

Weed Control in Direct-seeded Field Pea

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Weed control and field pea response to selected soil- and POST-applied herbicides were evaluated in a randomized complete-block design with three replicates. The experiment was conducted on a Heimdahl loam soil with 6.7 pH and 2.9% organic matter at the NDSU Carrington Research Extension Center. Herbicide treatments were applied to 5- by 25-ft plots with a pressurized hand-held plot sprayer at 17 gal/A and 30 psi through 8002 flat-fan nozzles. Fall sulfentrazone treatments were applied October 25, 2004 to a moist soil surface with 47 F, 71% RH, 15% clear sky, and 11 mph wind. On April 28, 2005, inoculated 'Integra' field pea was seeded into standing wheat stubble in 7-inch rows at a rate of 300,000 pure live seeds/A. PRE treatments were applied to a dry soil surface on April 30 with 31 F, 64% RH, 30% clear sky, and 10 mph wind. Rainfall totaled 1.22 inches 8 d following PRE application. The trial area was treated on May 6 with a PRE burn-down application of glyphosate at 0.75 lb ae/A plus ammonium sulfate at 1% v/v. The early POST (EPOST) treatment was applied on May 23 with 73 F, 35% RH, 100% cloudy sky, and 6 mph wind to 2-inch tall field pea, 1- to 2-leaf green and yellow foxtail, 0.5-inch tall common lambsquarters, 0.5-inch tall prostrate and redroot pigweed, and 0.5-inch tall wild buckwheat. POST treatments were applied on June 6 with 75 F, 46% RH, clear sky, and 9 mph wind to 5- to 7-inch tall field pea, 2- to 4-leaf green and yellow foxtail, 1- to 3-inch tall common lambsquarters, 0.5- to 1-inch tall prostrate and redroot pigweed, and 1- to 2-inch tall wild buckwheat. Average plant density in untreated plots was measured on June 6: field pea = 11 plants/ft², foxtail = 35 plants/ft², common lambsquarters = 3 plants/ft², pigweed = 11 plants/ft² and wild buckwheat = 1 plant/ft². The trial was harvested with a plot combine on August 4.

Generally, fall- and PRE-applied treatments provided good to excellent broadleaf weed control when evaluated on June 3, except carfentrazone and thifensulfuron + tribenuron (Table 1). Fall- or PRE-applied sulfentrazone at 0.188 lb/A provided similar broadleaf weed control. Broadleaf weed control was reduced with fall-applied sulfentrazone at 0.094 lb/A followed by PRE application at 0.094 lb/A compared to fall- or PRE-applied sulfentrazone at 0.188 lb/A. Imazethapyr+pendimethalin provided 88% foxtail control and excellent broadleaf weed control (96 to 99%). Crop injury (reduced plant biomass) ranging from 17 to 18% occurred with spring-applied sulfentrazone at 0.188 lb/A (Table 2). Also, substantial crop injury occurred with imazamox at 0.031 lb/A + bentazon following pendimethalin. Severe pea injury and yield loss occurred with fomesafen. Weed control on August 4 ranged from 88 to 99% with fall-applied sulfentrazone at 0.188 lb/A followed by bentazon at 0.5 lb/A + sethoxydim at 0.1 lb/A, sulfentrazone + imazethapyr, imazethapyr + pendimethalin, and pendimethalin followed by imazamox at 0.031 lb/A + bentazon (Table 3). Sequentially-applied bentazon at 0.5 lb/A + sethoxydim at 0.1 lb/A provided 98% control of common lambsquarters compared to 75% control with bentazon at 1.0 lb/A + sethoxydim at 0.2 lb/A. Pea seed yield ranged from 68.9 to 70.7 bu/A with sulfentrazone followed by bentazon + sethoxydim, and imazethapyr + pendimethalin compared to the untreated check at 49.2 bu/A (Table 2).

Table 1. Weed control with soil-applied herbicides in no-till field pea , Carrington, 2005.

Treatment ¹	Application timing ²	Rate lb ai/A	6/3			
			Foxtail spp. ³	Common lambquarters	Pigweed spp. ³	Wild buckwheat
			-----% control -----			
Untreated	x	x	0	0	0	0
Sulfentrazone	Fall	0.188	66	99	99	93
Sulfentrazone/Sulfentrazone	Fall/PRE	0.094/0.094	58	91	94	75
Sulfentrazone	PRE	0.188	73	99	99	94
Sulfentrazone+imazethapyr	PRE	0.188+0.031	76	99	99	94
Sulfentrazone+metribuzin	PRE	0.094+0.25	63	98	98	80
Imazethapyr+pendimethalin	PRE	0.031+1.5	88	99	99	96
Imazethapyr	PRE	0.031	74	99	99	96
Imazethapyr	PRE	0.031	73	99	99	99
Pendimethalin	PRE	1.5	76	85	93	86
Pendimethalin	PRE	1.5	86	88	96	99
Carfentrazone	PRE	0.008	0	0	0	0
Thifensulfuron+tribenuron+NIS	PRE	0.0075+0.0019+0.25%	0	0	0	0
LSD (0.05)			7	6	4	15

