

## Weed Management in Direct-seeded Imidazolinone-resistant Sunflower

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Weed control and crop response were investigated with selected soil-applied herbicides in direct-seeded, imidazolinone-resistant (Clearfield™) sunflower. The trial had a randomized complete block design with three replicates. The experiment was conducted on a loam soil with 6.7 pH and 2.9% organic matter at the NDSU Carrington Research Extension Center. Herbicide treatments were applied to 10 by 30 ft plots with a CO<sub>2</sub> pressurized hand-held plot sprayer at 17 gal/A and 30 psi through 8002 flat fan nozzles. Preplant (PP) fall sulfentrazone treatments were applied October 25, 2004, on a moist soil surface with 47 F, 71% RH, 15% clear sky, and 11 mph wind. Early PP spring treatments were applied April 30, 2005 on a dry soil surface with 34 F, 59% RH, 100% cloudy sky, and 13 mph wind. Rainfall totaled 1.22 inches during May 1 to 8. PP spring treatments were applied on May 25 on a dry soil surface with 62 F, 37% RH, 100% cloudy sky, and 9 mph wind. Rainfall totaled 0.83 inches during May 26 to June 5. Glyphosate at 0.75 lb ae/A + AMS at 1% v/v was applied across the trial on June 3. Mycogen '8N429CL' was direct-seeded in wheat stubble in 30-inch rows on June 10 and hand-thinned to 20,000 plants/A on July 6. PRE treatments were applied on a moist soil surface on June 13 with 60 F, 86% RH, 100% cloudy sky, and 12 mph wind. Rainfall totaled 1.64 inches during June 13 to 26. POST imazamox was applied on July 2 with 68 F, 83% RH, 90% clear sky, and 9 mph wind to V4- to V6-stage sunflower, tillering yellow foxtail, 2- to 5-inch tall common lambsquarters, 1- to 6-inch tall redroot pigweed, and 0.5- to 1-inch tall dandelion. Weed densities on July 5 were: yellow foxtail = 25 plants/ft<sup>2</sup>, common lambsquarters = 1 plant/ft<sup>2</sup>, redroot pigweed = 4 plants/ft<sup>2</sup>, and dandelion = 1 plant/ft<sup>2</sup>. The trial was harvested with a plot combine on October 26.

Adequate rainfall occurred for timely activation of soil-applied herbicides. Visual evaluation of soil-applied treatments on July 1 (before POST application of imazamox) indicated 79 to 81% control of yellow foxtail with pendamethalin (Table 1). Flumioxazin and carfentrazone/sulfentrazone controlled dandelion 81 to 90% and redroot pigweed 93 to 99%. Except for dandelion, weed control generally improved with imazamox following soil-applied treatments. Dandelion was suppressed (40 to 73% control) while redroot pigweed control was excellent (89 to 99%) with all treatments when evaluated on August 5. Treatments that included sulfentrazone provided 97 to 99% common lambsquarters control. No crop injury was detected in the trial (data not shown). Seed yield was significantly greater with all herbicide treatments compared to the untreated check (Table 2). Seed yield with fall-applied sulfentrazone was lower compared to other treatments. Yield greater than 1500 lb/A was achieved with PP spring-applied sulfentrazone, and flumioxazin.

**Table 1. Weed control in direct-seeded imidazolinone-resistant sunflower.**

Treatment	Herbicide <sup>1</sup>		1-Jul			5-Aug			
	Rate	Timing	yeft <sup>2</sup>	dali <sup>3</sup>	rrpw <sup>4</sup>	yeft	colq <sup>5</sup>	dali	rrpw
	ai/A		% control						
untreated check	x	x	0	0	0	0	0	0	0
Sulfentrazone/Imazamox	0.188/0.031	PPF/POST	52	57	73	70	99	53	95
Sulfentrazone/Sulfentrazone/ Imazamox	0.094/0.094/ 0.031	PPF/PPS/POST	59	13	91	73	98	57	98
Sulfentrazone/Imazamox	0.188/0.031	EPPS/POST	63	58	78	71	99	62	98
Sulfentrazone/Imazamox	0.188/0.031	PPS/POST	70	58	91	77	97	57	99
Flumioxazin/Imazamox	0.063/0.031	EPPS/POST	69	81	93	77	80	70	98
Flumioxazin/Imazamox	0.063/0.031	PPS/POST	72	90	93	76	70	73	99
Pendamethalin/Imazamox	1.5/0.031	EPPS/POST	81	27	79	82	63	55	98
Pendamethalin/Imazamox	1.5/0.031	PPS/POST	79	73	74	88	79	66	99
Carfentrazone+NIS/ Sulfentrazone/Imazamox	0.008+0.25%/ 0.188/0.031	PPS/PRE/POST	71	83	99	75	99	68	99
Imazamox	0.031	POST	x	x	x	70	70	40	89
LSD (0.05)			9	10	7	12	8	22	13

<sup>1</sup>Treatments: All imazamox treatments include NIS at 1% v/v and UAN at 2.5% v/v. NIS=Preference, a nonionic surfactant from Agrilience, at 0.25% v/v. Timing: PPF=October 25, 2004; EPPS=April 30, 2005; PPS=May 25; PRE=June 13; POST=July 2.

<sup>2</sup>yeft=green and yellow foxtail.

<sup>3</sup>dali=dandelion.

<sup>4</sup>rrpw=prostrate and redroot pigweed.

<sup>5</sup>colq=common lambsquarters.

**Table 2. Direct-seeded imidazolinone-resistant sunflower response to herbicides.**

Treatment	Herbicide <sup>1</sup>		Seed Yield lb/A	Test Weight lb/bu
	Rate ai/A	Timing		
untreated check	x	x	503	29.3
Sulfentrazone/Imazamox	0.188/0.031	PPF/POST	1086	28.2
Sulfentrazone/Sulfentrazone/Imazamox	0.094/0.094/0.031	PPF/PPS/POST	1162	28.7
Sulfentrazone/Imazamox	0.188/0.031	EPPS/POST	1382	28.6
Sulfentrazone/Imazamox	0.188/0.031	PPS/POST	1575	29.0
Flumioxazin/Imazamox	0.063/0.031	EPPS/POST	1519	28.4
Flumioxazin/Imazamox	0.063/0.031	PPS/POST	1540	28.9
Pendamehalin/Imazamox	1.5/0.031	EPPS/POST	1263	28.6
Pendamehalin/Imazamox	1.5/0.031	PPS/POST	1490	28.4
Carfentrazone+NIS/Sulfentrazone/ Imazamox	0.008+0.25%/0.188/ 0.031	PPS/PRE/POST	1337	28.9
Imazamox	0.031	POST	1460	28.3
LSD (0.05)			306	NS

<sup>1</sup>Treatments: All imazamox treatments include NIS at 1% v/v and UAN at 2.5% v/v.

Pendamehalin=Prowl H<sub>2</sub>O; NIS=Preference, a nonionic surfactant from Agrilience, at 0.25% v/v.

Timing: PPF=October 25, 2004; EPPS=April 30, 2005; PPS=May 25; PRE=June 13; POST=July 2.