

## Split Applications of Acuron, Halex GT, Resicore, Balance Flexx, and Armezon Pro for Weed Control in Irrigated Corn

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### Summary

Control of kochia, green foxtail, quinoa, and Palmer amaranth was excellent and did not differ among treatments. Common sunflower control was slightly less effective with Acuron (*S*-metolachlor + atrazine + mesotrione + bicyclopyrone) + atrazine applied PRE compared to other treatments early in the season but later in the season no differences occurred. Crabgrass control was excellent regardless of treatment early in the season, and remained high with all herbicides except Balance Flexx (isoxaflutole) + atrazine PRE followed by Diflexx (dicamba) + atrazine and glyphosate POST, which provided less than 89% control. All herbicide treatments resulted in grain yields that were 67 to 101 bu/a greater than the untreated controls. The best herbicide treatment yielded 34 bu/a more than the lowest yielding herbicide combination.

### Introduction

Acuron, Halex GT (*S*-metolachlor + mesotrione + glyphosate), Resicore (acetochlor + clopyralid + mesotrione), Balance Flexx, Diflexx, and Armezon Pro (topramezone + dimethenamid-*P*) are all competitive herbicides with different levels of preemergence and postemergence weed control. Because many of the preemergence components of these package mixes begin to decay as soon as they are applied to moist soil, it has long been known that applying part of the total load early and delaying application of the rest of the dose until later can extend control. Further, many of these premixes have postemergence activity as well, allowing for extended control with a second application. Zidua (pyroxasulfone) is a long residual herbicide with excellent preemergence control of grassy weeds and good activity on some small seeded broadleaf weeds. It was also included to augment weed control with atrazine applied preemergence alone. Postemergence glyphosate was included to help with any weeds that escaped the initial application. Therefore, it was the objective of this study to test these various compounds and their timings of application for weed control.

### Experimental Procedures

An experiment at the Kansas State University Southwest Research-Extension Center near Garden City, KS, evaluated sequential applications of premix herbicides for efficacy in corn. The experimental area was overseeded with kochia, Palmer amaranth, crabgrass, quinoa, and domesticated sunflower prior to corn planting. Quinoa and domesticated sunflower were used as surrogates for common lambsquarters and com-

mon sunflower, respectively. Herbicides were applied either preemergence (PRE) alone or PRE followed by postemergence (POST). All herbicides were applied using a tractor-mounted, compressed-CO<sub>2</sub> sprayer delivering 20 GPA at 30 psi. Application, environmental, crop, and weed information is shown in Table 1. Plot size was 10 × 35 feet and arranged in a randomized complete block with four replicates. Soil for the experiment was a Beeler silt loam with pH 7.6 and 2.4% organic matter. Visual weed control was determined on June 23 and September 5, 2017, which was 7 and 81 days after the POST treatments (DAPT), respectively. Corn yields were determined on October 23, 2017, by mechanically harvesting the center two rows of each plot and adjusting grain weights to 15.5% moisture.

## Results and Discussion

Control of kochia, green foxtail, quinoa, and Palmer amaranth was 96 to 100% regardless of herbicide or evaluation date, and did not differ among treatments (data not shown). Although common sunflower control was slightly less with Acuron + atrazine applied PRE compared to other treatments at 7 DAPT (Table 2), no differences for sunflower control occurred by 81 DAPT. Crabgrass control was 95 to 100% regardless of treatment early in the season, and remained high with all herbicides except Balance Flexx + atrazine PRE followed by Diflexx + atrazine and glyphosate POST (88%). All herbicide treatments resulted in grain yields that were 67 to 101 bu/a greater than the untreated controls. The best yields were achieved when Acuron + atrazine were applied alone PRE and when Resicore + atrazine PRE was followed by Resicore + atrazine and glyphosate POST (133 to 128 bu/a). These yields were better than yields from corn receiving Balance Flexx + atrazine PRE followed by Diflexx + atrazine and glyphosate POST (99 bu/a). The best herbicide treatment yielded 34 bu/a more than the lowest yielding herbicide combination.

