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Leafy spurge control with picloram plus various 2,4-D formulations or pH-buffered spray solution[1]

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Picloram remains the most effective herbicide for leafy spurge control. Previous research at North Dakota State University has shown annual application of picloram + 2,4-D at 0.25 + 1.0 lb/A to be more cost effective than picloram at 1.0 to 2.0 lb/A applied once. The purpose of these experiments was to compare the effect of a mixed amine or alkanolamine formulation of 2,4-D and pH-buffered spray solution with picloram on leafy spurge control.

The 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 feet in a randomized complete block design with four replications. Evaluations were based on percent stand reduction as compared to the control. Picloram plus the mixed amine ormulation of 2,4-D provided better leafy spurge control compared to picloram plus 2,4-D alkanolamine (Table). Leafy spurge control with picloram + 2,4-D mixed amine at 0.25 + 1.0 lb/A was similar to picloram at 0.5 lb/A alone and was approximately 30% less expensive. Similarly, leafy spurge control from picloram plus dicamba was greater when applied with 2,4-D mixed amine than with the alkanolamine. Neither 2,4-D formulation alone controlled leafy spurge.

Previous greenhouse research at North Dakota State University has shown increased picloram uptake and translocation to leafy spurge roots when applied in a pH 4.75 buffered solution compared to higher or lower pH solutions. A field experiment to evaluate long-term leafy spurge control with buffered and unbuffered spray solutions was established on June 3, 1985. The experimental methods were similar to the 2,4-D formulated experiments except citric acid was added to the picloram:water solution as necessary to maintain a pH of 4.75. Leafy spurge control was less when the spray solution was buffered to pH 4.75 compared to unbuffered solutions regardless of picloram rate. The buffered spray solution tended to desiccate the leafy spurge leaves which probably resulted in poor herbicide uptake. The temperature was 74° F with 60% relative humidity when the treatments were applied, but buffered picloram solutions in the greenhouse experiments were applied following a topical surfactant application which may have prevented leaf injury. Thus application during a period of high humidity in the field may result in less leaf injury and increased translocation to the roots as shown in greenhouse experiments:

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Table. Leafy spurge control with picloram alone and in combination with various 2,4-D formulations and a buffer solution. (Lym and Messersmith).

Treatment	Rate	Evaluation date				
		Aug 1984	May 1985	Aug 1985	June 1986	Aug 1986
	(lb/A)	(% control)				
2,4-D formulations, Sheyenne, ND						
Picloram	0.25	76	23	4	1	---
Picloram	0.5	95	75	43	10	---
Picloram + 2,4-D alkanolamine	0.25+1.0	78	14	6	3	---
2,4-D mixed amine[a]	4.0	47	7	13	0	---
Picloram + 2,4-D mixed amine[a]	0.25+1.0	94	72	23	21	---
2,4-D alkanolamine	4.0	42	20	7	5	---
LSD (0.05)		15	25	15	12	
2,4-D formulations, Hunter, ND						
Picloram + dicamba + 2,4-D mixed amine[a]	0.25+1.0+2.0	---	---	99	98	89
2,4-D mixed.amine[a]	4.0	---	---	6	3	0
2,4-D alkanolamine	4.0	---	---	5	0	0
Picloram + dicamba +2,4-D alkanolamine	0.25+1.0+2.0	---	---	51	51	25
Picloram + dicamba	0.25+1.0	---	---	53	38	15
LSD (0.05)				15	15	15
pH-buffered, Hunter, ND						
Picloram	0.5	---	---	54	30	36
Picloram	1.0	---	---	83	79	46
Picloram + buffer[b]	0.25	---	---	54	11	6
Picloram + buffer[b]	0.5	---	---	29	7	13
Picloram + buffer[b]	1.0	---	---	38	27	24
LSD (0.05)				17	38	36

[a]Mixed amine salts of 2,4-D (2:1 dimethylamine:diethanolamine)-EH736
[b]Citric acid buffered to pH 4.75.