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## Fallow Weed Control with Liberty and Enlist One Tank Mixtures and Application Timings

### Abstract

This study evaluated Liberty (glufosinate) and Enlist One (2,4-D choline) at three application timings and with various tank mix partners for weed control in fallow. Most herbicides tested controlled 94% or more of volunteer sorghum 17 days after the late postemergence treatments in the season. Conversely, Palmer amaranth and crabgrass control was less than 90% with most herbicides. However, control of these species was good when Tricor, or Zidua plus OpTill were applied preemergence followed by Liberty or Liberty and Enlist One late postemergence.

### Keywords

Herbicide resistance, sequential applications

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## **Fallow Weed Control with Liberty and Enlist One Tank Mixtures and Application Timings**

*R.S. Currie and P.W. Geier*

### **Summary**

This study evaluated Liberty (glufosinate) and Enlist One (2,4-D choline) at three application timings and with various tank mix partners for weed control in fallow. Most herbicides tested controlled 94% or more of volunteer sorghum 17 days after the late postemergence treatments in the season. Conversely, Palmer amaranth and crabgrass control was less than 90% with most herbicides. However, control of these species was good when Tricor, or Zidua plus OpTill were applied preemergence followed by Liberty or Liberty and Enlist One late postemergence.

### **Introduction**

Development of glyphosate-resistant weed biotypes has prompted producers to find alternative control methods. Herbicides such as Liberty and 2,4-D have potential to aid in controlling resistant weeds. Also, the use of residual herbicides prior to weed emergence can decrease the abundance of resistant weeds present in the crop. The objective of this study was to compare Liberty plus 2,4-D choline alone, and with other herbicides, at various application timings for efficacy in a fallow situation.

### **Materials and Methods**

An experiment was conducted at the Kansas State University Southwest Research-Extension Center near Garden City, KS, to compare Liberty plus Enlist One tank mixtures at various application timings for weed control in fallow. Herbicides (Table 2) were applied using a tractor-mounted, compressed CO<sub>2</sub> sprayer delivering 19.4 gpa at 30 psi and 4.1 mph. Application, environmental, and weed information is shown in Table 1. Plots were 10 by 35 feet and arranged in a randomized complete block design with four replications. Soil was a Beeler silt loam with 2.4% organic matter and pH of 7.6. Visual estimates of weed control were taken on August 3 and August 21, 2020. These dates were 24 days after the early postemergence treatments (DAB), and 17 days after the late postemergence treatments (DAC), respectively.

### **Results and Discussion**

Only four treatments controlled Palmer amaranth 90% or throughout the season: Liberty plus Enlist One and Tricor DF (metribuzin) preemergence (PRE) followed by Liberty plus Enlist One late postemergence (LPOST); Liberty plus Enlist One and Zidua SC (pyroxasulfone) PRE followed by Liberty plus Enlist One LPOST; Zidua (pyroxasulfone) plus OpTill (imazethapyr/saflufenacil); and glyphosate PRE followed

by Liberty alone or with Enlist One LPOST (Table 2). Conversely, the only treatments that did not control volunteer sorghum at 90% or more, regardless of rating date, were glyphosate PRE followed by glyphosate LPOST and Liberty plus Enlist One PRE followed by Liberty plus Enlist One LPOST. At 17 DAC, crabgrass was controlled 89 to 98% by Liberty plus Enlist One and Tricor DF PRE followed by Liberty plus Enlist One LPOST; Zidua plus OpTill and glyphosate PRE followed by Liberty alone or with Enlist One; and Liberty plus glyphosate alone or with Enlist One PRE followed by Liberty plus glyphosate alone or with Enlist One LPOST.

*Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned. Persons using such products assume responsibility for their use in accordance with current label directions of the manufacturer.*

**Table 1. Application, environmental, and weed information for the glufosinate and 2,4-D choline experiment in fallow**

<b>Application timing</b>	<b>Preemergence</b>	<b>Early postemergence</b>	<b>Late postemergence</b>
Application date	June 24, 2020	July 10, 2020	August 4, 2020
Air temperature (°F)	93	73	65
Relative humidity	32	77	66
Soil temperature (°F)	83	76	64
Wind speed (mph)	6 to 10	2 to 7	6 to 11
Wind direction	South	East	Southeast
Soil moisture	Good	Good	Good
Palmer amaranth			
Height (inches)	---	2 to 15	2 to 60
Density (plants/10 ft <sup>2</sup> )	0	40	25
Volunteer sorghum			
Height (inches)	---	2 to 6	2 to 16
Density (plants/10 ft <sup>2</sup> )	0	2	1
Crabgrass			
Height (inches)	---	0.5 to 1	1 to 6
Density (plants/10 ft <sup>2</sup> )	0	10	1

