

Reprinted with permission from: Leafy spurge symposium. Riverton, WY. July 9-10, 1986. pp. 84-86.

Published by: Great Plains Agricultural Council: Leafy Spurge Symposium.

Leafy spurge control following a seven-year management program

RODNEY G. LYM and CALVIN G. MESSERSMITH

An experiment to evaluate long term leafy spurge management was established at four sites (Sheyenne National Grassland near McLeod, Sheldon and two near Valley City) in North Dakota in 1980. All sites were established in early June except one site at Valley City which was established in September 1980. The herbicides applied in 1980 included 2,4-D and picloram as liquid (2S) and granule (2%G) formulations, and picloram applied using the roller and pipe-wick applicators. The conventional broadcast treatments were applied using a tractor-mounted sprayer delivering 8 gpa water at 35 psi. A granular applicator was used to apply the picloram 2%G treatments. Solution concentration in the roller was 0.25 lb/gal; this is the same solution concentration as picloram at 2 lb/A sprayed at 8.5 gpa. The solution concentration was increased for the pipe-wick applicator to picloram at 0.5 lb/gal since the pipe-wick applied about half the total volume per acre as the roller applicator. The roller and pipe-wick applicator height was adjusted to treat the top one-half of the tallest leafy spurge stems. The additive in the roller and pipe-wick treatments was a 5% (v:v) oil concentrate (83% paraffin based petroleum oil plus 15% emulsifier). The plots were 15 by 150 feet and treatments were replicated twice at each site in a randomized complete block design. Each plot was divided into six 7.5 by 50 feet subplots and retreatments of 2,4-D, picloram 2S, dicamba or no treatment were applied in June 1981 except the fall Valley City site which was retreated in August 1981.

Original 1980 whole plot treatments were reapplied in 1982 with several of the treatments changed. A carpet applicator was substituted for the roller applicator. The granular picloram treatments were replaced by picloram applied with the pipe-wick or carpet applicator with two passes, the second pass in the opposite direction to the first. Dicamba at 8 lb/A spray applied replaced the picloram plus oil concentrate pipe-wick applied treatment. The carpet applicator was designed by Magnolia Spray Equipment Corp., Jackson, MS, and consists of a 1 by 8 ft. carpet attached to a rectangular spray box. The herbicide solution was sprayed onto the backside of the carpet through nozzles inside the spray box. Excess solution was returned to the spray tank. The picloram solution on the carpet applicator was 0.25 lb/gal and 0.4 lb/gal for two and one pass applications, respectively. The whole plots were retreated in 1982 with the original treatment except picloram at 2 lb/A was reapplied to the control subplot only since subplots receiving annual retreatments maintained satisfactory leafy spurge control. The experimental site at the Sheyenne National Grasslands was treated in the fall of 1982 to establish an equal number of spring and fall treatment sites. Subplot retreatments were again in 1983, 1984, and 1985. Evaluations are based on visual percent stand reduction as compared to the control.

In general, leafy spurge control was higher from spring applied treatments compared to similar fall applied treatments (Table). Previous research at North Dakota State University has shown spring or fall applied treatments to give similar leafy spurge control; however, in this study the fall treatments were applied to leafy spurge plants that had been harvested from yield in July of each year through 1984. Thus, the plants were shorter and in the vegetative growth stage compared to the normal fall growth stage. This reduced the plant leaf area treated and may have resulted in less herbicide uptake and translocation. The plants were not mowed in 1985 so this variable should not affect control from fall treatments in the future.

Picloram (2S) at 1 and 2 lb/A provided the best long-term leafy spurge control regardless of retreatment (Table). Picloram at 1 and 2 lb/A provided 45% control when averaged over rate and date but control increased to 78 and 57% for spring and fall, respectively, when averaged over dicamba and picloram retreatments. Thus, when higher rates of picloram are applied every few years, there is little advantage in using more than 1 lb/A initially when annual retreatments are applied.

Dicamba at 8 lb/A alone spring applied averaged 20% control, but control increased to 80 and 99% with retreatments of dicamba at 2.0 lb/A or picloram + 2,4-D at 0.25 + 1 lb/A (Table). Leafy spurge control from fall applied dicamba at 8 lb/A averaged 6% and increased to an average of 62% following retreatments of picloram at 0.25 lb/A, picloram + 2,4-D at 0.25 + 1 lb/A or dicamba, at 2 lb/A.

Annual application of 2,4-D, the most economical treatment in the study provided 0 and 15% leafy spurge control as a fall and spring applied treatment, respectively (Table). Leafy spurge control was increased to 84% when the 2,4-D original treatment was retreated with picloram + 2,4-D at 0.25 + 1 lb/A annually in the spring, but the same fall applied treatment provided only 19% control.

