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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 seven picloram and picloram plus 2,4-D treatments and 13 2,4-D treatments, while the Valley City site has received six and 12 treatments, respectively. The plots were 10 by 30 ft 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, 0.38 and 0.5 lb/A provided 49, 69 and 77% leafy spurge control, respectively, 60 months after treatment (Table). Control had declined by approximately 9% compared to the previous year. 2,4-D alone provided an average of 47% control of leafy spurge after biannual applications for 6 years.

Leafy spurge control 60 months after treatment increased by an average of 26, 16, and 13% when 2,4-D at 1 to 2 lb/A was applied with picloram at 0.25, 0.38, or 0.5 lb/A respectively, when compared to the same picloram rate applied alone. Picloram at 0.5 lb/A plus 2,4-D provided an average of 90% leafy spurge control but had declined slightly compared to the previous year. 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 and 1987 compared to 1985 which probably was due to above average

precipitation and excellent growing conditions in 1986 following several years of below average precipitation.

Picloram at 0.5 lb/A alone and all picloram at 0.38 or 0.5 lb/A plus 2,4-D treatments are near or have reached the target of 90% or better leafy spurge control. Some type of treatment will need to be continued to maintain control, but perhaps more economical treatments will sustain the target control level. (Published with approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo 58105).

**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 (Lym and Messersmith).**

		Site and 1987 evaluation date								
Herbicide	Rate	Dickinson		Valley City		Months after treatment				
		June	Sept	May	Aug	12 <sup>a</sup>	24	36	48	60
	(lb/A)	----- (% control) -----								
Picloram	0.25	51	30	48	61	39	48	48	58	49
Picloram	0.38	65	51	74	79	65	62	52	77	69
Picloram	0.5	76	63	77	78	65	71	81	86	77
2,4-D bian	1	55	30	24	25	22	30	38	50	39
2,4-D bian	1.5	48	27	48	42	22	24	26	45	49
2,4-D bian	2	54	24	55	27	19	30	26	54	54
Pic+2,4-D	0.25+1	79	79	67	94	52	66	63	85	73
Pic+2,4-D	0.25+1.5	81	84	74	85	58	66	70	85	77
Pic+2,4-D	0.25+2	75	62	76	90	57	62	66	83	76
Pic+2,4-D	0.38+1	79	73	90	91	69	72	70	90	84
Pic+2,4-D	0.38+1.5	85	81	84	92	68	74	76	93	84
Pic+2,4-D	0.38+2	82	85	90	95	68	59	76	91	86
Pic+2,4-D	0.5+1	82	81	92	99	71	75	84	94	87
Pic+2,4-D	0.5+1.5	86	89	97	96	64	73	80	97	91
Pic+2,4-D	0.5+2	86	87	96	98	76	75	81	95	91
LSD (0.05)		20	19	20	19	18	14	19	14	14

<sup>a</sup> Mean values through 48 months after treatment include data from the Sheldon location which was discontinued after 1985.