

Evaluation of DiFlexx and DiFlexx Duo Herbicide Formulations for Weed Control and Crop Response in Field Corn at Rochester, Minnesota in 2016

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The objective of this trial was to evaluate DiFlexx and DiFlexx Duo herbicide formulations for weed control and crop response in field corn in southeastern Minnesota. The research site was a Lawler loam series with a pH of 6.4, O.M. 2.4%, and soil test P and K levels of 35 ppm and 165 ppm, respectively. Fertilizer was applied in the fall on November 5, 2015, at a rate of 0-46-180-0 lbs/A. Spring fertilizer was broadcast on April 16, 2016 ahead of planting at a rate of 115-0-0-24 (N-P-K-S). Additional nitrogen was applied on May 20, 2016 (25 lbs/A) and on June 10, 2016 (36 lbs/A). The field was disked and field cultivated once prior to planting. The previous crop was soybean. The corn hybrid, DeKalb Brand DKC49-72RIB, was planted April 25, 2016 at a depth of 1.5 inches in 30-inch rows at a rate of 32,000 seeds per acre. A randomized complete block design was used with three replications. Preemergence (PRE) and postemergence (POST) treatments were applied with a tractor-mounted sprayer delivering 15 gpa at 30 psi using TTI-11002 and TTIJ60-11002 spray tips, based on herbicide (systemic or contact). Evaluations of the plots were taken May 19, 24, 31, June 8, 13, and September 13. The center two rows of each plot were machine harvested on October 19, 2016. Application dates, environmental conditions and weed stages are reported in Table 1. Performance ratings for giant ragweed, common lambsquarters, common waterhemp and grass control can be found in Tables 2 through 5, respectively. No significant crop response was observed (data not shown).

DISCUSSION

DiFlexx is a dicamba-based herbicide for broadleaf control in corn. It is a combination of dicamba plus Crop Safety Innovation (CSI™). DiFlexx Duo is a premix of dicamba, tembotrione and CSI™. These herbicides may be applied postemergence up to V6 corn. In this trial, the PRE herbicide Zidua did not provide adequate control of giant ragweed, only 17-20 %, Table 2. The PRE Capreno applied at either 3.67 fl oz/a or 5.0 fl oz/a provided very good giant ragweed control, 81-85% and 82-89%, respectively, Table 2. PRE Capreno at 3.67 fl oz/a extended the window for post weed control up to 10 days, and at 5.0 fl oz/a up to 14 days. (University of Minnesota Extension Regional Office, Rochester.)

Table 1. Application timing, plant stage, environmental conditions

Date	4/26	5/23	6/2	6/6
Treatment	PRE (A)	POST I (B)	POST II (C)	POST III (D)
Temperature (F)				
Air	48	68	62	6
Soil	58.1	65.0	64.1	63.5
Relative Humidity (%)	82	48	69	52
Wind (mph)	16	20	10	15
Soil Moisture	Normal	Normal	Normal	Normal
Corn				
Stage		V3	V5	V5-V6
Height (inch)	0.0	3.5	10.0	15.0
Giant Ragweed				
Weed Density (ft ²)			16	16
Height (inch)	0.0	2.4	13.8	6.3
Common Waterhemp				
Weed Density (ft ²)			12.5	12.5
Height (inch)	0.0	0.2	2.8	1.9
Common Lambsquarters				
Weed Density (ft ²)			8.0	8.0
Height (inch)	0.0	0.9	3.1	2.6
Grass				
Weed Density (ft ²)			14.0	
Height (inch)	0.0	0.5	3.3	2.3
Rainfall after each application (inch)				
Week 1	0.77	1.91	0.9	0.3
Week 2	0.0	1.89	3.75	2.38
Week 3	1.43	1.37	0.3	1.01