**Table 1. Application information**

Application timing	Preemergence	Postemergence
Application date	May 24, 2017	June 16, 2017
Air temperature (°F)	66	77
Relative humidity (%)	30	56
Soil temperature (°F)	54	75
Wind speed (mph)	2	8
Wind direction	West	South
Soil moisture	Fair	Good
Corn		
Height (inch)	---	8 to 13
Leaves (number)	0	4 to 5
Common sunflower		
Height (inch)	---	4 to 8
Density (plants/10 ft <sup>2</sup> )	0	1
Palmer amaranth		
Height (inch)	---	4 to 6
Density (plants/10 ft <sup>2</sup> )	0	2
Green foxtail		
Height (inch)	---	8 to 12
Density (plants/10 ft <sup>2</sup> )	0	2
Kochia		
Height (inch)	---	10 to 15
Density (plants/10 ft <sup>2</sup> )	0	2
Quinoa		
Height (inch)	---	6 to 10
Density (plants/10 ft <sup>2</sup> )	0	1
Crabgrass		
Height (inch)	---	2 to 4
Density (plants/10 ft <sup>2</sup> )	0	3

**Table 2. Split-application herbicide efficacy in corn**

Treatment	Rate/a	Timing <sup>a</sup>	Common sunflower		Crabgrass		Corn yield bu/a
			7 DAPT <sup>b</sup>	81 DAPT	7 DAPT	81 DAPT	
			----- % Visual -----				
Untreated	---		0	0	0	0	31.5
Acuron	2.5 qt	PRE	96	100	98	97	132.9
Atrazine	0.4 qt	PRE					
Acuron	1.25 qt	PRE	100	100	100	99	124.2
Atrazine	0.3 qt	PRE					
Acuron	1.25 qt	POST					
Atrazine	0.3 qt	POST					
Status	2.5 oz	POST					
Glyphosate	31 oz	POST					
Ammonium sulfate	2.0%	POST					
Acuron	1.5 qt	PRE	100	100	100	100	125.0
Atrazine	0.3 qt	PRE					
Halex GT	4.0 pt	POST					
Atrazine	0.5 qt	POST					
Status	2.5 oz	POST					
Nonionic surfactant	0.5%	POST					
Ammonium sulfate	2.0%	POST					
Resicore	1.25 qt	PRE	100	100	95	100	127.6
Atrazine	0.5 qt	PRE					
Resicore	1.25 qt	POST					
Atrazine	0.5 qt	POST					
Glyphosate	31 oz	POST					
Ammonium sulfate	2%	POST					
Balance Flexx	3.0 oz	PRE	100	100	96	88	98.8
Atrazine	0.5 qt	PRE					
Diflexx	32 oz	POST					
Atrazine	0.5 qt	POST					
Glyphosate	31 oz	POST					
Ammonium sulfate	2%	POST					
Zidua	3.0 oz	PRE	100	100	100	100	120.2
Atrazine	0.5 qt	PRE					
Armezon Pro	16 oz	POST					
Atrazine	0.5 qt	POST					
Glyphosate	31 oz	POST					
Crop oil concentrate	1%	POST					
Ammonium sulfate	2%	POST					

*continued*

**Table 2. Split-application herbicide efficacy in corn**

Treatment	Rate/a	Timing <sup>a</sup>	Common sunflower		Crabgrass		Corn yield bu/a
			7 DAPT <sup>b</sup>	81 DAPT	7 DAPT	81 DAPT	
			----- % Visual -----				
Acuron	1.5 qt	PRE	100	100	99	100	121.5
Atrazine	0.3 qt	PRE					
Acuron	1.5 qt	POST					
Atrazine	0.3 qt	POST					
Status	2.5 oz	POST					
Glyphosate	31 oz	POST					
Ammonium sulfate	2%	POST					
LSD (0.05)			3	NS	4	3	28.0

<sup>a</sup>PRE = preemergence. POST = postemergence.

<sup>b</sup>DAPT = days after postemergence applications Weed control was determined on June 23 and September 5, 2017. Corn yields were determined on October 23, 2017.



**Figure 1. Untreated control.**



**Figure 2. Acuron 2.5 qt/a + atrazine 0.4 qt/a applied preemergence, 33 days after application.**



**Figure 3. Acuron 1.25 qt/a + atrazine 0.3 qt/a applied preemergence followed by Acuron 1.25 qt/a + atrazine 0.3 qt/a, Status 2.5 oz/a, glyphosate 31 oz/a and ammonium sulfate 2% applied postemergence, 10 days after postemergence application.**



**Figure 4. Resicore 1.25 qt/a + atrazine 0.5 qt/a applied preemergence followed by Resicore 1.25 qt/a + atrazine 0.5 qt/a, glyphosate 31 oz/a and ammonium sulfate 2% applied postemergence, 10 days after postemergence application.**



**Figure 5. Balance Flexx 3.0 oz/a + atrazine 0.5 qt/a applied preemergence followed by Diflexx 32 oz/a + atrazine 0.5 qt/a, glyphosate 31 oz/a and ammonium sulfate 2% applied postemergence, 10 days after postemergence application.**