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Published by: Great Plains Agricultural Council: Leafy Spurge Symposium.

Leafy spurge control with glyphosate compounds

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Experiments were established at Ft. Collins and Parker, CO to evaluate the effectiveness of prepackaged mixes of glyphosate + 2,4-D or dicamba for leafy spurge (*Euphorbia esula* L.) control. Leafy spurge and downy brome were the dominant plant species at Ft. Collins. The Parker site was a pasture where leafy spurge and Kentucky bluegrass (*Poa pratensis* L.) were the dominant species.

Different glyphosate + 2,4-D formulations were included in the experiment. Landmaster II and Landmaster BW contain 1.2 + 1.0 and 1.2 + 1.9 lb of glyphosate + 2,4-D per gallon of product, respectively, both herbicides formulated as their isopropylamine salts. Fallowmaster, 1.5 + 0.6 lb of glyphosate + dicamba per gallon of product, respectively, also was evaluated. Glyphosate and dicamba were formulated as their isopropylamine salts. Picloram and dicamba were included for comparison.

Landmaster II was applied at 0.94 lb ai/A (0.51 + 0.43 lb glyphosate + 2,4-D, respectively), Landmaster BW at 1.36 lb ai/A (0.53 + 0.83 lb glyphosate + 2,4-D, respectively), Fallowmaster at 0.73 lb ai/A (0.52 + 0.21 lb glyphosate + dicamba, respectively), picloram at 1.0 lb ai/A, and dicamba at 2.0 lb ai/A. Treatments were applied in spring at flowering or in fall to regrowth on May 22 and October 10, 1989, respectively at Ft. Collins, and on June 14 and October 20, 1989, respectively at Parker. All treatments were applied with a CO₂ pressurized backpack sprayer at 15 psi. All treatments containing glyphosate were applied through 11001LP flat fan tips at 10 gpa, whereas picloram and dicamba were applied through 11003LP flat fan tips at 24 gpa. In spring at Ft. Collins, leafy spurge was 12 to 15 inches tall, flowering and there were 1 to 5 plants/ft²; in fall, leafy spurge was 12 to 16 inches tall, vegetative, and there were 5 to 10 plants/ft². Downy brome was the only grass present at Ft. Collins, therefore, grass injury data were not taken. In spring at Parker, leafy spurge was 13 to 18 inches tall, flowering with some plants setting seed, and there were 2 to 5 plants/ft²; in fall leafy spurge was 10 to 16 inches, vegetative, and there were 2 to 5 plants/ft². In spring at Parker, Kentucky bluegrass was 4 to 6 inches tall and vegetative; and in fall it was 3 to 5 inches tall and vegetative.

At Ft. Collins, both Landmaster formulation rates provided rapid leafy spurge shoot burn-down with spring applications, but control did not persist during the year of application (Table 1). Spring applied Fallowmaster provided poor control the year of ap-

plication. Excellent season-long control occurred with spring applied picloram whereas, dicamba provided poor season-long control. Fall treatments were evaluated 17 days after application and at that time, Landmaster II and Landmaster BW provided 79 and 73% leafy spurge control, respectively (data not shown). Fall applied Fallowmaster only provided 59% control. Fall applied picloram and dicamba provided 80 and 73% leafy spurge control, respectively.

At Parker, both Landmaster formulation rates applied in spring provided fair control 30 DAT, but again, control did not persist (Table 2). Grass injury caused by these compounds was evaluated 90 DAT; 45 and 29% injury occurred with Landmaster II and Landmaster BW, respectively. Spring applied Fallowmaster provided poor season-long control. Grass injury caused by Fallowmaster was 48% 90 DAT. Picloram applied in spring provided only 68% control 30 DAT, but increased to 83% 90 DAT. Dicamba provided 40% control 30 DAT, and control still was poor (58%) 90 DAT. Low grass injury occurred with spring applied picloram and dicamba (10 and 17%, respectively, 90 DAT). Fall applied treatments were not evaluated in 1989 at Parker.