Table 2. Evaluation of DiFlexx and DiFlexx Duo herbicides for giant ragweed control in field corn in Rochester, MN, 2016.											
Pest Code	AMBTR									YIELD @15%	
	Giant ragweed										
	Rating Date	Rate	Appl	May-19	May-24	May-31	Jun-8	Jun-13	Sep-13	BU/A	
Treatment	Rate	Appl	Percent Control (%)								
10 UNTREATED CHECK			0 c	0 e	0 g	0 h	0 f	0 g	6	h	
A/C = PRE 4/26/16 / POST II 6/2/16 (MIPOWE (V5) – 3 to 4 inch weeds)											
1 SOA 15 / 10, 27			17 b	18 c	17 f	94 abc	96 abc	97 bc	171	fg	
ZIDUA	2.0	oz wt/a	A								
LIBERTY 280	29	fl oz/a	C								
LAUDIS	3.0	fl oz/a	C								
Ammonium Sulfate	8.5	lb/100 gal	C								
2 SOA 15 / 10, 4			20 b	20 c	20 f	95 ab	97 ab	97 abc	184	b-f	
ZIDUA	2.0	oz wt/a	A								
LIBERTY 280	29	fl oz/a	C								
DIFLEXX	16	fl oz/a	C								
Ammonium Sulfate	8.5	lb/100 gal	C								
3 SOA 15, 10, 4, 27			18 b	20 c	20 f	95 ab	97 ab	97 abc	180	def	
ZIDUA	2.0	oz wt/a	A								
LIBERTY 280	29	fl oz/a	C								
DIFLEXX DUO	24	fl oz/a	C								
Ammonium Sulfate	8.5	lb/100 gal	C								
4 SOA 15 / 10, 5			20 b	20 c	17 f	87 fg	96 abc	97 bc	174	efg	
ZIDUA	2.0	oz wt/a	A								
LIBERTY 280	29	fl oz/a	C								
ATRAZINE	16	fl oz/a	C								
Ammonium Sulfate	8.5	lb/100 gal	C								
8 SOA 2, 27 / 10, 27			82 a	86 a	81 e	95 ab	98 a	99 a	187	a-e	
CAPRENO	3.67	fl oz/a	A								
LIBERTY 280	29	fl oz/a	C								
LAUDIS	3.0	fl oz/a	C								
Ammonium Sulfate	8.5	lb/100 gal	C								
9 SOA 2,27 / 10, 4, 27			82 a	85 a	81 e	97 a	98 a	99 ab	186	a-e	
CAPRENO	3.67	fl oz/a	A								
LIBERTY 280	29	fl oz/a	C								
DIFLEXX DUO	24	fl oz/a	C								
Ammonium Sulfate	8.5	lb/100 gal	C								
A/D = PRE 4/26/16 / POST III 6/6/16 (MIPOWE (V5-V6) 3 to 4 inch weeds)											
5 SOA 2, 27 / 10, 4			84 a	87 a	89 cd	91 cde	98 a	99 ab	199	a	
CAPRENO	5	fl oz/a	A								
LIBERTY 280	22	fl oz/a	D								
DIFLEXX	16	fl oz/a	D								
Ammonium Sulfate	8.5	lb/100 gal	D								
6 SOA 2, 27 / 10, 4			84 a	86 a	88 d	88 efg	98 ab	98 abc	195	abc	
CAPRENO	5	fl oz/a	A								
LIBERTY 280	29	fl oz/a	D								
DIFLEXX	16	fl oz/a	D								
Ammonium Sulfate	8.5	lb/100 gal	D								
7 SOA 2, 27 / 10, 5			82 a	84 a	86 d	87 g	96 abc	96 c	191	a-d	
CAPRENO	5	fl oz/a	A								
LIBERTY 280	29	fl oz/a	D								
ATRAZINE	16	fl oz/a	D								
Ammonium Sulfate	8.5	lb/100 gal	D								

Table 2 (continued). Evaluation of DiFlexx and DiFlexx Duo herbicides for giant ragweed control in field corn in Rochester, MN, 2016.

