Weed Control and Crop Tolerance in Fall Seeded Roundup Ready Alfalfa

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Introduction and Methods

An experiment was conducted near Manhattan, KS on a Reading silt loam soil with 2.5% organic matter and a pH of 5.7 to evaluate weed control and tolerance of Roundup Ready alfalfa to Roundup and competitive treatments. Cheat, wheat, bushy wallflower, and field pennycress seed were broadcast over the entire plot area prior to the last tillage operation before establishing the experiment. A commercially destined Roundup Ready alfalfa variety was seeded at 10 lb per acre on September 10, 2002 with a single disk drill with 4 inch spacings at a seeding depth or 0.5 inch. Sufficient moisture was received for establishment, but alfalfa stands were thin due to the low seeding rate and grasshopper damage (despite insecticide treatment). Early fall postemergence (EFP) treatments were applied to cotyledon to unifoliate alfalfa, 1 leaf wheat and cheat, and cotyledon stage henbit, bushy wallflower, and field pennycress on September 23 with 74 F, 40% relative humidity, and partly clear skies. Fall postemergence (FP) treatments were applied to 2- to 4-trifoliate alfalfa, 4-leaf and 2-tiller wheat, 1- to 3-leaf cheat, cotyledon to 4-leaf henbit, and 0- to 2-inch bushy wallflower and field pennycress rosettes on October 11 with 66 F, 78% relative humidity, and overcast skies. Spring postemergence (SP) treatments were applied to 8-inch alfalfa, multi-tiller wheat and cheat, blooming henbit, 6-inch bushy wallflower, and 8- to 12-inch field pennycress on April 9 with 52 F, 31% relative humidity, and clear skies. Sequential (SEQ) treatments were applied to 8-inch alfalfa, multi-tiller wheat and cheat, blooming henbit, 6-inch bushy wallflower, and 8- to 12-inch field pennycress on April 11 with 72 F, 27% relative humidity, and clear skies. All treatments were applied with a CO_2 back-pack sprayer delivering 15 gpa at 25 psi through TT110015 Turbo Tee spray tips to the center 6.3 ft of 10- by 20-ft plots. The experiment was a randomized complete block design with four replications. Alfalfa injury and weed control were evaluated on March 31, April 28, and May 21.

Results and Discussion

None of the Roundup Ultra Max treatments at any rate or timing caused injury to alfalfa, except to the few non-Roundup Ready alfalfa biotypes in the population. Fall applications of Pursuit and Raptor caused substantial stunting and some stand loss. Injury from Pursuit and Raptor was more severe in one replication, probably because the alfalfa was less developed due to shading by nearby trees. Subsequent flushes of weeds after the early fall postmergence applications of Roundup Ultra Max resulted in weed escapes. Fall postemergence treatments of Roundup Ultra Max gave good control of most weed species, but a few late emerging weeds escaped control. Spring applications of Roundup Ultra Max provided good control of all weeds but henbit. However, spring treatments also appeared to compromise first cutting alfalfa yields and stand establishment (observation only) due to weed competition in the fall. Very few differences occurred among the Roundup Ultra Max application rates. Fall applications of Pursuit gave better control of wheat, cheat, and henbit than spring treatments. Pursuit gave good control of bushy wallflower and field pennycress with both fall and spring postemergence applications. Raptor provided excellent control of wheat, cheat, bushy wallflower, and field pennycress with both fall and spring postemergence treatments. However, henbit control with Raptor was much lower with spring than fall treatment. Roundup Ready alfalfa appears to have excellent tolerance to glyphosate and good potential for weed control in seedling alfalfa. (Dept. of Agronomy, Kansas State University, Manhattan)

Table 1. Alfalfa injury and weed control on March 31 from fall treatments in Roundup Ready alfalfa (Peterson and Regehr).