¹Pendimethalin=ProwlH₂O, BASF; NIS=Preference, a nonionic surfactant from Agrilience. The trial was treated on May 6 with a PRE burn-down application of glyphosate at 0.75 lb ae/A plus ammonium sulfate at 1% v/v.

²Fall=October 25, 2004; PRE=April 30, 2005.

³Foxtail spp.=Yellow and green; Pigweed spp.=Redroot and prostrate.

Table 2. Field pea response to herbicide treatments, Carrington, 2005.

Treatment ¹	Application timing ²	Rate lb ai/A	Crop injury			Seed yield bu/A	Test weight lb/bu
			6/3	7/2	8/4		
			----- % -----				
Untreated	x	x	0	0	0	49.2	63.2
Sulfentrazone/Bentazon+ sethoxydim+MSO+UAN	Fall/POST	0.188/0.5+ 0.1+1%+2pt	0	0	0	70.6	63.3
Sulfentrazone/Sulfentrazone/ Bentazon+sethoxydim+MSO+ UAN	Fall/PRE/ POST	0.094/0.094/ 0.5+ 0.1+1%+ 2pt	0	8	6	68.9	63.5
Sulfentrazone/Bentazon+ sethoxydim+MSO+UAN	PRE/POST	0.188/0.5+ 0.1+1%+2pt	18	12	0	69.3	63.4
Sulfentrazone+imazethapyr	PRE	0.188+0.031	17	7	0	62.5	63.5
Sulfentrazone+metribuzin/ Bentazon+sethoxydim+MSO+ UAN	PRE/POST	0.094+0.25/ 0.5+0.1+1%+ 2pt	0	0	0	61.4	63.0
Imazethapyr+pendimethalin	PRE	0.031+1.5	0	0	0	70.7	63.3
Imazethapyr/Bentazon+ sethoxydim+MSO+UAN	PRE/POST	0.031/1.0+ 0.2+1%+2pt	0	0	0	58.3	63.0
Imazethapyr/Bentazon+ sethoxydim+MSO+UAN	PRE/POST	0.031/0.5+ 0.1+1%+2pt	0	0	0	61.0	63.1
Pendimethalin/Imazamox+ bentazon+MSO+UAN	PRE/POST	1.5/0.031+0.188+1% +2pt	0	21	17	52.6	63.7
Pendimethalin/Imazamox+ bentazon+MSO+UAN	PRE/POST	1.5/0.016+0.188+1% +2pt	0	0	0	51.3	62.7
Carfentrazone/Bentazon+ sethoxydim+MSO+UAN	PRE/POST	0.008/1.0+ 0.2+1%+2pt	0	0	3	51.8	63.5
Thifensulfuron+tribenuron+NIS/ Bentazon+ sethoxydim+MSO+ UAN	PRE/POST	0.0075+0.0019+ 0.25%/1.0+ 0.2+1%+2pt	0	0	2	55.9	62.5
Imazamox+bentazon+NIS+UAN	POST	0.031+0.188+1% +2pt	x	0	0	62.5	63.6
Imazamox+bentazon+MSO+ UAN	POST	0.016+0.188+1% +2pt	x	0	0	50.0	63.8
Imazamox+bentazon+ sethoxydim+MSO+UAN	POST	0.031+1.0+ 0.2+1%+2pt	x	0	2	46.6	63.5
Bentazon+sethoxydim+MSO+ UAN	POST	1.0+0.2+1%+ 2pt	x	0	2	57.4	62.9
Bentazon+sethoxydim+MSO+ UAN/Bentazon+sethoxydim+ MSO+ UAN	EPOST/ POST	0.5+0.1+1%+2pt/ 0.5+0.1+1%+2pt	x	0	2	61.6	63.1
Fomesafen+imazamox+ bentazon+MSO+UAN	POST	0.095+0.016+ 0.188+1%+2pt	x	95	83	8.4	64.1
Fomesafen+imazamox+ bentazon+MSO+UAN	POST	0.143+0.016+ 0.188+1%+2pt	x	95	90	6.9	64.3
LSD (0.05)			5	5	6	10.1	NS

¹MSO=Destiny, a methylated seed oil from Agrilience, St. Paul, MN; Pendimethalin=ProwlH₂O, BASF; UAN=urea ammonium nitrate; NIS=Preference, a nonionic surfactant from Agrilience. The trial was treated on May 6 with a PRE burn-down application of glyphosate at 0.75 lb ae/A plus ammonium sulfate at 1% v/v.

