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## **Picloram and 2,4-D combination treatments for long-term leafy spurge management**

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Picloram is an effective herbicide for leafy spurge control especially when applied at rates from 1 to 2 lb/A. However, the high cost of picloram at 2 lb/A makes it uneconomical to treat large acreages in pasture and rangeland weed control programs. Research by North Dakota State University has suggested that picloram at 0.25 to 0.5 lb/A applied annually will give satisfactory leafy spurge control after 3 to 5 years. The purpose of this experiment is to establish the number of annual applications of picloram needed to provide 90 to 100% control of leafy spurge and to investigate possible synergism between picloram and 2,4-D.

The experiment was established at three locations in North Dakota and began on 25 August 1981 at Dickinson, 1 September 1981 at Sheldon and on 11 June 1982 at Valley City. The soil at Dickinson was a loamy fine sand with pH 6.6 and 3.6% organic matter, at Sheldon was a fine sandy loam with pH 7.7 and 2.1% organic matter, and at Valley City was a loam with pH 6.7 and 9.4% organic matter. Dickinson, located in western North Dakota, generally receives much less precipitation than the other two sites located in eastern North Dakota. All treatments were applied annually except 2,4-D alone which was applied biannually (both spring and fall). Picloram treatments were applied in late August 1981 and in June of 1982 through 1986. The Sheldon location was discontinued following the fall evaluations in 1985. Thus, the Dickinson site has received six picloram and picloram plus 2,4-D treatments and 11 2,4-D treatments, while the Valley City site has received five and ten treatments, respectively. The plots were 10 by 30 feet and each treatment was replicated four times in a randomized complete block design at all sites. Evaluations were based on percent stand reduction as compared to the control.

Picloram at 0.25, 0.375 and 0.5 lb/A provided 58, 77 and 86% leafy spurge control, respectively, 48 months after treatment when averaged across all locations (Table). Control had gradually increased for all picloram treatments over the experiment. 2,4-D alone provided an average of 50% control of leafy spurge after biannual applications for 5 years.

Leafy spurge control increased when 2,4-D was applied with picloram at 0.25 or 0.375 lb/A (Table). Leafy spurge control increased an average of 26 and 14% with picloram at 0.25 or 0.375 lb/A plus 2,4-D at 1 to 2 lb/A, respectively, when compared to the same picloram rate applied alone 48 months after treatment. Picloram at 0.5 lb/A plus 2,4-D provided an average of 95% leafy spurge control and was similar to picloram at 0.5 lb/A alone at 8%. The greatest enhancement with 2,4-D plus picloram seems to be with 2,4-D at 1.5 lb/A or less and picloram at 0.375 lb/A or less. In general, leafy spurge control has been similar at all sites and does not seem to be influenced by soil types, pH, or

organic matter. However, leafy spurge control at Dickinson had declined in 1986 compared to 1985 which probably was due to above average precipitation and excellent growing conditions in 1986 following several years of below average precipitation. After six treatments with picloram at 0.5 lb/A alone and all picloram plus 2,4-D treatments provided control of leafy spurge near or at the 90 to 100% target level.. Some type of treatment will need to be continued to maintain control, but perhaps more economical treatments will sustain the target control level.

**Table. Leafy spurge control from annual picloram or picloram plus 2,4-D treatments and biannual 2,4-D treatments at two locations in North Dakota.**

Herbicide	Rate	Site and 1986 evaluation date				Months after treatment			
		Dickinson		Valley City		12 <sup>a</sup>	24	36	48
		June	Sept.	June	Aug.				
		(lb/A) ————— (% control) —————							
Picloram	0.25	52	48	43	81	39	48	48	58
Picloram	0.375	62	76	82	82	65	62	52	77
Picloram	0.5	70	76	68	78	65	71	81	86
2,4-D bian	1	40	47	28	46	22	30	38	50
2,4-D bian	1.5	36	25	50	41	22	24	26	45
2,4-D bian	2	33	24	65	53	19	30	26	54
Pic+2,4-D	0.25+1	77	83	69	87	52	66	63	85
Pic+2,4-D	0.25+1.5	67	77	62	82	58	66	70	85
Pic+2,4-D	0.25+2	67	73	84	82	57	62	66	83
Pic+2,4-D	0.375+1	82	83	81	90	69	72	70	90
Pic+2,4-D	0.375+1.5	87	91	84	89	68	74	76	93
Pic+2,4-D	0.375+2	79	85	91	89	68	59	76	91
Pic+2,4-D	0.5+1	84	92	91	93	71	75	84	94
Pic+2,4-D	0.5+1.5	80	90	97	94	64	73	80	97
Pic+2,4-D	0.5+2	83	99	94	94	76	75	81	95
LSD (0.05)		19	20	23	16	18	14	19	14

<sup>a</sup>Mean values include data from the Sheldon location which was discontinued after 1985.