Treatment[a]	Application Rate	Application Time[b]	Alfalfa injury	Wheat	Cheat	Henbit	Bushy wallflower	Field pennycress
	(oz/A)		(%)	----------(% control)----------				
Roundup Ultra Max +AMS	26 + 2%	EFP	0	80	69	50	75	55
Roundup Ultra Max +AMS	39 + 2%	EFP	0	83	74	48	70	58
Roundup Ultra Max +AMS	52 + 2%	EFP	0	84	93	53	73	58
Roundup Ultra Max +AMS	26 + 2%	FP	0	98	100	81	94	91
Roundup Ultra Max +AMS	39 + 2%	FP	0	98	99	86	98	97
Roundup Ultra Max +AMS	52 + 2%	FP	0	98	98	88	100	99
Pursuit +NIS + AMS	1.44 + 0.25% + 2%	FP	23	74	99	100	100	100
Pursuit +NIS + AMS	2.2 + 0.25% + 2%	FP	35	88	100	100	100	100
Pursuit+Select+COC+AMS	1.44 + 5 + 1% + 2%	FP	35	95	100	100	100	100
Raptor+COC+AMS	5 + 1% + 2%	FP	38	97	100	100	100	100
Butyrac 200 + Select+CO	32 + 6 + 32	FP	10	93	95	84	63	89
LSD (5%)			9	8	9	5	7	7

[a] AMS = spray grade ammonium sulfate applied on a % w/w basis; NIS = Activate Plus nonionic surfactant from Agriliance applied on a % v/v basis; COC = Crop Oil Plus with 17% emulsifier from Agriliance.

[b] EFP = early fall postemergence; FP = fall postemergence.

Table 2. Alfalfa injury and weed control on April 28 or May 21 in Roundup Ready alfalfa (Peterson and Regehr).

Treatment[a]	Application Rate	Application Time[b]	Alfalfa injury	Wheat	Cheat	Henbit	Bushy wallflower	Field pennycress
	(oz/A)		(%)	(% control)				
Roundup Ultra Max +AMS/Roundup Ultra Max+AMS	26 + 2%/52 + 2%	EFP/SEQ	0	100	100	55	100	100
Roundup Ultra Max +AMS/Roundup Ultra Max+AMS	39 + 2%/52 + 2%	EFP/SEQ	0	100	100	50	100	100
Roundup Ultra Max +AMS/Roundup Ultra Max+AMS	52 + 2%/52 + 2%	EFP/SEQ	0	100	100	55	100	100
Roundup Ultra Max +AMS	26 + 2%	FP	0	96	94	80	96	87
Roundup Ultra Max +AMS	39 + 2%	FP	0	96	95	86	99	95
Roundup Ultra Max +AMS	52 + 2%	FP	0	98	94	89	99	98
Roundup Ultra Max +AMS	26 + 2%	SP	0	100	100	40	100	100
Roundup Ultra Max +AMS	39 + 2%	SP	0	100	100	45	100	100
Roundup Ultra Max +AMS	52 + 2%	SP	0	100	100	50	100	100
Pursuit +NIS + AMS	1.44+0.25% +2%	FP	8	50	100	100	100	100
Pursuit +NIS + AMS	2.2+0.25%+2%	FP	10	84	100	100	100	100
Pursuit+Select+COC+AMS	1.44+5+1%+2%	FP	14	91	99	100	100	100
Raptor+COC+AMS	5+1%+2%	FP	18	98	100	100	100	100
Butyrac 200 + Select+COC	32 + 6 +32	FP	0	86	89	84	45	80
Pursuit +NIS + AMS	1.44+0.25% +2%	SP	0	85	80	35	99	98
Pursuit +NIS + AMS	2.2+0.25%+2%	SP	0	90	81	35	99	98
Pursuit+Select+COC+AMS	1.44+5+1%+2%	SP	0	96	81	38	100	99
Raptor+COC+AMS	5+1%+2%	SP	0	100	100	38	97	100
LSD (5%)			7	7	6	6	7	7

[a] AMS = spray grade ammonium sulfate applied on a % w/w basis; NIS = Activate Plus nonionic surfactant from Agriliance applied on a % v/v basis; COC = Crop Oil Plus with 17% emulsifier from Agriliance.

[b] EFP = early fall postemergence; FP = all postemergence; SP = spring postemergence, SEQ = sequential treatments.

Fall Postemergence application of Roundup Ultra Max (26 oz/A) + AMS

Spring Postemergence application of Roundup Ultra Max (26 oz/A) + AMS

Fall Postemergence application of Raptor (5 oz/A) + NIS + UAN

Spring Postemergence application of Raptor (5 oz/A) + NIS + UAN