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Update on leafy spurge control in North Dakota – 1983

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Economical control of leafy spurge has been a major goal of the leafy spurge program in North Dakota. Annual application of picloram plus 2,4-D at 0.25 plus 1.0 lb/A for two years has resulted in greater forage production and similar leafy spurge control compared to picloram applied once at 2.0 lb/A after three years (Table 1). Dicamba at 2.0 lb/A has given fair forage production, but only 39% leafy spurge control. Dicamba has generally given better leafy spurge control in western compared to eastern North Dakota. Annual applications of 2,4-D have not resulted in long-term leafy spurge control, but does kill the top growth long enough to allow increased forage production.

Application of picloram using a pipe-wick has given good leafy spurge control while using only 20 to 40% as much picloram as a broadcast spray at 2.0 lb/A. The wick used consisted of 0.75 inch PVC pipe with 0.12 inch holes drilled every two inches and covered by 0.5 inch poly-foam overlaid with canvas. The wicking material was wrapped around 75% of the pipe circumference and attached to the PVC pipe with contact cement. 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); 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 (picloram: water) (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 2). Picloram application with the diagonal wick resulted in better leafy spurge control than either the 2-bar or 3-bar rectangular design and was rated 98% control 22 months after treatment.

In a similar experiment picloram applied using the 2-bar wick in the fall resulted in much better leafy spurge control than a mid-summer treatment (Table 3). Data from similar experiments in 1980 and 1981 also indicated picloram applied with the wick applicator resulted in better leafy spurge control as a fall treatment rather than a spring or early summer treatment.

In 1981 and 1982 leafy spurge root samples were taken weekly to a six inch depth from early April to late October. Analysis of the soluble sugars indicated sucrose as the major carbohydrate present with a slight amount of glucose and fructose also present. The

soluble carbohydrate reached maximum levels in late fall just prior to freeze up and constituted 16% of the leafy spurge root material on a dry weight basis. Large fluctuations in the free carbohydrate levels were observed during mid-summer in both growing seasons. These fluctuations were found to vary inversely with the average weekly high temperature and similarly to the average weekly low temperature with a correlation coefficient of -0.80 ($P = 0.01$) and 0.80 ($P = 0.01$), respectively. Carbohydrate levels decreased as the average weekly temperature increased; conversely root carbohydrate levels increased as the average weekly temperature decreased. Such large fluctuations in carbohydrate movement could affect herbicide translocation and thus leafy spurge control. Root samples are being taken twice weekly in 1983 so that a more precise prediction of periods of increased carbohydrate and perhaps herbicide translocation to the root system can be made.

Table 1. Leafy spurge control from various annual herbicide treatments or a single application of picloram.

Herbicide	Rate	Control		Total forage production	Net return ¹
		1982	1983		
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	(lb/A)	————— (%) —————		(lb/A)	(\$/A)
<u>Annual treatments (1981-82)</u>					
Picloram	0.25	14	50	4,090	23
Picloram + 2,4-D	0.25+1.0	20	68	4,086	19
Dicamba	2.0	5	39	3,501	-12
2,4-D	2.0	4	22	3,349	15
<u>Single application (1980)</u>					
Picloram	2.0	84	76	2,548	-72
Control		2,114	
LSD (0.05)		24	16	448	

¹ Economic return estimated by converting forage production to hay at \$48/T minus herbicide and application cost. 2,4-D at \$2.17/lb, dicamba at \$10-30/lb, picloram at \$40.00/lb. Application cost at \$2.05/A.

Table 2. Leafy spurge control with picloram using several wick applicators with treatments applied on 10 August 1981.

Applicator	No. passes	Picloram concentration ^a	Control		
			1982		1983
			June	August	June
			(%)		
2-Bar	1	1:3	77	36	48
2-Bar	2	1:3	88	77	76
3-Bar	1	1:3	75	15	30
3-Bar	2	1:3	92	80	86
Diagonal	1	1:3	71	56	53
Diagonal	2	1:3	100	99	98
LSD (0.05)			21	25	25

^a Picloram (Tordon 22K):water (v/v).

Table 3. Leafy spurge control with picloram applied using the wick applicator in mid-summer or early fall.

Applicator	No. passes	Picloram concentration ^a	Control June 1983
<u>Applied 8 July 1982</u>			— % —
2-Bar	1	1:7	12
2-Bar	1	1:3	24
<u>Applied 27 August 1982</u>			
2-Bar	1	1:7	85
2-Bar	1	1:3	88
LSD (0-05)			17

^aPicloram (Tordon 22K):water) (v/v).