

Weed Control with Soil- and POST-applied Herbicides in 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 8.0 pH and 3.3% organic matter at the NDSU Carrington Research Extension Center. The trial area was tilled with a disk followed by two passes with a Melroe culti-harrow on October 20, 2003. Herbicide treatments were applied to 5- by 25-ft. plots with a pressurized hand-held plot sprayer at 18 gal/A and 30 psi through 8002 flat-fan nozzles. Fall sulfentrazone treatments were applied October 28 to a dry soil surface with 39° F, 66% RH, 25% clear sky, and 2 mph wind. Snowfall occurred one day following herbicide application. PPI treatments were applied on April 29 with 54° F, 86% RH, and 95% clear sky and immediately incorporated to a 2.5- to 3-inch depth using a roto-tiller. The trial area was cultivated twice on May 7 with a Melroe culti-harrow at a 2-inch depth prior to seeding, except fall treatments which were harrowed once at a 0.5- to 1-inch depth. On May 7, inoculated 'Integra' field pea was seeded in 7-inch rows at a pure live seed rate of

300,000 seeds/A. PRE treatments were applied to a dry soil surface on May 8 with 61° F, 49% RH, 20% clear sky, and 13 mph wind. Rainfall totaled 1.04 inches one week following PRE application. POST treatments were applied on June 9 with 54° F, 63% RH, 35% clear sky, and 12 mph wind to 4- to 5-inch tall field pea, 2- to 3-leaf green and yellow foxtail, 0.5- to 2-inch tall common lambsquarters, 2-leaf (0.5- to 1-inch tall) hairy and eastern black nightshade, cotyledon- to 2-leaf (0.5-inch tall) prostrate and redroot pigweed, and 1-inch tall annual smartweed. Average plant density in untreated plots was estimated: field pea = 8 plants/ft², foxtail = 36 plants/ft², common lambsquarters = 3 plants/ft², nightshade = 6 plants/ft² and annual smartweed = 2 plants/ft². The trial was harvested with a plot combine on August 19.

Fall-applied sulfentrazone generally provided less broadleaf weed control compared to spring-applied sulfentrazone (Table 1). Fall-applied sulfentrazone at 0.25 lb/A did not improve broadleaf weed control compared to the lower rate. PRE sulfentrazone+imazethapyr provided excellent broadleaf weed control of 98-99%, while foxtail was suppressed at 65-72% and pea yield was lower than the other sulfentrazone treatments (Table 2). Weed control was good to excellent with PPI pendimethalin followed by POST bentazon+sethoxydim+imazamox, 86-99%, and PPI pendimethalin&imazethapyr followed by POST bentazon+sethoxydim, 80-99%. PRE imzaethapyr+glyphosate provided 66-97% weed control, while PRE imazethapyr+pendimethalin provided at least 92% control of all weeds on August 13. Broadleaf weed control ranged from 32-76% with PRE thifesulfuron+glyphosate followed by POST sethoxydim. Imazamox at 0.023 lb/A provided similar weed control and pea yield compared to 0.031 lb/A. All POST imazamox+bentazon+sethoxydim treatments generally provided greater than 90% control of weeds except for common lambsquarters and resulted in similar yield. However, imazamox at 0.016 lb/A +bentazon at 1 lb/A +sethoxydim at 0.2 lb/A +MSO+UAN injured pea 12-18%. Fomesafen+sethoxydim suppressed broadleaf weeds, but severely injured pea 48-68% and reduced yield.

Table 1. Weed control in field pea, Carrington, 2004.

Treatment ¹	Application timing	Rate	7/9					8/13				
			Fox-tail spp. ²	Common lambs-quarters	Night-shade spp. ²	Pig-weed spp. ²	Annual smart-weed	Fox-tail spp.	Common lambs-quarters	Night-shade spp.	Pig-weed spp.	Annual smart-weed
			lb ai/A ----- % ----- ¹									
Sulfentrazone/Sethoxydim+MSO	Fall/POST	0.188/0.2+2pt	98	92	77	81	68	96	89	73	77	68
Sulfentrazone/Sethoxydim+MSO	Fall/POST	0.25/0.2+2pt	97	85	87	80	53	96	80	73	82	68
Pendimethalin/Bentazon+sethoxydim+imazamox+MSO+UAN	PPI/POST	1.5/1+0.2+0.16+1%v/v+2pt	98	96	99	96	93	98	89	95	97	86
Imazethapyr/Bentazon+sethoxydim+MSO+UAN	PPI/POST	0.031/1+0.2+2pt+2pt	98	76	96	85	96	88	73	75	86	91
Pendimethalin&imazethapyr/Bentazon+sethoxydim+MSO+UAN	PPI/POST	0.5&0.033/1+0.2+2pt+2pt	98	86	95	88	99	98	83	80	97	96
Imazethapyr+sulfentrazone	PRE	0.031+0.188	72	99	98	99	99	65	99	99	99	99
Imazethapyr+glyphosate	PRE	0.031+0.75(ae)	66	85	97	83	94	68	72	88	89	89
Imazethapyr+pendimethalin	PRE	0.031+1.5	91	96	98	94	81	92	96	93	96	95
Sulfentrazone/Sethoxydim+MSO	PRE/POST	0.188/0.2+2pt	96	98	98	96	83	96	99	83	96	84
Thifensulfuron+glyphosate+NIS/Sethoxydim+MSO	PRE/POST	0.008+0.75(ae)+0.25%v/v / 0.2+2pt	96	47	67	60	32	97	48	65	68	40
Thifensulfuron+glyphosate+NIS/Sethoxydim+MSO	PRE/POST	0.014+0.75(ae)+0.25%v/v / 0.2+2pt	97	47	68	58	48	97	40	69	76	47
Bentazon+sethoxydim+MSO+UAN	POST	1+0.2+2pt+2pt	96	83	69	68	86	96	72	71	72	83
Imazethapyr+NIS	POST	0.031+0.25%	80	75	99	93	89	86	73	85	98	87
Imazamox+NIS	POST	0.031+0.25%	83	72	99	96	80	78	74	96	96	91
Imazamox+NIS	POST	0.023+0.25%	81	73	99	96	98	78	70	98	99	99
Imazamox+bentazon+sethoxydim+NIS+UAN	POST	0.031+0.188+0.038+0.25%v/v+2pt	94	86	99	99	89	91	81	99	98	99
Imazamox+bentazon+sethoxydim+MSO+UAN	POST	0.016+1+0.2+1%v/v+2pt	91	91	99	99	89	93	92	99	98	96
Imazamox+bentazon+sethoxydim+MSO+UAN	POST	0.016+0.5+0.1+1%v/v+2pt	90	89	96	96	89	91	87	98	97	86
Fomesafen+sethoxydim+COC	POST	0.19+0.2+0.5%v/v	99	68	97	83	63	94	40	78	83	61
Untreated	x	x	0	0	0	0	0	0	0	0	0	0
LSD (0.05)			4	12	17	4	24	8	14	11	10	14

