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Leafy spurge control with picloram plus dicamba or various 2,4-D formulations applied annually¹

RODNEY G. LYM and CALVIN G. MESSERSMITH

Picloram remains the most effective herbicide for leafy spurge control. Previous research at North Dakota State University has shown picloram + 2,4-D at 0.25 + 1 lb/A applied annually to be more cost effective than picloram at 1 to 2 lb/A applied once. The purpose of these experiments was to compare the effect of dicamba and/or various 2,4-D formulations applied with picloram for leafy spurge control.

The initial 2,4-D formulation experiments were established on the Sheyenne National Grasslands near McLeod, ND, on June 15, 1984, and near Hunter, ND, on May 30, 1985. The herbicides were applied using a tractor mounted sprayer delivering 8.5 gpa at 35 psi. All plots were 10 by 30 ft in a randomized complete block design with four replications. Evaluations were based on visible percent stand reduction as compared to the control.

Picloram + 2,4-D mixed amine provided better leafy spurge control than picloram + 2,4-D alkanolamine (Table 1). Leafy spurge control from picloram + 2,4-D mixed amine at 0.25 + 1 lb/A was similar to control from picloram at 0.5 lb/A alone, but picloram + 2,4-D is approximately 30% less expensive. Similarly, leafy spurge control from picloram + dicamba was greater when applied with 2,4-D mixed amine than with the alkanolamine. Neither 2,4-D formulation alone controlled leafy spurge.

Picloram + dicamba + 2,4-D mixed amine provided 72% leafy spurge control 2 years after application at Hunter (Table 1). This level of control was similar to that attained with picloram at 2 lb/A in North Dakota but is 70% less expensive. Therefore, similar experiments were begun in 1986 to evaluate this combination treatment further. Experiments were established on June 11 and 18, near Dickinson and Valley City, respectively, and on August 28 on the Sheyenne National Grasslands and September 3 and 15 near Valley City and Dickinson, respectively. Treatments were applied annually as previously described in the spring or fall through 1988.

Leafy spurge control was similar regardless of the 2,4-D formulation applied with picloram + dicamba in the spring (Table 2). Control was only 20% when averaged across all treatments and both locations 1 year after the second application. This is much lower

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than would be expected with picloram + 2,4-D at 0.25 + 1 lb/A which averages 60% or more based on long-term observations.

Leafy spurge control with picloram at 0.5 lb/A averaged 32% 1 year following the second fall application (Table 2). Control improved to 49% when applied with dicamba at 2 lb/A. Leafy spurge control with picloram + dicamba was not improved by adding 2,4-D regardless of the 2,4-D formulation.

In general, leafy spurge control was similar with all 2,4-D formulations in combination with picloram and dicamba. However, the 2,4-D mixed amine formulation occasionally did provide better leafy spurge control in a combination treatment than the alkanolamine or ester formulations. These experiments will be continued to evaluate the long-term effect of picloram combined with various 2,4-D formulations and dicamba on leafy spurge control.

Table 1. Leafy spurge control with picloram applied with various formulations of 2,4-D (Lym and Messersmith).

Location/application date		Months after treatment				
Treatment	Rate	3	12	15	24	27
		(% control)				
Sheyenne, June 1984						
Picloram	0.25	76	23	4	1	–
Picloram	0.5	95	75	43	10	–
Picloram + 2,4-D alkanolamine	0.25 + 1	78	14	6	3	–
Picloram + 2,4-D mixed amine ^a	0.25 + 1	94	72	23	21	–
2,4-D mixed amine ^a	4	47	7	13	0	–
2,4-D alkanolamine	4	42	20	7	5	–
LSD (0.05)		15	25	15	12	–
Hunter, June 1985						
Picloram + dicamba + 2,4-D mixed amine ^a	0.25 + 1 + 2	99	98	89	72	60
Picloram + dicamba + 2,4-D alkanolamine	0.25 + 1 + 2	51	51	25	25	18
2,4-D mixed amine ^a	4	6	3	0	0	0
2,4-D alkanolamine	4	5	0	0	0	0
Picloram + dicamba	0.25 + 1	53	38	15	0	7
LSD (0.05)		15	15	15	15	20

^a Mixed amine salts of 2,4-D (2:1 dimethylamine:diethanolamine)-EH 736.

Table 2. Leafy spurge control with picloram applied with dicamba and various formulations of 2,4-D applied annually since 1986 for leafy spurge control (Lym and Messersmith).

Application date/treatment	Rate (lb/A)	Location/1988 evaluation date						Mean ^a
		Valley City		Dickinson		Sheyenne		
		June	Aug	June	Sept	June	Sept	
		(% control)						
Spring								
2,4-D mixed amine ^b + dicamba+picloram	0.25+1.25	24	63	10	79			17
2,4-D mixed amine ^b + dicamba+picloram	2+0.5+0.25	17	59	26	88			22
2,4-D mixed amine ^b + picloram+dicamba	1+0.5+0.12	15	52	12	76			13
2,4-D alkanolamine + dicamba+picloram	2+1+0.25	25	54	18	84			22
Dicamba+picloram	1+0.25	32	56	20	86			26
LSD (0.05)		NS	NS	NS	NS			NS
Fall								
2,4-D mixed amine ^b + dicamba+picloram	2+1+0.25	84	31	66	8	73	38	26
2,4-D alkanolamine + dicamba+picloram	2+1+0.25	89	29			73	54	42
2,4-D mixed amine ^b + dicamba+picloram	4+2+0.5	96	61	94	45	93	67	56
2,4-D ester ^c + 2,4-DP + picloram + dicamba	2+2+0.5+0.25	74	14	49	8	74	46	22
2,4-D ester ^c + 2,4-DP + picloram + dicamba	2+2+0.5+0.5	96	47	82	35	93	67	50
2,4-D alkanolamine + dicamba+picloram	4+2+0.5	94	50	81	39	90	61	50
Dicamba+picloram	2+0.5	95	41	93	51	83	56	49
Picloram	0.5	95	46	57	15	65	33	32
LSD (0.05)		6	20	32	36	17	27	11

^a Mean 24 months after first treatment.

^b Mixed amine salts of 2,4-D (2:1 dimethylamine:diethanolamine)–EH 736.

^c 2,4-D isooctyl ester: 2,4-DP butoxyethanol ester:dicamba (4:4:1)–EH 680.