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## **Roller and wick application of picloram for leafy spurge control<sup>1</sup>**

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Experiments were conducted to determine the effectiveness of roller and wick application of picloram as an economical alternative for leafy spurge control in pastureland. Leafy spurge control was compared for conventional broadcast, roller and wick application. Also, variable picloram concentrations, wick designs, height of applicator during treatment and time of treatment were evaluated. The wick applicator is similar to the rope-wick applicator but uses a poly-foam backed canvas instead of the rope and delivers more volume of solution per acre for improved coverage in dense leafy spurge stands. (Wick design described in 1981 NCWCC Research Report 3:36-37).

All experiments were a randomized complete block design with four replications, except the first experiment had five replications. The broadcast treatments were applied at 35 psi, and at 8.5 gpa for the first experiment and 8 gpa for the last three experiments. The picloram concentrations with the roller and wick applications varied from 1:1 to 1:15 picloram (Tordon 22K):water (v:v). The 1:7 concentration was comparable to picloram at 2 lb/A broadcast at 8 gpa (1 gal Tordon 22K:7 gal water). The roller and wick applicators were adjusted to treat the top half of the tallest leafy spurge. Evaluations were based on reduction of plant density as compared to the control.

The first experiment was established on 3 October 1979 near Walcott, ND with broadcast treatments of picloram compared to roller applications at 1 or 3 mph. The leafy spurge was 20 to 25 inches tall with senescent lower leaves but with new fall growth on the stem tip. The temperature was in the low 40's F and a killing frost occurred within 6 days of treatment.

Picloram broadcast at 2 lb/A provided 100% control in the year following treatment, and control had decreased steadily to 85% by the end of the third year (Table 1). The roller applied treatments and picloram at 1 lb/A broadcast provided similar leafy spurge control for one year, but the roller applied treatments were better 2 and 3 years after application.

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**Table 1. Leafy spurge control with picloram using the roller applicator near Walcott, ND for treatments applied 3 October 1979. (Lym and Messersmith).**

Type of application	Rate <sup>a</sup> (lb/A)	Control				
		May 1980	June 1980	May 1981	Aug. 1981	June 1982
Broadcast	1	99	79	59	19	6
Broadcast	2	100	100	98	96	85
Roller - 1 mph	2	99	80	61	43	34
Roller - 2 mph	2	94	77	70	53	24
LSD (0.05)		6	13	19	32	28

<sup>a</sup>Solution concentration on the roller was the same as 2 lb/A at 8.5 gpa broadcast (picloram (Tordon 22K): water=1:7.5 v:v).

The second experiment evaluated the most efficient picloram concentration, for use with the roller and wick applicators. Solution concentrations ranged from 1:1 to 1:15 picloram (Tordon 22K):water (v:v). An experiment was established in the spring on 16 June 1980 near Sheldon, ND and in the fall near Valley City, ND on 2 September 1980. The lowest solution concentration that gave adequate leafy spurge control was considered the most efficient because it used less picloram per acre than a more concentrated solution. The 1:1 solution concentration provided the highest leafy spurge control after two years (Table 2). However, the 1:3 solution concentration may be the most efficient mixture, because both 1:1 and 1:3 solution concentrations provided similar control with both applicators through 1981 and retreatment would have been recommended for all treatments in June 1982. Control was similar between spring and fall treatments when compared one year after application.

**Table 2. Leafy spurge control with variable picloram concentrations using the roller and wick applicators with treatments applied on 16 June 1980 at Sheldon and 2 September 1980 at Valley City. (Lym and Messersmith).**

Applicator	Picloram <sup>a</sup> concentration	Location/Evaluation date					
		Sheldon			Valley City		
		May 1981	Aug. 1981	June 1982	June 1981	Sept. 1981	June 1982
		% control					
Roller	1:1	90	58	59	96	93	65
Roller	1:3	93	48	40	97	81	34
Roller	1:7	75	15	17	91	50	15
Roller	1:11	70	9	4	67	15	6
Roller	1:15	69	12	6	35	3	2
Wick	1:1	88	38	43	96	92	40
Wick	1:3	80	18	8	93	78	16
Wick	1:7	41	2	0	79	28	3
Wick	1:11	49	8	3	68	5	0
Wick	1:15	62	5	0	15	0	0
LSD(0.05)		14	21	30	17	22	32

<sup>a</sup>Picloram (Tordon 22K):water (v:v).

