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Leafy spurge control with glyphosate plus 2,4-D: A regional research project

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Abstract:

Glyphosate plus 2,4-D has been registered as a fall applied treatment for leafy spurge control in pasture and rangeland. Research data are limited concerning weed control and potential grass injury with glyphosate in pasture and rangeland. Members of the Great Plains Agricultural Conference (GPAC) established a regional research project to evaluate various formulations of glyphosate plus 2,4-D for leafy spurge control and grass injury. The experiment was established in Colorado, Montana, North Dakota, South Dakota and Wyoming in dense stands of leafy spurge with several grass species present (Table 1). Treatments were applied on or near August 15 or September 15, 1989 using 8 to 20 gpa at 35 psi. Plots were 10 by 30 feet and treatments were replicated four times in a randomized complete block design at all locations.

Leafy spurge control and grass injury varied by location and treatment date. Glyphosate plus 2,4-D at 0.38 plus 0.65 lb/A provided an average of 79% leafy spurge control when applied in September in Colorado, North Dakota and South Dakota but only 63 and 13% control in Montana and Wyoming, respectively, 9 months after treatment (MAT) (Table 2). However, grass injury also was higher in Colorado and the Dakotas and averaged 77% compared to no injury in Montana and Wyoming. Leafy spurge control and grass injury was higher when treatments were applied in September compared to August at all locations except Montana.

Leafy spurge control was similar 9 MAT when glyphosate at 0.38 lb/A was applied with 2,4-D at 0.34 or 0.65 lb/A or with dicamba at 0.172 lb/A (Table 2). Glyphosate plus 2,4-D or glyphosate plus dicamba provided better leafy spurge control than glyphosate alone when applied in August, but control was similar when applied in September. Piclo-

ram applied at 0.5 lb/A provided 94% leafy spurge control with minimal grass injury averaged over both application dates and all locations except Montana and Wyoming where control averaged 70 and 32%, respectively. Leafy spurge control from picloram plus glyphosate was similar to picloram alone but grass injury was higher especially when applied in September.

Glyphosate plus 2,4-D provided less than 35% leafy spurge control 12 MAT averaged over both application dates and all locations except South Dakota (Table 3). No treatment provided satisfactory control 12 MAT in Montana, North Dakota or Wyoming. Glyphosate plus 2,4-D at 0.38 plus 0.34 lb/A applied in August in South Dakota provided 88% leafy spurge control which was similar to picloram at 0.5 lb/A.

Leafy spurge control and grass injury varied by region and application date. In general, glyphosate plus 2,4-D or dicamba provided 60 to 70% leafy spurge control with 30 or 70% grass injury 9 MAT when applied in August and September, respectively. Glyphosate plus 2,4-D is an economical treatment and will be useful in a long-term leafy spurge control program, especially in areas with a dense leafy spurge infestation and sparse grass cover.

Table 1. Location, cooperators, and application data for 1989-90 GPAC regional glyphosate study.

	Location/principal Investigator									
	Wyoming		Montana		S. Dakota		N. Dakota		Colorado	
	M. Ferrell		P. Fay		M. Peterson		R. Lym		K. G. Beck	
Application date (1989)	<u>7 Aug</u>	<u>12 Sept</u>	<u>7 Aug</u>	<u>15 Sept</u>	<u>15 Aug</u>	<u>16 Sept</u>	<u>16 Aug</u>	<u>14 Sept</u>	<u>18 Aug</u>	<u>15 Sept</u>
Air temperature (F)	80	48	62	70	73	75	78	68	81	77
Relative humidity (%)	37	55	66	72	75	40	43	51	44	34
Soil temp. 1 Inch (F)	110	65	55	52	75	77	79	67	66	52
Cloud cover	clear	clear	clear	5%	hazy	clear	clear	clear	85%	clear
Soil pH	6.3		6.4		7.6		7.4		7.5	
Soil organic matter (%)	1.8		9		3.7		2.3		4.1	
Leafy spurge stage	seed-set	dormant	seed-set	dormant	seed-set green	seed-set green	fall branching	green and red leaves dropping	post seed-set	post seed-set
Grasses present	Intermediate wheatgrass Bluegrass spp.		Timothy Sandburg bluegrass		Smooth brome Kentucky bluegrass		Western wheatgrass Bluegrass spp.		Western wheatgrass Kentucky bluegrass Smooth brome	

Table 2. Leafy spurge control and grass Injury 9 months after treatment.