Pest Code	AMBTR											YIELD @15%				
	Giant ragweed															
Pest Name	May-19	May-24	May-31	Jun-8	Jun-13	Sep-13						BU/A				
Rating Date	Percent Control (%)															
Treatment	Rate	Appl														
B = POST I 5/23/16 (EAPOWE (V3) – 2 to 3 inch weeds)																
11	SOA 2,27, 9, 4		0	c	30	b	96	ab	95	ab	96	bc	96c	c	195	abc
	CAPRENO	3.0 fl oz/a	B													
	ROUNDUP	32 fl oz/a	B													
	POWERMAX	8 fl oz/a	B													
	DIFLEXX	8 fl oz/a	B													
	Ammonium Sulfate	8.5 lb/100 gal	B													
12	SOA 9, 4, 27, 15		0	c	30	b	97	a	94	ab	94	c	94	d	191	a-d
	ROUNDUP	32 fl oz/a	B													
	POWERMAX	24 fl oz/a	B													
	DIFLEX DUO	24 fl oz/a	B													
	ZIDUA	2.0 oz wt/a	B													
	Ammonium Sulfate	8.5 lb/100 gal	B													
13	SOA 9, 2, 27		0	c	30	b	96	ab	93	bcd	92	d	91	e	182	c-f
	ROUNDUP	32 fl oz/a	B													
	POWERMAX	24 fl oz/a	B													
	DIFLEX DUO	24 fl oz/a	B													
	Ammonium Sulfate	8.5 lb/100 gal	B													
14	SOA 15, 27, 9		0	c	10	d	95	ab	90	def	87	e	85	f	178	d-g
	ARMEZON PRO	18 fl oz/a	B													
	ROUNDUP	32 fl oz/a	B													
	POWERMAX	8.5 lb/100 gal	B													
	Ammonium Sulfate	8.5 lb/100 gal	B													
15	SOA 27, 4, 19, 9		0	c	30	b	93	bc	86	g	86	e	86f	f	163	g
	ARMEZON	0.75 fl oz/a	B													
	STATUS	3 oz wt/a	B													
	ROUNDUP	32 fl oz/a	B													
	POWERMAX	8.5 lb/100 gal	B													
	Ammonium Sulfate	8.5 lb/100 gal	B													
16	SOA 9, 15, 27, 2, 4		0	c	30	b	96	ab	96	ab	96	abc	96	c	197	ab
	HALEX GT	3.75 pt/a	B													
	NORTHSTAR	2.5 oz wt/a	B													
	NIS	0.25 % v/v	B													
	Ammonium Sulfate	8.5 lb/100 gal	B													
LSD P=.10			4		4		4		3		2		2		15.0	

Means followed by same letter do not significantly differ.

Table 3 (continued). Evaluation of DiFlexx and DiFlexx Duo herbicides for common lambsquarters control in field corn in Rochester, MN, 2016.																
Pest Code			CHEAL							YIELD						
Pest Name			Common Lambsquarters													
Rating Date			May-19	May-24	May-31	Jun-8	Jun-13	Jun-13	Sep-13	@15%						
Treatment	Rate	Appl	Percent Control (%)							BU/A						
B = POST I 5/23/16 (EAPOWE (V3) – 2 to 3 inch weeds)																
11	SOA 2,27, 9, 4		0	c	30	d	99	ab	97	ab	98	ab	98	a	195	abc
	CAPRENO	3.0 fl oz/a		B												
	ROUNDUP	32 fl oz/a		B												
	POWERMAX	8 fl oz/a		B												
	DIFLEXX	8 fl oz/a		B												
	Ammonium Sulfate	8.5 lb/100 gal		B												
12	SOA 9, 4, 27, 15		0	c	30	d	99	a	99	a	99	ab	98	ab	191	a-d
	ROUNDUP	32 fl oz/a		B												
	POWERMAX	24 fl oz/a		B												
	DIFLEX DUO	2.0 oz wt/a		B												
	ZIDUA	8.5 lb/100 gal		B												
	Ammonium Sulfate	8.5 lb/100 gal		B												
13	SOA 9, 2, 27		0	c	30	d	99	ab	97	ab	95	c	96	bc	182	c-f
	ROUNDUP	32 fl oz/a		B												
	POWERMAX	24 fl oz/a		B												
	DIFLEX DUO	8.5 lb/100 gal		B												
	Ammonium Sulfate	8.5 lb/100 gal		B												
14	SOA 15, 27, 9		0	c	10	e	98	abc	96	b	90	d	91	d	178	d-g
	ARMEZON PRO	18 fl oz/a		B												
	ROUNDUP	32 fl oz/a		B												
	POWERMAX	8.5 lb/100 gal		B												
	Ammonium Sulfate	8.5 lb/100 gal		B												
15	SOA 27, 4, 19, 9		0	c	30	d	97	de	92	c	89	d	90	d	163	g
	ARMEZON	0.75 fl oz/a		B												
	STATUS	3 oz wt/a		B												
	ROUNDUP	32 fl oz/a		B												
	POWERMAX	8.5 lb/100 gal		B												
	Ammonium Sulfate	8.5 lb/100 gal		B												
16	SOA 9, 15, 27, 2, 4		0	c	30	d	99	a	99	a	98	ab	98	a	197	ab
	HALEX GT	3.75 pt/a		B												
	NORTHSTAR	2.5 oz wt/a		B												
	NIS	0.25 % v/v		B												
	Ammonium Sulfate	8.5 lb/100 gal		B												
LSD P=.10			1		2		1		2		2		2		15.0	

Means followed by same letter do not significantly differ.