The third experiment evaluated picloram application to leafy spurge at three solution concentrations, two roller application heights and two dates of application. The roller height was adjusted to treat the top half of most leafy spurge plants (high) or as near to the soil surface as the terrain would permit (low). The picloram solution concentrations were 1:3, 1:5 and 1:7 (v:v) and were applied on 8 July 1981 (summer) or 1 September 1981 (fall). Fall treatments resulted in the best leafy spurge control across all solution concentrations especially when applied at the low height (Table 3). Among the fall treatments picloram at 1:7 (v:v) applied at the low height provided the best leafy spurge control at 56%.

**Table 3. Leafy spurge control with variable picloram concentrations using the roller applicator at two heights applied on 8 July and 1 September 1981, (Lym and Messersmith).**

Time of application	Picloram <sup>a</sup> concentration	Roller height					
		June 1982			August 1982		
		Low	High	Mean	Low	High	Mean
		% control					
Summer	1:3	38	5	22	5	3	4
	1:5	14	6	10	9	2	6
	1:7	11	6	9	12	0	6
Mean		21	6	14	9	2	6
Fall	1:3	60	13	37	37	5	21
	1:5	88	8	48	34	2	18
	1:7	64	18	41	56	1	29
Mean		71	13	42	42	3	23
June LSD (0.05) = Conc=25; Height=20; Height x Conc=32; Time x Height x Conc=14							
Aug. LSD (0.05) = Conc=11; Height=9; Height x Conc=22; Time x Height x Conc=6							

<sup>a</sup>Picloram (Tordon 22K):water (v:v).

The fourth experiment evaluated three designs of a pipe-wick applicator. The pipe-wick consisted of 0.75 inch PVC pipe with 0.12 inch drilled every two inches and covered by 0.5 inch poly-foam overlayed with canvas. The wicking material was wrapped around about 75% of the pipe circumference and attached to the PVC pipe with contact cement. Liquid in the storage tank flowed into the wick with flow rate dependent on weed density. The design consisted of 1) two 6-foot bars, one foot apart rectangular shaped (2-bar applicator); 2) three 6-foot bars one foot apart rectangular shaped (3-bar applicator); and 3) two 6-foot bars one foot apart with three interconnecting diagonal bars so each leafy spurge stem was treated by the front diagonal and rear bar (diagonal applicator). Picloram at 1:3 (v:v) was applied using the wicks either with one pass or two passes; the second pass was in the opposite direction to the first pass. Picloram applied using two passes resulted in better leafy spurge control than a single pass regardless of applicator type (Table 4). Picloram application with the diagonal wick resulted in better leafy spurge control than with either 2-bar or 3-bar rectangular design, while the 2- and 3-bar designs provided similar leafy spurge control.

**Table 4. Leafy spurge control with picloram using several wick applicators with treatments applied on 10 August 1981. (Lym and Messersmith).**

Applicator	No. passes	Picloram <sup>a</sup> concentration	Control	
			June 1982	August 1982
			(%)	
2-Bar	1	1:3	77	36
2-Bar	2	1:3	88	77
3-Bar	1	1:3	75	15
3-Bar	2	1:3	92	80
Diagonal	1	1:3	71	56
Diagonal	2	1:3	100	99
LSD (0-05)			21	25

<sup>a</sup> Picloram (Tordon 22K):water (v:v).

In general, picloram applied using the roller applicator provided similar control to picloram at 1 lb/A broadcast, but retreatment during the second growing season after the initial treatment would be recommended following both treatments. Fall applications of picloram have been more effective than spring applications when using the roller applicator. The wick may be the most practical applicator because it is comparatively easy and inexpensive to build and operate.