²Fall=October 25, 2004; PRE=April 30, 2005; EPOST=May 23; POST=June 6.

Table 3. Weed control with soil- and POST-applied herbicides in no-till field pea, Carrington, 2005.

Treatment ¹	Application timing ²	Rate lb ai/A	7/2				8/4			
			Fox-tail spp. ³	Common lambs-quarters	Pig-weed spp. ³	Wild buck-wheat	Fox-tail spp.	Common lambs-quarters	Pig-weed spp.	Wild buck-wheat
			-----% control -----							
Untreated	x	x	0	0	0	0	0	0	0	0
Sulfentrazone/Bentazon+sethoxydim+MSO+UAN	Fall/POST	0.188/0.5+0.1+1%+2pt	80	98	96	86	89	98	98	91
Sulfentrazone/Sulfentrazone/Bentazon+sethoxydim+MSO+UAN	Fall/PRE/POST	0.094/0.094/0.5+0.1+1%+2pt	82	99	80	74	93	99	88	70
Sulfentrazone/Bentazon+sethoxydim+MSO+UAN	PRE/POST	0.188/0.5+0.1+1%+2pt	76	99	98	92	84	99	99	90
Sulfentrazone+imazethapyr	PRE	0.188+0.031	80	99	99	89	91	99	99	99
Sulfentrazone+metribuzin/Bentazon+sethoxydim+MSO+UAN	PRE/POST	0.094+0.25/0.5+0.1+1%+2pt	70	97	96	69	86	99	98	80
Imazethapyr+pendimethalin	PRE	0.031+1.5	96	96	99	91	99	99	99	99
Imazethapyr/Bentazon+sethoxydim+MSO+UAN	PRE/POST	0.031/1.0+0.2+1%+2pt	72	90	99	77	83	90	99	89
Imazethapyr/Bentazon+sethoxydim+MSO+UAN	PRE/POST	0.031/0.5+0.1+1%+2pt	73	93	98	83	82	97	99	99
Pendimethalin/Imazamox+bentazon+MSO+UAN	PRE/POST	1.5/0.031+0.188+1%+2pt	98	99	99	78	98	99	99	88
Pendimethalin/Imazamox+bentazon+MSO+UAN	PRE/POST	1.5/0.016+0.188+1%+2pt	97	95	99	69	98	96	99	70
Carfentrazone/Bentazon+sethoxydim+MSO+UAN	PRE/POST	0.008/1.0+0.2+1%+2pt	67	57	58	63	77	67	73	70
Thifensulfuron+tribenuron+NIS/Bentazon+sethoxydim+MSO+UAN	PRE/POST	0.0075+0.0019+0.25%/1.0+0.2+1%+2pt	67	71	70	61	74	70	72	67
Imazamox+bentazon+NIS+UAN	POST	0.031+0.188+1%+2pt	78	75	99	62	84	73	99	73
Imazamox+bentazon+MSO+UAN	POST	0.016+0.188+1%+2pt	81	81	98	63	86	86	96	75
Imazamox+bentazon+sethoxydim+MSO+UAN	POST	0.031+1.0+0.2+1%+2pt	70	94	99	65	78	97	99	78
Bentazon+sethoxydim+MSO+UAN	POST	1.0+0.2+1%+2pt	71	77	68	69	82	75	68	73
Bentazon+sethoxydim+MSO+UAN/Bentazon+sethoxydim+MSO+UAN	EPOST/POST	0.5+0.1+1%+2pt/0.5+0.1+1%+2pt	72	96	73	47	80	98	72	57
Fomesafen+imazamox+bentazon+MSO+UAN	POST	0.095+0.016+0.188+1%+2pt	65	88	98	64	0	65	65	65
Fomesafen+imazamox+bentazon+MSO+UAN	POST	0.143+0.016+0.188+1%+2pt	66	89	95	81	13	65	65	65
LSD (0.05)			8	11	9	18	13	6	6	15

¹MSO=Destiny, a methylated seed oil from Agrilience, St. Paul, MN; Pendimethalin=ProwlH₂O, BASF; UAN=urea ammonium nitrate; NIS=Preference, a nonionic surfactant from Agrilience. The trial was treated on May 6 with a PRE burn-down application of glyphosate at 0.75 lb ae/A plus ammonium sulfate at 1% v/v.

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