

Anthem Maxx Tank Mixture Comparisons in Irrigated Corn

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Summary

The use of multiple herbicide modes of action in single versus sequential applications was examined for efficacy in corn. Common sunflower control was complete with all early postemergence and postemergence herbicides late in the season. Control of Russian thistle, Palmer amaranth, and green foxtail were 95% or more with all early postemergence and postemergence herbicides except Halex GT. All herbicide treatments increased grain yield 15–33% compared to the nontreated controls except Halex GT applied early postemergence.

Introduction

Several strategies are important components to combat herbicide resistance development in weeds. Use of herbicides with multiple modes of action in combinations; applying herbicides to small, actively-growing weeds; and sequential applications to eliminate escapes can all reduce selection pressure for weed resistance. Cultural practices such as crop rotation and tillage are also key management components. In this study, the use of multiple herbicide modes of action in single versus sequential applications was examined for efficacy in corn.

Experimental Procedures

An experiment conducted at the Kansas State University Southwest Research-Extension Center near Garden City, KS, compared the premix of Anthem Maxx (pyroxasulfone/fluthiacet) with various herbicides for preemergence (PRE), early postemergence (EPOST), or sequential (PRE followed by postemergence (POST)) efficacy in corn. All herbicide treatments were applied using a tractor-mounted, compressed CO₂ sprayer delivering 19.4 GPA at 3.0 mph and 4.1 mph. Application, environmental, crop, and weed information is given in Table 1. Natural weed populations were supplemented by overseeding the experimental area with domesticated sunflower (to simulate common sunflower). Plots were 10 × 35 feet and arranged in a randomized complete block with four replications. Soil was a Beeler silt loam containing 2.4% organic matter and pH 7.6. Weed control was visually determined on May 18 and July 25, 2018. These dates were 21 days after the PRE treatments (21 DA-A) and 55 days after the POST treatments (55 DA-C), respectively. Since Palmer amaranth emerged later than the other weeds in the trial, it was evaluated on June 7 (7 DA-C) and July 25, 2018 (55 DA-C). Corn yields were determined on October 4, 2018, by mechanically harvesting the center two rows of each plot and adjusting grain weights to 15.5% moisture.

Results and Discussion

Only the treatments of Anthem Maxx plus Balance Flexx (isoxaflutole) and atrazine PRE and Anthem Maxx plus Callisto (mesotrione), Hornet WDG (clopyralid/flu-metsulam), and atrazine PRE provided less than 100% common sunflower control at 21 DA-A (data not shown). However, sunflower control was complete regardless of treatment by 55 DA-C. All PRE herbicides controlled kochia 100%, Russian thistle 95–100%, and green foxtail 85–100% at 21 DA-A (Table 2). When Halex GT (*S*-metolachlor/glyphosate/mesotrione) was applied alone EPOST, kochia, Russian thistle, and green foxtail control was 91, 86, and 89%, respectively, at 55 DA-C. This treatment also provided the least Palmer amaranth control at 7 and 55 DA-C (94 and 83%, respectively). Herbicide-treated corn yielded 21–47 bu/a more grain than the nontreated controls (Table 2), except when Halex GT alone was applied EPOST.

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Table 1. Application information

Application timing	Preemergence	Early postemergence	Postemergence
Application date	April 27, 2018	May 22, 2018	May 31, 2018
Air temperature (°F)	62	63	87
Relative humidity (%)	34	79	35
Soil temperature (°F)	51	64	78
Wind speed (mph)	5 to 8	7 to 10	2 to 5
Wind direction	West-southwest	South	South
Soil moisture	Good	Good	Good
Corn			
Height (inch)	---	3 to 5	6 to 9
Leaves (number)	0	2 to 3	3 to 4
Palmer amaranth			
Height (inch)	---	1 to 2	2 to 3
Density (plants/10 feet ²)	0	0.1	0.1
Kochia			
Height (inch)	---	1 to 4	2 to 4
Density (plants/10 feet ²)	0	0.2	0.2
Russian thistle			
Height (inch)	---	3 to 5	3 to 5
Density (plants/10 feet ²)	0	0.3	0.2
Common sunflower			
Height (inch)	---	2 to 4	1 to 3
Density (plants/10 feet ²)	0	0.1	0.1
Quinoa			
Height (inch)	---	2 to 5	---
Density (plants/10 feet ²)	0	0.3	0
Green foxtail			
Height (inch)	---	1 to 3	1 to 2
Density (plants/10 feet ²)	0	0.2	0.2