Table 2. Weed control with glufosinate and 2,4-D choline mixtures in fallow

Treatment	Rate	Timing <sup>1</sup> oz/a	Palmer amaranth		Volunteer sorghum		Crabgrass		
			24 DAB <sup>2</sup>	17 DAC <sup>2</sup>	24 DAB	17 DAC	24 DAB	17 DAC	
			----- % Visual -----						
Glyphosate	32	PRE	0	33	0	80	0	83	
Ammonium sulfate	3 lb	PRE							
Glyphosate	32	LPOST							
Ammonium sulfate	3 lb	LPOST							
Liberty	32	PRE	23	28	0	78	0	80	
Enlist One	32	PRE							
Ammonium sulfate	3 lb	PRE							
Liberty	32	LPOST							
Enlist One	32	LPOST							
Ammonium sulfate	3 lb	LPOST							
Liberty	32	PRE	91	90	95	95	95	83	
Enlist One	32	PRE							
Zidua SC	3	PRE							
Ammonium sulfate	3 lb	PRE							
Liberty	32	LPOST							
Enlist One	32	LPOST							
Ammonium sulfate	3 lb	LPOST							
Liberty	32	PRE	84	86	95	94	88	75	
Enlist One	32	PRE							
Sonic	5	PRE							
Ammonium sulfate	3 lb	PRE							
Liberty	32	LPOST							
Enlist One	32	LPOST							
Ammonium sulfate	3 lb	LPOST							
Liberty	32	PRE	74	79	100	100	83	70	
Enlist One	32	PRE							
Trivence	6	PRE							
Ammonium sulfate	3 lb	PRE							
Liberty	32	LPOST							
Enlist One	32	LPOST							
Ammonium sulfate	3 lb	LPOST							
Liberty	32	PRE	93	91	100	100	96	90	
Enlist One	32	PRE							
Tricor DF	16	PRE							
Ammonium sulfate	3 lb	PRE							
Liberty	32	LPOST							
Enlist One	32	LPOST							
Ammonium sulfate	3 lb	LPOST							
Zidua	1.5	PRE	95	93	100	98	99	96	
OpTill	1.5	PRE							
Glyphosate	32	PRE							
Liberty	32	LPOST							
Enlist One	32	LPOST							
Ammonium sulfate	3 lb	LPOST							

Table 2. Weed control with glufosinate and 2,4-D choline mixtures in fallow

Treatment	Rate	Timing <sup>1</sup> oz/a	Palmer amaranth		Volunteer sorghum		Crabgrass	
			24 DAB <sup>2</sup>	17 DAC <sup>2</sup>	24 DAB	17 DAC	24 DAB	17 DAC
Zidua	1.5	PRE	96	93	99	99	99	98
OpTill	1.5	PRE						
Glyphosate	32	PRE						
Liberty	32	LPOST						
Ammonium sulfate	3 lb	LPOST						
Sharpen	1	PRE	81	86	93	100	85	73
Tricor DF	16	PRE						
Glyphosate	32	PRE						
Ammonium sulfate	3 lb	PRE						
Liberty	32	LPOST						
Enlist One	32	LPOST						
Ammonium sulfate	3 lb	LPOST						
Liberty	32	EPOST	69	45	98	100	83	73
Ammonium sulfate	3 lb	EPOST						
Liberty	32	LPOST						
Ammonium sulfate	3 lb	LPOST						
Liberty	32	EPOST	71	68	100	98	85	65
Enlist One	32	EPOST						
Ammonium sulfate	3 lb	EPOST						
Liberty	32	LPOST						
Enlist One	32	LPOST						
Ammonium sulfate	3 lb	LPOST						
Liberty	32	EPOST	81	70	100	100	88	85
Dual II Magnum	16	EPOST						
Ammonium sulfate	3 lb	EPOST						
Liberty	312	LPOST						
Ammonium sulfate	3 lb	LPOST						
Liberty	32	EPOST	85	85	99	100	83	83
Enlist One	32	EPOST						
Dual II Magnum	16	EPOST						
Ammonium sulfate	3 lb	EPOST						
Liberty	32	LPOST						
Enlist One	32	LPOST						
Ammonium sulfate	3 lb	LPOST						
Liberty	32	EPOST	74	78	100	100	85	91
Glyphosate	32	EPOST						
Ammonium sulfate	3 lb	EPOST						
Liberty	32	LPOST						
Glyphosate	32	LPOST						
Ammonium sulfate	3 lb	LPOST						

**Table 2. Weed control with glufosinate and 2,4-D choline mixtures in fallow**

Treatment	Rate	Timing <sup>1</sup> oz/a	Palmer amaranth		Volunteer sorghum		Crabgrass	
			24 DAB <sup>2</sup>	17 DAC <sup>2</sup>	24 DAB	17 DAC	24 DAB	17 DAC
			----- % Visual -----					
Liberty	32	EPOST	81	71	93	95	93	89
Enlist One	32	EPOST						
Glyphosate	32	EPOST						
Ammonium sulfate	3 lb	EPOST						
Liberty	32	LPOST						
Enlist One	32	LPOST						
Glyphosate	32	LPOST						
Ammonium sulfate	3 lb	LPOST						
LSD (0.05)			6	10	9	11	8	10

<sup>1</sup> PRE = preemergence. EPOST = early postemergence. LPOST = late postemergence.

<sup>2</sup> 24 DAB = 24 days after early postemergence treatment. 17 DAC = 17 days after late postemergence treatment.



**Figure 1. Untreated control.**



**Figure 2. Liberty 32 oz/a plus Enlist One 32 oz/a and Zidua SC 3 oz/a applied preemergence, followed by Liberty 32 oz/a plus Enlist One 32 oz/a applied late postemergence. Photo taken 17 days after the late postemergence treatment.**



**Figure 3. Zidua 1.5 oz/a plus OpTill 1.5 oz/a and glyphosate 32 oz/a applied preemergence, followed by Liberty 32 oz/a plus Enlist One 32 oz/a applied late postemergence. Photo taken 17 days after the late postemergence treatment.**





**Figure 4. Sharpen 1 oz/a plus Tricor 16 oz/a and glyphosate 32 oz/a applied preemergence, followed by Liberty 32 oz/a plus Enlist One 32 oz/a applied late postemergence. Photo taken 17 days after the late postemergence treatment.**



**Figure 5. Liberty 32 oz/a plus Enlist One 32 oz/a and Dual II Magnum 16 oz/a applied preemergence, followed by Liberty 32 oz/a plus Enlist One 32 oz/a applied late postemergence. Photo taken 17 days after the late postemergence treatment.**