Application time/ treatment	Rate (lb/A)	Wyoming		Montana		S. Dakota		N. Dakota		Colorado		mean ^a	
		Control	Grass Injury	Control	Grass Injury	Control	Grass Injury	Control	Grass Injury	Control	Grass Injury	Control	Grass Injury
(%)													
August 1989													
Glyphosate	0.38	10	0	11	0	48	46	29	40	33	8	36	31
Glyphosate+2,4-D ^b	0.38+0.34	35	3	67	0	89	35	52	29	68	20	70	28
Glyphosate+2,4-D ^c	0.38+0.65	23	0	61	0	77	49	55	16	64	16	65	27
Glyphosate+dicamba ^d	0.38+0.172	48	3	67	0	70	48	63	46	64	20	65	38
Picloram	0.5	30	0	80	0	90	0	85	18	99	23	91	13
Picloram+glyphosate	0.38+0.5	33	0	83	1	99	47	90	9	90	36	93	31
Picloram+glyphosate+2,4-D	0.5+0.38+0.65	23	7	78	0	98	29	68	30	99	31	88	30
September 1989													
Glyphosate	0.38	53	5	0	0	63	43	52	70	70	85	62	66
Glyphosate+2,4-D ^b	0.38+0.34	38	0	16	0	82	71	55	72	73	50	70	64
Glyphosate+2,4-D ^c	0.38+0.65	33	0	8	0	80	50	67	83	71	71	73	68
Glyphosate+dicamba ^d	0.38+0.172	63	9	13	0	92	69	66	85	79	77	79	77
Picloram	0.5	33	0	61	0	99	5	100	18	90	28	96	17
Picloram+glyphosate	0.38+0.5	40	3	62	0	99	70	99	97	97	66	98	78
Picloram+glyphosate+2,4-D	0.5+0.38+0.65	60	8	65	0	99	78	100	98	88	67	96	81
LSD (0.05)		29	5	14	NS	16	26	29	28	15	19	12	14
Location Mean													
LSD (0.05) Control	= 6	35	2	44	0	79	42	65	47	72	40		
Grass Injury	= 5												

^a South Dakota, North Dakota, and Colorado data only.

^b Landmaster II

^c Landmaster BW

^d Fallowmaster

Table 3. Leafy spurge control and grass injury 12 months after treatment.

Application time/ treatment	Rate (lb/A)	Wyoming		Montana		S. Dakota		N. Dakota		Colorado		mean ^a	
		Control	Grass Injury	Control	Grass Injury	Control	Grass Injury	Control	Grass Injury	Control	Grass Injury	Control	Grass Injury
----- (%) -----													
August 1989													
Glyphosate	0.38	0	0	5	0	38	31	4	0	9	3	3	0
Glyphosate+2,4-D ^b	0.38+0.34	8	0	38	0	88	33	5	6	28	15	17	2
Glyphosate+2,4-D ^c	0.38+0.65	10	0	28	0	58	35	13	8	31	10	17	3
Glyphosate+dicamba ^d	0.38+0.172	23	0	45	0	60	40	9	9	33	28	25	3
Picloram	0.5	5	0	48	0	82	5	9	0	88	20	21	0
Picloram+glyphosate	0.38+0.5	13	0	44	0	83	54	16	0	84	33	24	0
Picloram+glyphosate+2,4-D	0.5+0.38+0.65	3	0	28	0	92	36	9	3	78	25	13	1
September 1989													
Glyphosate	0.38	28	0	0	0	63	20	26	83	26	79	18	28
Glyphosate+2,4-D ^b	0.38+0.34	30	0	0	0	44	61	8	71	30	58	13	24
Glyphosate+2,4-D ^c	0.38+0.65	18	0	5	0	57	33	14	75	31	71	12	25
Glyphosate+dicamba ^d	0.38+0.172	45	0	9	0	64	56	16	84	55	74	23	28
Picloram	0.5	8	0	35	0	88	5	49	3	72	29	30	17
Picloram+glyphosate	0.38+0.5	13	0	29	0	87	73	54	70	75	49	32	23
Picloram+glyphosate+2,4-D	0.5+0.38+0.65	18	0	19	0	92	73	43	82	63	64	26	27
LSD (0.05)		21		12		29	30	20	14	11	14	NS	NS
Location Mean													
LSD (0.05) Control	= 12	15	0	22	0	65	37	18	33	47	37		
Grass Injury	= 14												

^a Montana, North Dakota, and Wyoming data only.

^b Landmaster 11

^c Landmaster BW

^d Fallowmaster