

Application Timing Efficacy of Enlist Duo in Irrigated Corn

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Summary

In this study, herbicides were tested to compare application timing for weed control in irrigated corn. All herbicides tested provided season-long control (90% or more) of Palmer amaranth, Russian thistle, quinoa, and common sunflower. The inclusion of Enlist Duo to SureStart II as an early postemergence (V2) treatment increased kochia and johnsongrass control compared to a preemergence treatment of SureStart II alone early in the season. However, by later in the year, control of kochia and johnsongrass was best when Enlist Duo application was delayed until the V4 stage. Enlist Duo provided equal control of all weeds when applied at 3.5 or 4.67 pt/a, and corn yields did not differ between Enlist Duo rates within application timings. Corn treated at the V2 stage yielded 210–216% more grain than untreated corn, whereas corn receiving Enlist Duo at the V4 stage yielded 257–263% more grain than the weedy controls.

Introduction

Enlist Duo was first approved for use in the United States in 2014 on herbicide-resistant corn and soybean, and has since been approved for use on herbicide-resistant cotton. Enlist Duo combines two common herbicides, glyphosate and 2,4-D, to help manage herbicide-resistant weed species. The 2,4-D component is a choline salt formulation, which minimizes the drift and volatilization potential compared to the ester and amine formulations. The objective of this study was to compare Enlist Duo at two rates and two application timings for weed control in irrigated corn.

Experimental Procedures

An experiment at the Kansas State University Southwest Research-Extension Center near Garden City, KS, evaluated the premix of Enlist Duo (2,4-D/glyphosate) at two rates and two application timings in corn. The premix was applied at 3.5 or 4.67 pt/a when corn was at the 4 leaf stage (V4) following preemergence application of SureStart II (acetochlor/flumetsulam/clopyralid) at 2.0 pt/a. Enlist Duo was also applied at the same rates early postemergence when corn was in the 2 leaf stage (V2) and included the treatment of SureStart II at 2.0 pt/a. All treatments were applied using a tractor-mounted, compressed-CO₂ sprayer delivering 19.4 GPA at 30 psi and 4.1 mph. Application, environmental, crop, and weed information are shown in Table 1. Natural weed populations were supplemented by overseeding the experimental area with quinoa (to simulate common lambsquarters) and domesticated sunflower (to simulate common sunflower). Plots were 10 × 32 feet and arranged in a randomized complete block with four replications. Soil was a Beeler silt loam with 2.4% organic matter and pH 7.6.

Visual weed control was determined on June 11 and August 2, 2018, which was 12 days after the V2 applications (12 DA-B) and 51 days after the V4 applications (51 DA-C), respectively. Grain yields were determined October 5, 2018, by mechanically harvesting the center two rows of each plot and adjusting weights to 15.5% moisture.

Results and Discussion

Control of Palmer amaranth, Russian thistle, common sunflower, and quinoa was 90% or more with all herbicides at 12 DA-B and 51 DA-C, and did not differ between treatments (data not shown). Kochia control at 12 DA-B was 14% greater when Enlist Duo was included with SureStart II at the V2 stage compared to SureStart II alone preemergence (Table 2). However, by 51 DA-C, kochia control was best when Enlist Duo was applied at the V4 stage, and no differences occurred between rates for kochia control. Similarly, Enlist Duo applied at the V2 stage increased johnsongrass control compared to SureStart II alone preemergence at 12 DA-B, but johnsongrass control was best at 51 DA-C when Enlist Duo was applied at the V4 stage. Increasing the Enlist Duo rate from 3.5–4.67 pt/a did not improve johnsongrass control with either application timing at 51 DA-C. Corn receiving herbicide treatment at the V2 stage yielded 81–84 bu/a more grain than untreated corn, whereas corn treated at the V4 stage yielded 114–118 bu/a more grain than the control plots. Grain yields did not differ between Enlist Duo rates within applications timings.

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Table 1. Application information

Application timing	Preemergence	V2	V4
Application date	May 9, 2018	May 30, 2018	June 12, 2018
Air temperature (°F)	92	89	82
Relative humidity (%)	20	32	57
Soil temperature (°F)	71	80	74
Wind speed (mph)	5 to 9	3 to 5	2 to 4
Wind direction	South-southwest	Southeast	East-southeast
Soil moisture	Good	Good	Good
Corn			
Height (inch)	---	5 to 8	8 to 12
Leaves (number)	0	1 to 2	4 to 5
Kochia			
Height (inch)	---	1 to 2	3 to 5
Density (plants/10 feet ²)	0	0.5	2.0
Palmer amaranth			
Height (inch)	---	0.5 to 1	2 to 4
Density (plants/10 feet ²)	0	0.5	2
Russian thistle			
Height (inch)	---	1 to 2	2 to 5
Density (plants/10 feet ²)	0	0.5	0.5
Common sunflower			
Height (inch)	---	1 to 2	2 to 4
Density (plants/10 feet ²)	0	0.2	0.2
Quinoa			
Height (inch)	---	1 to 2	2 to 3
Density (plants/10 feet ²)	0	0.2	0.3
Green foxtail			
Height (inch)	---	1 to 2	2 to 4
Density (plants/10 feet ²)	0	0.2	0.2

Table 2. Enlist Duo application timings in irrigated corn

Treatment	Rate	Timing ^a	Kochia		Johnsongrass		Corn yield bu/a
			12 DA-B ^b	51 DA-C ^c	12 DA-B	51 DA-C	
	per acre		----- % visual -----				
SureStart II	2.0 pt	PRE	65	89	68	89	187.1
Enlist Duo	3.5 pt	V4					
Ammonium sulfate	2.5%	V4					
SureStart II	2.0 pt	PRE	70	93	80	94	191.5
Enlist Duo	4.67 pt	V4					
Ammonium sulfate	2.5%	V4					
SureStart II	2.0 pt	V2	79	70	98	65	153.6
Enlist Duo	3.5 pt	V2					
Ammonium sulfate	2.5%	V2					
SureStart II	2.0 pt	V2	84	75	93	73	157.1
Enlist Duo	4.67 pt	V2					
Ammonium sulfate	2.5%	V2					
Untreated			---	---	---	---	72.8
LSD (0.05)			11	6	11	8	17.5

^aPRE = preemergence, V2 = corn with two visible leaf collars, V4 = corn with four visible leaf collars.

^bDA-B = days after the V2 application timing.

^cDA-C = days after the V4 application timing.



Figure 1. Untreated control.



Figure 2. SureStart II at 2.0 pt/a applied preemergence, followed by Enlist Duo at 3.5 pt/a applied postemergence, picture taken 1 day after the postemergence treatment.



Figure 3. SureStart II at 2.0 pt/a applied preemergence, followed by Enlist Duo at 4.67 pt/a applied postemergence, picture taken 1 day after the postemergence treatment.



Figure 4. SureStart II at 2.0 pt/a plus Enlist Duo at 3.5 pt/a applied early postemergence, picture taken 14 days after application.



Figure 5. SureStart II at 2.0 pt/a plus Enlist Duo at 4.67 pt/a applied early postemergence, picture taken 14 days after application.