¹MSO=Destiny, a methylated seed oil from Agrilience, St. Paul, MN; Pendimethalin=ProwlH₂O, BASF; UAN=urea ammonium nitrate; Pendimethalin&imazethapyr=Pursuit Plus, BASF; NIS=Preference, a nonionic surfactant from Agrilience; glyphosate=Roundup UltraMax (3.7 lb ae/gal), Monsanto; COC=Hi-Per-Oil, a petroleum-based oil from Agrilience.

Table 2. Field pea response to herbicide treatments, Carrington, 2004.

Treatment ¹	Application timing	Rate lb ai/A	Stand plants/A	Crop injury		Seed yield bu/A
				6/23	7/9	
Sulfentrazone/Sethoxydim+MSO	Fall/POST	0.188/0.2+2pt	285847	0	0	73.2
Sulfentrazone/Sethoxydim+MSO	Fall/POST	0.25/0.2+2pt	264345	0	0	76.1
Pendimethalin/ Bentazon+sethoxydim+imazamox+MSO+UAN	PPI/ POST	1.5/1+0.2+0.16+1%v/v+2pt	241578	0	0	76.9
Imazethapyr/Bentazon+sethoxydim+MSO+UAN	PPI/POST	0.031/1+0.2+2pt+2pt	221341	2	6	76.3
Pendimethalin&imazethapyr/ Bentazon+sethoxydim+MSO+UAN	PPI/ POST	0.5&0.033/1+0.2+2pt+2pt	244108	0	0	77.2
Imazethapyr+sulfentrazone	PRE	0.031+0.188	250432	0	0	57.3
Imazethapyr+glyphosate	PRE	0.031+0.75(ae)	254226	0	0	81.4
Imazethapyr+pendimethalin	PRE	0.031+1.5	250432	0	0	77.4
Sulfentrazone/Sethoxydim+MSO	PRE/POST	0.188/0.2+2pt	247902	0	0	78.2
Thifensulfuron+glyphosate+NIS/ Sethoxydim+MSO	PRE/ POST	0.008+0.75(ae)+0.25%v/v/ 0.2+2pt	217547	0	0	77.5
Thifensulfuron+glyphosate+NIS/ Sethoxydim+MSO	PRE/ POST	0.014+0.75(ae)+0.25%v/v/ 0.2+2pt	258021	0	0	75.6
Bentazon+sethoxydim+MSO+UAN	POST	1+0.2+2pt+2pt	266875	2	0	77.8
Imazethapyr+NIS	POST	0.031+0.25%	246638	0	0	85.1
Imazamox+NIS	POST	0.031+0.25%	268139	0	0	77.5
Imazamox+NIS	POST	0.023+0.25%	255491	0	0	69.0
Imazamox+bentazon+sethoxydim+NIS+UAN	POST	0.031+0.188+0.038+0.25%v/v+2pt	294700	0	0	72.6
Imazamox+bentazon+sethoxydim+MSO+UAN	POST	0.016+1+0.2+1%v/v+2pt	274463	18	12	68.4
Imazamox+bentazon+sethoxydim+MSO+UAN	POST	0.016+0.5+0.1+1%v/v+2pt	276993	7	8	72.7
Fomesafen+sethoxydim+COC	POST	0.19+0.2+0.5%v/v	254226	68	48	54.9
Untreated	x	x	264345	0	0	69.6
LSD (0.05)			NS	2	3	13.0

¹MSO=Destiny, a methylated seed oil from Agrilience, St. Paul, MN; Pendimethalin=ProwlH₂O, BASF; UAN=urea ammonium nitrate; Pendimethalin&imazethapyr=Pursuit Plus, BASF; NIS=Preference, a nonionic surfactant from Agrilience; glyphosate=Roundup UltraMax (3.7 lb ae/gal), Monsanto; COC=Hi-Per-Oil, a petroleum-based oil from Agrilience.