSS ⁷	SORVU ⁸	
15	SureStart II	2 pt	A	100	100	97	73	96	100	137.4
	Glyphosate+AMS	24 oz	C							
16	SureStart II	2 pt	B	100	99	92	100	94	100	124.4
	Glyphosate+AMS	24 oz	B							
17	Untreated control			0	0	0	0	0	0	43.3
	LSD @ 5% =			2.9	3.2	14.7	5.3	5.7	5.3	14.2

¹ AMS is ammonium sulfate at 2 or 2.5% w/v, COC is crop oil concentrate.

² A is preemergence, B is early postemergence, C is postemergence.

³ Russian thistle.

⁴ Kochia.

⁵ Palmer amaranth.

⁶ Green foxtail.

⁷ Crabgrass.

⁸ Shattercane.

⁹ Bu/a.