The annual retreatments that provided the highest leafy spurge control were picloram + 2,4-D at 0.25 + 1 lb/A and dicamba at 2 lb/A (Table). These retreatments averaged 85 and 56% leafy spurge control as spring and fall applied treatments, respectively, when averaged over all whole plot treatments. Annual retreatments of 2,4-D or dicamba at 1 lb/A averaged only 53 and 25% leafy spurge control as spring and fall applied treatments averaged over whole plot treatments, respectively. Leafy spurge control was increased 25% when 2,4-D was added to picloram at 0.25 lb/A compared to picloram at 0.25 lb/A alone as an annual treatment spring applied, but not when fall applied. Thus, the most practical retreatment when considering both cost and control were picloram at 0.25 lb/A alone in the fall or picloram + 2,4-D at 0.25 + 1 lb/A spring applied, but dicamba at 2 lb/A would be the retreatment of choice where picloram could not be applied such as in areas with a water table 10 feet or less below the surface.

No treatment using a reduced-volume applicator maintained satisfactory control alone. The reduced volume applicators would not have an economic advantage if several annual retreatments were required for satisfactory leafy spurge control. Several herbicide treatment alternatives provided 90% or more leafy spurge control 6 years after the initial treatment, but no treatment program had eradicated leafy spurge.

Table. Leafy spurge control in North Dakota following a seven-year management program.

Whole Plot						Retreatment subplot 1981, 1983-86/rate lb/A						
<u>Treatment^a</u>	Soln		<u>Treatment^a</u>		Soln	2,4-D	Dicamba	Dicamba	Picloram	Picloram	Control	Mean
1980	Rate	conc ^b	1982	Rate	conc ^b	1.0	1.0	2.0	0.25	+ 2,4-D	0	
	(lb/A)	(lb/gal)		(lb/A)	(lb/gal)	(% control)						
Spring applied												
2,4-D	2.0	0.24	2,4-D	2.0	0.24	14	41	76	68	84	15	50
Picloram 2%G	1.0		Picloram (carpet-2 pass)	---	0.25	51	39	67	64	88	0	51
Picloram 2%G	2.0	---	Picloram (wick-2 pass)	---	0.5	81	74	87	86	95	65	81
Picloram 2S	1.0	0.13	Picloram 2S	1.0	0.13	66	58	98	75	90	45	72
Picloram 2S	2.0	0.25	Picloram 2S ^C	2.0	0.25	55	83	75	62	86	27	64
Picloram (Roller)	---	0.25	Picloram (carpet)		0.25	54	49	76	46	91	25	57
Picloram + oil conc. (Roller)	---	0.25	Picloram (carpet)		0.25	52	67	83	85	91	30	68
Picloram (Wick)	---	0.5	Picloram (wick)		0.5	18	38	70	50	87	0	44
Picloram + oil conc. (Wick)	---	0.5	Dicamba	8.0	1.0	74	49	80	77	99	20	67
Control	---	---	Control	---	---	15	63	92	60	85	0	53
Mean						50	56	80	67	90	24	
LSD (0.05) whole plot = 11 subplot = 10 whole plot x subplot = 30												
Fall applied												
2,4-D	2.0	0.24	2,4-D	2.0	0.24	0	22	32	33	19	0	18
Picloram 2%G	1.0	---	Picloram (carpet-2 pass)	---	0.25	8	45	48	38	55	16	35
Picloram 2%G	2.0	---	Picloram (wick-2 pass)	---	0.5	37	28	61	55	52	24	43
Picloram 2S	1.0	0.13	Picloram 2S	1.0	0.13	17	33	58	50	63	42	44
Picloram 2S	2.0	0.25	Picloram 2S ^C	2.0	0.25	37	48	75	55	76	50	57
Picloram (Roller)	---	0.25	Picloram (carpet)	---	0.25	19	23	70	38	47	18	36
Picloram + oil conc. (Roller)	---	0.25	Picloram (carpet)	---	0.25	43	48	78	56	73	25	54
Picloram (Wick)	---	0.5	Picloram (wick)	---	0.5	8	31	54	32	35	9	28
Picloram + oil conc. (Wick)	---	0.5	Dicamba	8.0	1.0	14	21	62	65	60	6	38
Control			Control	---	---	0	15	47	44	42	0	25
Mean						18	31	59	46	52	19	25
LSD (0.05) whole plot = 15 subplots = 12 whole plot x subplot = 37												

^aSpray applied except the treatments identified as roller, wick or carpet applicator applied.

^bHerbicide:water (v/v)

^cApplied to control subplot only.