Table 2. Anthem Maxx comparisons in corn

Treatment	Rate	Timing ^a	Kochia	Palmer	Russian	Green	Corn yield
			55 DA-C ^b	amaranth	thistle	foxtail	
			----- % Visual -----				bu/a
Anthem Maxx	4.0 oz	PRE	100	100	100	100	166.8
Atrazine	32 oz	PRE					
Callisto	4.0 oz	POST					
Atrazine	16 oz	POST					
Glyphosate	22 oz	POST					
Crop oil concentrate	1.0%	POST					
Ammonium sulfate	1.0%	POST					
Anthem Maxx	4.0 oz	PRE	100	100	100	100	180.6
Callisto	5.0 oz	PRE					
Atrazine	32 oz	PRE					
Status	3.0 oz	POST					
Atrazine	16 oz	POST					
Glyphosate	22 oz	POST					
Crop oil concentrate	1.0%	POST					
Ammonium sulfate	1.0%	POST					
Anthem Maxx	4.0 oz	PRE	100	100	100	100	179.6
Balance Flexx	3.0 oz	PRE					
Atrazine	32 oz	PRE					
Status	3.0 oz	POST					
Atrazine	16 oz	POST					
Glyphosate	22 oz	POST					
Crop oil concentrate	1.0%	POST					
Ammonium sulfate	1.0%	POST					
Anthem Maxx	4.0 oz	PRE	100	100	100	100	169.8
Hornet WDG	4.0 oz	PRE					
Atrazine	32 oz	PRE					
Callisto	3.0 oz	POST					
Atrazine	16 oz	POST					
Glyphosate	22 oz	POST					
Crop oil concentrate	1.0%	POST					
Ammonium sulfate	1.0%	POST					
Anthem Maxx	4.0 oz	PRE	100	100	98	93	181.6
Callisto	5.0 oz	PRE					
Atrazine	48 oz	PRE					
Anthem Maxx	4.0 oz	PRE	100	100	98	99	179.1
Balance Flexx	3.0 oz	PRE					
Atrazine	48 oz	PRE					
Anthem Maxx	4.0 oz	PRE	100	100	98	100	160.8
Hornet WDG	4.0 oz	PRE					
Atrazine	48 oz	PRE					
Acuron	2.5 qt	PRE	100	98	100	93	168.4
Resicore	2.5 qt	PRE	94	100	100	100	186.9

continued

Table 2. Anthem Maxx comparisons in corn

Treatment	Rate	Timing ^a	Kochia	Palmer	Russian	Green	Corn yield
			55 DA-C ^b	amaranth	thistle	foxtail	
			----- % Visual -----				bu/a
Anthem Maxx	4.0 oz	PRE	95	96	93	98	171.4
Callisto	6.0 oz	PRE					
Hornet WDG	4.0 oz	PRE					
Atrazine	48 oz	PRE					
Anthem Maxx	4.0 oz	EPOST	100	100	100	95	176.5
Callisto	3.0 oz	EPOST					
Atrazine	32 oz	EPOST					
Glyphosate	22 oz	EPOST					
Crop oil concentrate	1.0%	EPOST					
Ammonium sulfate	1.0%	EPOST					
Halex GT	3.6 pt	EPOST	91	83	86	89	160.1
Nonionic surfactant	0.25%	EPOST					
Ammonium sulfate	1.0%	EPOST					
Acuron	2.0 qt	EPOST	100	100	98	95	175.4
Glyphosate	22 oz	EPOST					
Crop oil concentrate	1.0%	EPOST					
Untreated	---	---	---	---	---	---	139.5
LSD (0.05)			5	4	5	7	20.9

^aPRE = preemergence. EPOST = early postemergence. POST = postemergence.

^bDA-C = days after the postemergence applications.



Figure 1. Untreated control.



Figure 2. Anthem Maxx 4 oz/a plus atrazine 32 oz/a applied preemergence followed by Callisto 4 oz/a plus atrazine 16 oz/a plus glyphosate 22 oz/a applied postemergence, picture taken 13 days after postemergence application.



Figure 3. Anthem Maxx 4 oz/a plus Hornet WDG 4 oz/a plus atrazine 32 oz/a applied preemergence followed by Callisto 4 oz/a plus atrazine 16 oz/a plus glyphosate 22 oz/a postemergence, picture taken 13 days after postemergence application.



Figure 4. Anthem Maxx 4 oz/a plus Callisto 5 oz/a plus atrazine 48 oz/a applied preemergence, picture taken 47 days after preemergence application.



Figure 5. Resicore 2.5 qt/a applied preemergence, picture taken 47 days after preemergence application.



Figure 6. Halex GT 3.6 pt/a applied early postemergence, picture taken 22 days after early postemergence treatment.