Table 4. Evaluation of DiFlexx and DiFlexx Duo herbicides for common waterhemp control in field corn in Rochester, MN, 2016.

Pest Code	AMATA					YIELD		
	Common waterhemp							
Pest Name						@15% BU/A		
Rating Date	May-24	May-31	Jun-8	Jun-13	Sep-13			
Treatment	Rate	Appl	Percent Control (%)					
10 UNTREATED CHECK			0 e	0 c	0 d	0 e	0 d	6 h
A/C = PRE 4/26/16 / POST II 6/2/16 (MIPOWE (V5) – 3 to 4 inch weeds)								
1 SOA 15 / 10, 27			99 a	98 a	99 a	99 ab	99a a	171 fg
ZIDUA	2.0	oz wt/a A						
LIBERTY 280	29	fl oz/a C						
LAUDIS	3.0	fl oz/a C						
Ammonium Sulfate	8.5	lb/100 gal C						
2 SOA 15 / 10, 4			99 a	97 a	99 a	99 a	97 a	184 b-f
ZIDUA	2.0	oz wt/a A						
LIBERTY 280	29	fl oz/a C						
DIFLEXX	16	fl oz/a C						
Ammonium Sulfate	8.5	lb/100 gal C						
3 SOA 15, 10, 4, 27			99 a	99 a	99 a	98 ab	97 a	180 def
ZIDUA	2.0	oz wt/a A						
LIBERTY 280	29	fl oz/a C						
DIFLEXX DUO	24	fl oz/a C						
Ammonium Sulfate	8.5	lb/100 gal C						
4 SOA 15 / 10, 5			99 a	98 a	99 a	98 ab	97 a	174 efg
ZIDUA	2.0	oz wt/a A						
LIBERTY 280	29	fl oz/a C						
ATRAZINE	16	fl oz/a C						
Ammonium Sulfate	8.5	lb/100 gal C						
8 SOA 2, 27 / 10, 27			99 a	98 a	99 a	99 a	97 a	187 a-e
CAPRENO	3.67	fl oz/a A						
LIBERTY 280	29	fl oz/a C						
LAUDIS	3.0	fl oz/a C						
Ammonium Sulfate	8.5	lb/100 gal C						
9 SOA 2,27 / 10, 4, 27			98 b	98 a	99 a	99 a	97 a	186 a-e
CAPRENO	3.67	fl oz/a A						
LIBERTY 280	29	fl oz/a C						
DIFLEXX DUO	24	fl oz/a C						
Ammonium Sulfate	8.5	lb/100 gal C						
A/D = PRE 4/26/16 / POST III 6/6/16 (MIPOWE (V5-V6) 3 to 4 inch weeds)								
5 SOA 2, 27 / 10, 4			99 a	99 a	99 a	99 ab	98 a	199 a
CAPRENO	5	fl oz/a A						
LIBERTY 280	22	fl oz/a D						
DIFLEXX	16	fl oz/a D						
Ammonium Sulfate	8.5	lb/100 gal D						
6 SOA 2, 27 / 10, 4			99 a	99 a	99 a	99 a	97 a	195 abc
CAPRENO	5	fl oz/a A						
LIBERTY 280	29	fl oz/a D						
DIFLEXX	16	fl oz/a D						
Ammonium Sulfate	8.5	lb/100 gal D						
7 SOA 2, 27 / 10, 5			99 a	99 a	99 a	99 ab	97 a	191 a-d
CAPRENO	5	fl oz/a A						
LIBERTY 280	29	fl oz/a D						
ATRAZINE	16	fl oz/a D						
Ammonium Sulfate	8.5	lb/100 gal D						

Table 4 (continued). Evaluation of DiFlexx and DiFlexx Duo herbicides for common waterhemp control in field corn in Rochester, MN, 2016.