Control longevity and grass injury carryover were evaluated at 13 and 12 months after treatment (MAT) at Ft. Collins and Parker, respectively. At both locations, all products containing glyphosate provided poor control the season after spring treatments were applied (Tables 1 and 2). Fall applied Landmaster products provided poor to fair control the season after treatments were applied. Fall applied Fallowmaster provided only 8% control 12 MAT at Parker; however, at Ft. Collins, 70% leafy spurge control occurred with this treatment 13 MAT. Picloram provided good to excellent control at Ft. Collins and excellent control at Parker the season after treatments were applied, regardless of timing. Spring applied dicamba provided poor control at both locations (37 and 59% control at Ft. Collins and Parker, respectively) in 1990. However, 84% leafy spurge control occurred at both locations with fall applied dicamba.

Grass injury persisted at Parker (Table 2). Spring applied Landmaster II caused 47% grass injury 12 MAT whereas, Landmaster BW caused only 13% injury. Grass injury from spring applied Fallowmaster persisted and was 29% 12 MAT. No grass injury occurred with either fall applied Landmaster treatments but 20% grass injury persisted with fall applied Fallowmaster. Fall applied picloram caused greater grass injury to carry-over into the following growing season compared to the spring treatment. Dicamba caused 13 and 21% grass injury to persist 12 MAT with the spring and fall applied treatments, respectively.

Herbicide treatments containing glyphosate + 2,4-D generally caused rapid leafy spurge shoot burn-down, but weed recovery ensued before the end of the growing season. Only the glyphosate + 2,4-D at 0.94 lb and the Fallowmaster at 0.73, applied in fall, provided comparable control to picloram, and only to picloram applied in spring.

Using glyphosate + 2,4-D mixtures is most likely best suited for areas where herbicides with soil activity presents a potential hazard. Repeat applications will be necessary for adequate leafy spurge control where glyphosate + 2,4-D is used and grass injury may occur. Sequential applications of glyphosate + 2,4-D and split applications of 2,4-D in spring followed by fall applied glyphosate + 2,4-D are being evaluated.

Table 1. Leafy spurge (EPHES) control with glyphosate + 2,4-D, glyphosate + dicamba, picloram, and dicamba applied in spring or fall at Ft. Collins, Colorado.

Treatment	Rate (lb ai/A)	Timing	EPHES control		
			30 DAT	90 DAT	13 MAT
			% of check		
Glyphosate + 2,4-D	0.51 + 0.43	flower	94	55	51
Glyphosate + 2,4-D	0.53 + 0.83	flower	95	60	59
Glyphosate + dicamba	0.52 + 0.21	flower	51	36	38
Picloram	1.0	flower	96	99	82
Dicamba	2.0	flower	54	55	37
Glyphosate + 2,4-D	0.51 + 0.43	fall	-	-	64
Glyphosate + 2,4-D	0.53 + 0.83	fall	-	-	53
Glyphosate + dicamba	0.52 + 0.21	fall	-	-	70
Picloram	1.0	fall	-	-	99
Dicamba	2.0	fall	-	-	84
LSD (0.05)			15	15	19

Table 2. Leafy spurge (EPHES) control and Kentucky bluegrass (POAPR) injury with glyphosate + 2,4-D, glyphosate + dicamba, picloram, and dicamba applied in spring or fall at Parker, Colorado.

Treatment	Rate (lb ai/A)	Timing	EPHES control & POAPR injury				
			30 DAT	90 DAT		12 MAT	
			EPHES	EPHES	POAPR	EPHES	POAPR
			% of check				
Glyphosate + 2,4-D	0.51 + 0.43	flower	65	54	45	52	47
Glyphosate + 2,4-D	0.53 + 0.83	flower	71	52	29	56	13
Glyphosate + dicamba	0.52 + 0.21	flower	40	43	48	66	29
Picloram	1.0	flower	68	83	10	90	14
Dicamba	2.0	flower	40	58	17	59	13
Glyphosate + 2,4-D	0.51 + 0.43	fall	-	-	-	0	0
Glyphosate + 2,4-D	0.53 + 0.83	fall	-	-	-	8	0
Glyphosate + dicamba	0.52 + 0.21	fall	-	-	-	9	20
Picloram	1.0	fall	-	-	-	95	33
Dicamba	2.0	fall	-	-	-	84	22
LSD (0.05)			8	10	8	14	23