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Comparison of 2,4-D formulations with picloram or glyphosate spring- or fall-applied for leafy spurge control¹

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Picloram plus 2,4-D is the most cost-effective treatment for leafy spurge control. Previous research at North Dakota State University has shown that leafy spurge control is increased 15 to 25% when 2,4-D at 1 lb/A is applied with picloram at 0.5 lb/A or less. Control has been similar regardless of the 2,4-D formulation applied with picloram. However, subtle differences between treatments may not be revealed when treatments are applied only once. Recently, several powder formulations of 2,4-D have been formulated to decrease the cost of container shipment and disposal. The purpose of these experiments was to evaluate various 2,4-D formulations plus glyphosate, metsulfuron, or picloram applied annually for leafy spurge control.

The first experiment was established on June 7, 1990 near Valley City, ND. Herbicides were applied using a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. Retreatments were applied in 1991. All plots were 10 by 30 feet in a randomized complete block design with four replicates. Evaluations were based on visible percent stand reduction as compared to the control.

Leafy spurge control was similar with picloram plus 2,4-D regardless of 2,4-D formulation (Table 1). Control was generally lower 15 MAFT (months after the first treatment) than 3 MAFT. Above average precipitation was received during the second year (1991) and leafy spurge regrowth was vigorous. Picloram at 0.25 lb/A provided better leafy spurge control than either 2,4-D formulation alone even when 2,4-D was applied at 4 lb/A.

The second and third experiments were established September 9, 1991 near Valley City, ND using the same methods previously described. Leafy spurge was in the fall regrowth stage with red stems and leaves.

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Table 1. Comparison of 2,4-D amine and mixed amine formulations applied alone and with picloram in June 1990 and 1991 for leafy spurge control (Lym and Messersmith).

Treatment	Rate — lb/A —	Months after first treatment			
		3	12	15	24
		— % control —			
2,4-D mixed amine ^a	1	27	0	0	0
2,4-D mixed amine ^a	2	33	0	0	0
2,4-D mixed amine ^a	4	29	0	1	6
2,4-D alkanolamine	4	43	0	4	8
2,4-D mixed amine + picloram	2 + 0.25	59	18	26	29
2,4-D alkanolamine + picloram	2 + 0.25	58	13	46	33
2,4-D mixed amine + picloram	2 + 0.5	83	50	54	79
2,4-D alkanolamine + picloram	2 + 0.5	78	47	64	77
Picloram	0.25	62	4	23	22
Picloram	0.5	79	35	60	65
Picloram	1	96	89	93	100
2,4-D alkanolamine + picloram	1 + 0.5	77	29	64	78
LSD (0.05)		18	22	25	22

^aMixed amine salts of 2,4-D (2:1 v/v dimethylamine:diethanolamine)-HiDep.

As in the previous experiment with spring-applied treatments, leafy spurge control was similar with picloram plus 2,4-D regardless of 2,4-D formulation (Table 2). No treatment provided satisfactory control 12 MAT including picloram plus 2,4-D at 0.5 plus 1 lb/A, the standard fall-applied treatment for leafy spurge. Previous research has shown this treatment will provide 90% or better leafy spurge control following 3 to 4 annual re-treatments.

Table 2. Comparison of 2,4-D mixed amine and alkanolamine applied in September 1991 for leafy spurge control (Lym and Messersmith).

Treatment	Rate — lb/A —	Control/MAT	
		9	12
		— % —	
2,4-D mixed amine ^a	1	16	0
2,4-D mixed amine ^a	2	15	0
2,4-D mixed amine ^a	4	20	0
2,4-D mixed amine ^a + picloram	2 + 0.25	67	5
2,4-D mixed amine ^a + picloram	2 + 0.5	94	11
2,4-D alkanolamine + picloram	2 + 0.5	97	9
2,4-D alkanolamine + picloram	1 + 0.25	66	0
2,4-D alkanolamine + picloram	1 + 0.5	96	35
LSD (0.05)		30	6

^aMixed amine salts of 2,4-D (2:1 v/v dimethylamine:diethanolamine) HiDep.

Leafy spurge control with glyphosate was similar regardless of 2,4-D formulation (Table 3). Metsulfuron did not control leafy spurge whether applied alone or with 2,4-D regardless of formulation. The commercial formulation of glyphosate plus 2,4-D even when applied at a lower rate tended to provide better control than the tank-mixed treatments.

Table 3. 2,4-D mixed amine applied alone and with glyphosate or metsulfuron for leafy spurge control in September 1991 (Lym and Messersmith).

Treatment	Rate	Control/MAT
		9
	oz/A	%
2,4-D mixed amine ^a	15.2	18
2,4-D mixed amine ^a	30.4	5
Metsulfuron	0.25	9
Glyphosate	2	0
2,4-D mixed amine ^a + metsulfuron	15.2 + 0.25	0
2,4-D mixed amine ^a + metsulfuron	30.4 + 0.25	0
2,4-D mixed amine ^a + glyphosate	15.2 + 2	4
2,4-D mixed amine ^a + glyphosate	30.4 + 2	0
2,4-D alkanolamine ^a + glyphosate	20.8 + 12.2	13
2,4-D mixed amine ^a + glyphosate	20.8 + 12.2	4
Glyphosate + 2,4-D ^b	0.4 + 0.7	32
LSD (0.05)		20

^aMixed amine salts of 2,4-D (2:1 dimethylamine:diethanolamine)-HiDep.

^bCommercial formulation (Landmaster BW).

The fourth experiment was established June 8, 1992 near Valley City when the leafy spurge was in the yellow bract to flowering growth stage with lush growth and 18 to 24 inches tall. The 2,4-D formulations were added to water immediately prior to application and no surfactants were used.

The water soluble powder CL-782 provided only 68% topgrowth control 1 MAT compared to 97% or better for all other 2,4-D formulations including a second dimethylamine powder (Table 4). Control was similar for all 2,4-D treatments 3 MAT, including CL-782 and averaged 20%.

In general, leafy spurge control was similar with all 2,4-D formulations applied alone or in combination with picloram or glyphosate. CL-782 dimethylamine 80% WSP was the only 2,4-D formulation evaluated that provided less control than other 2,4-D formulations and this occurred only 1 MAT.

Table 4. Comparison of various 2,4-D formulations applied in June 1992 for leafy spurge control (Lym and Messersmith).

Treatment	Rate —lb/A —	Control/MAT	
		1	3
		%	
2,4-D dimethylamine (Weedar 64)	2	98	20
2,4-D dimethylamine + diethanolamine (HiDep)	2	98	13
2,4-D butoxyethylester (Weedone LV4)	2	100	18
2,4-D acid + butoxyethylester (Weedone 638)	2	99	18
2,4-D isooctyl(2-ethylhexyl)ester (Esteron 99)	2	99	18
2,4-D triisopropanolamine + diethylamine (Formula 40)	2	97	17
2,4-D dimethylamine 80% WSP (CL-782)	2	68	28
2,4-D dimethylamine 85% WSP (Savage)	2	99	26
Picloram	0.5	99	89
LSD (0.05)		11	27