

Weed control and crop tolerance in glyphosate-resistant hard red spring wheat

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The experiment was conducted on a loam soil with 6.2 pH at the NDSU Carrington Research Extension Center. The experimental design was a randomized complete block with three replicates. ‘Oxen-derived’ glyphosate-resistant HRS wheat was planted at approximately 75 lb seed/A on May 11. Herbicide treatments were applied with a CO₂-hand-boom plot sprayer delivering 10 gal/A at 30 psi through 8001 flat fan nozzles to the center 6.7 ft of 10 by 25 ft plots. EPOST treatments were applied on May 30 with 62 F, 76 % RH, 10% clear sky, and 4 mph wind to 3-leaf wheat, 1- to 4-leaf yellow and green foxtail, 0.5- to 3-inch tall volunteer flax, 0.5- to 1-inch tall redroot and prostrate pigweed, and 0.5- to 2-inch tall wild buckwheat. POST treatments were applied on June 7 with 61 F, 87 % RH, clear sky, and 7 mph wind to 4.5-leaf wheat, 1- to 5-leaf yellow and green foxtail, 0.5- to 3-inch tall volunteer flax, 0.5- to 1-inch tall redroot and prostrate pigweed, and 1- to 3-inch tall wild buckwheat. Average wheat density was 18 plants/ft², foxtail density was 18 plants/ft², volunteer flax density was 2 plants/ft², pigweed density was 6 plants/ft², and wild buckwheat density was 1 plant/ft². Weed control and wheat injury were visually estimated. The trial was harvested for seed yield with a plot combine on August 14.

Glyphosate treatments including tank mixtures provided excellent foxtail control (90 to 97%) 14 and 21 days after treatment (Table 1). Glyphosate at 0.375 lb/A generally provided similar control of all weeds compared to higher rates or sequential application of glyphosate. An exception was glyphosate at 0.75 lb/A or a sequential application was required to provide excellent wild buckwheat control (93 to 99%) compared to lower glyphosate rates when applied at the later wheat growth stage. Tank mixtures with glyphosate improved wild buckwheat control compared to glyphosate alone at 0.375 lb/A while control of other weed species was similar. Glyphosate generally provided greater weed control, except with wild buckwheat, than conventional herbicide tank mixtures.

Table 1. Weed control in glyphosate-resistant wheat.

Treatment ^a	Rate (lb/A)	14 days after treatment				21 days after treatment				Harvest
		SETSS ^b	LINUX	AMASS ^c	POLCO	SETSS	LINUX	AMASS	POLCO	SETSS
----- (% control) -----										
EPOST										
Glyphosate	0.375	97	99	98	98	97	98	98	93	88
Glyphosate	0.56	97	98	99	97	97	98	98	97	88
Glyphosate	0.75	95	99	99	98	94	98	99	96	81
POST										
Glyphosate	0.375	97	99	98	83	94	96	91	78	90
Glyphosate	0.56	97	97	98	82	91	93	95	70	83
Glyphosate	0.75	97	97	99	97	95	94	98	93	89
Glyphosate(EPOST)/glyphosate	0.375/0.375	95	98	97	99	90	96	95	96	76
Clodinafop+bromoxynil&MCPA+DSV	0.06+0.5+1%	73	81	89	99	82	57	86	99	80
Fenoxaprop+bromoxynil&MCPA	0.08+0.5	86	65	94	99	85	48	89	90	73
Tralkoxydim+Supercharge+bromoxynil &MCPA	0.18+0.5%+0.5	74	48	91	95	79	27	83	95	80
Flucarbazone+bromoxynil&MCPA+NIS	0.026+0.5+0.25%	69	90	99	98	68	86	99	98	40
Glyphosate+MCPAioe	0.375+0.25	96	99	96	95	92	96	91	86	81
Glyphosate+bromoxynil&MCPA	0.375+0.5	95	99	95	99	90	97	93	85	79
Glyphosate+thifensulfuron	0.375+0.023	97	99	98	97	94	95	97	88	86
Glyphosate+dicamba	0.375+0.06	96	99	95	93	89	98	89	90	79
Glyphosate+clopyralid&2,4-D	0.375+0.58	97	98	97	99	96	94	95	99	91
Untreated	---	0	0	0	0	0	0	0	0	0
LSD (0.05)		4	9	7	5	8	13	10	13	13

^aGlyphosate=Roundup UltraMax (3.7 lb ae/gal); DSV=adjuvant from Syngenta; NIS=Induce, a nonionic surfactant from Helena Chemical Co., Memphis, TN.

^bFoxtail spp.=Yellow and green.

^cPigweed spp.=Redroot and prostrate.