Pest Code	AMATA					YIELD		
	Common waterhemp							
Pest Name						@15%		
Rating Date	May-24	May-31	Jun-8	Jun-13	Sep-13			
Treatment	Rate	Appl	Percent Control (%)			BU/A		
B = POST I 5/23/16 (EAPOWE (V3) – 2 to 3 inch weeds)								
11 SOA 2,27, 9, 4			30 c	98 a	95 b	85 c	87 b	195 abc
CAPRENO	3.0	fl oz/a	B					
ROUNDUP								
POWERMAX	32	fl oz/a	B					
DIFLEXX	8	fl oz/a	B					
Ammonium Sulfate	8.5	lb/100 gal	B					
12 SOA 9, 4, 27, 15			30 c	99 a	99 a	99 a	98 a	191 a-d
ROUNDUP								
POWERMAX	32	fl oz/a	B					
DIFLEX DUO	24	fl oz/a	B					
ZIDUA	2.0	oz wt/a	B					
Ammonium Sulfate	8.5	lb/100 gal	B					
13 SOA 9, 2, 27			30 c	97 a	93 c	83 c	85 b	182 c-f
ROUNDUP								
POWERMAX	32	fl oz/a	B					
DIFLEX DUO	24	fl oz/a	B					
Ammonium Sulfate	8.5	lb/100 gal	B					
14 SOA 15, 27, 9			10 d	99 a	98 a	96 b	97 s	178 d-g
ARMEZON PRO	18	fl oz/a	B					
ROUNDUP								
POWERMAX	32	fl oz/a	B					
Ammonium Sulfate	8.5	lb/100 gal	B					
15 SOA 27, 4, 19, 9			30 c	91 b	91 c	79 d	81 c	163 g
ARMEZON	0.75	fl oz/a	B					
STATUS	3	oz wt/a	B					
ROUNDUP								
POWERMAX	32	fl oz/a	B					
Ammonium Sulfate	8.5	lb/100 gal	B					
16 SOA 9, 15, 27, 2, 4			30 c	99 a	99 a	98 ab	97 a	197 ab
HALEX GT	3.75	pt/a	B					
NORTHSTAR	2.5	oz wt/a	B					
NIS	0.25	% v/v	B					
Ammonium Sulfate	8.5	lb/100 gal	B					
LSD P=.10			0.2	4	2	2	3	15.0

Means followed by same letter do not significantly differ.

Table 5 (continued). Evaluation of DiFlexx and DiFlexx Duo herbicides for grass control in field corn in Rochester, Minnesota, 2016.

Pest Code	GRASS							YIELD @15%								
	Grangea sp.															
Pest Name																
Rating Date	May-19	May-24	May-31	Jun-8	Jun-13	Sep-13										
Treatment	Rate	Appl	Percent Control (%)					BU/A								
B = POST I 5/23/16 (EAPOWE (V3) – 2 to 3 inch weeds)																
11 SOA 2,27, 9, 4			0	b	30	b	96	abc	93	b	92	b	89	b	195	abc
CAPRENO	3.0	fl oz/a	B													
ROUNDUP	32	fl oz/a	B													
POWERMAX																
DIFLEXX	8	fl oz/a	B													
Ammonium Sulfate	8.5	lb/100 gal	B													
12 SOA 9, 4, 27, 15			0	b	30	b	98	ab	99	a	98	a	98	a	191	a-d
ROUNDUP	32	fl oz/a	B													
POWERMAX																
DIFLEX DUO	24	fl oz/a	B													
ZIDUA	2.0	oz wt/a	B													
Ammonium Sulfate	8.5	lb/100 gal	B													
13 SOA 9, 2, 27			0	b	30	b	95	c	91	b	82	d	83	c	182	c-f
ROUNDUP	32	fl oz/a	B													
POWERMAX																
DIFLEX DUO	24	fl oz/a	B													
Ammonium Sulfate	8.5	lb/100 gal	B													
14 SOA 15, 27, 9			0	b	10	c	96	bc	99	a	99	a	98	a	178	d-g
ARMEZON PRO	18	fl oz/a	B													
ROUNDUP	32	fl oz/a	B													
POWERMAX																
Ammonium Sulfate	8.5	lb/100 gal	B													
15 SOA 27, 4, 19, 9			0	b	30	b	97	abc	93	b	85	c	86	bc	163	g
ARMEZON	0.75	fl oz/a	B													
STATUS	3	oz wt/a	B													
ROUNDUP	32	fl oz/a	B													
POWERMAX																
Ammonium Sulfate	8.5	lb/100 gal	B													
16 SOA 9, 15, 27, 2, 4			0	b	30	b	98	ab	99	a	97	a	95	a	197	ab
HALEX GT	3.75	pt/a	B													
NORTHSTAR	2.5	oz wt/a	B													
NIS	0.25	% v/v	B													
Ammonium Sulfate	8.5	lb/100 gal	B													
LSD P=	10						3		2		4		4		15.0	

Means followed by same letter do not significantly differ.