

*Reprinted from: 1985 Leafy Spurge Symposium. Bozeman, MT. July 17-18, 1985.
Research Reports: North Dakota. p. 111-112.*

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

Leafy spurge control with resulting forage production from several herbicide treatments¹

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An experiment to evaluate long-term leafy spurge control and forage production was established at two sites in North Dakota in 1983. The predominate grasses were bluegrass (*Poa. spp.*) with occasional crested wheatgrass, smooth brome, big bluestem or other native grasses. The treatments were selected based on previous research conducted at North Dakota State University and included 2,4-D at 2.0 lb/A, picloram + 2,4-D at 0.25 + 1.0 lb/A, picloram at 2.0 lb/A and dicamba at 8.0 lb/A and were applied in August 1983 or June 1984 as spring or fall treatments. The 2,4-D at 2.0 lb/A and picloram plus 2,4-D treatments were applied annually while the picloram alone and dicamba treatments were reapplied when leafy spurge control declined to 70% or less. Thus, picloram at 2.0 lb/A was reapplied at Valley City in August of 1985 but not at Dickinson and no spring picloram retreatment was needed at either site. Dicamba at 8.0 lb/A was reapplied in June 1985 at both locations but only at Dickinson in September 1985. The plots were 15 by 50 ft with four replications in a randomized complete block design at each site. Forage yields were obtained by harvesting a 4 by 25 ft section with a rotary mower in July 1984 and 1985. Sub-samples were taken by hand along each harvested strip and separated into leafy spurge and forage so the weight of each component in the mowed sample could be calculated. The samples were oven dried and are reported with 12% moisture content. Economic return was estimated by converting forage production to animal unit days (AUD) and then to pounds of beef at \$0.60/lb minus the cost of the herbicide and estimated application cost, i.e. 2,4-D = \$2.00/lb ai, dicamba = \$11.75/lb ai, picloram = \$40.00/lb ai, and application = \$2.05/A.

All herbicide treatments have resulted in an economic loss at Dickinson despite excellent leafy spurge control from several treatments. This site generally receives 8 to 10 inches less rainfall than the Valley City location. Forage production averaged across all treatments was 909 lb/A at Dickinson and 2806 lb/A at Valley City (Table). Leafy spurge control from 2,4-D at 2.0 lb/A was not satisfactory from spring or fall applications at either site. However, it did provide short-term control resulting in an economic gain at Valley City of \$21 and \$8/A as a spring and fall applied treatment, respectively. Leafy spurge control with picloram + 2,4-D at 0.25 + 1.0 lb/A averaged over both locations was 94% after two applications as a spring applied treatment, but only 2% when fall applied. Previous research at North Dakota State University has shown that annual application of

¹ Cooperative investigation Dep. of Agron. and ARS, U.S. Dep. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo.

this treatment in the spring or fall provides similar leafy spurge control. Leafy spurge was under drought stress in 1984 when the herbicides were applied which may have reduced the observed control. Forage production averaged for both locations was 2036 and 1713 lb/A for spring or fall application of picloram + 2,4-D at 0.25 + 1.0 lb/A, respectively.

Picloram at 2.0 lb/A provided 87% leafy spurge control as a spring applied treatment, but only 34% control when fall applied at Valley City. However, at Dickinson control was 36 and 85% when spring and fall applied, respectively (Table). Dicamba generally gave good leafy spurge control as a fall but not as a spring-applied treatment. All treatments have reduced leafy spurge production compared to the control except the fall application of 2,4-D at 2.0 lb/A at Valley City.

Table. Leafy spurge control, forage production and estimated net return from several herbicide treatments at two sites in North Dakota. (Lym and Messersmith).

Original	Herbicide		Rate	Total cost (\$/A)	Control		Yield ^a		Utilization (AUD)	Net return (\$/A)
	Rate	Re-treatment			June	Aug	Forage	Leafy spurge		
	(lb/A)				---- (%)----		----- (lb/A)-----			
Valley City										
Spring 1983										
2,4-D	2.0	2,4-D	2.0 ^b	12.10	0	25	2180	1718	55	21
Picloram+2,4-D	0.25+1.0	Picloram	0.25+1.0 ^b	28.10	24	92	2920	1273	73	16
Picloram	2.0	...	...	82.05	99	87	3250	1228	81	- 33
Dicamba	8.0	Dicamba	8.0	192.10	53	24	2949	1178	74	-148
Fall 1983										
2,4-D	2.0	2,4-D	2.0 ^b	18.15	10	0	1712	2235	43	8
Picloram+2,4-D	0.25+1.0	Picloram+2,4-D	0.25+1.0 ^b	42.15	60	4	2608	1651	65	- 3
Picloram	2.0	Picloram	2.0 ^c	164.10	84	36	3722	247	93	-108
Dicamba	8.0	...	...	96.05	99	87	3128	612	78	- 49
		Control					2785	2429	0	
LSD (0.05)					20	18	380	363		
Dickinson										
Spring 1983										
2,4-D	2.0	2,4-D	2.0 ^b	18.15	3	25	624	127	16	- 2
Picloram+2,4-D	0.25+1.0	Picloram	0.25+1.0 ^b	42.15	23	96	1152	66	29	- 11
Picloram	2.0	...	...	82.05	89	34	1106	68	28	- 65
Dicamba	8.0	Dicamba	8.0 ^c	192.10	23	30	749	76	11	- 89
Fall 1983										
2,4-D	2.0	2,4-D	2.0 ^b	12.10	5	0	917	385	23	- 4
Picloram+2,4-D	0.25+1.0	Picloram+2,4-D	0.25+1.0 ^b	28.05	30	0	819	421	21	- 30
Picloram	2.0	Picloram	2.0 ^c	82.05	99	85	1116	4	28	- 65
Dicamba	8.0	Dicamba	8.0 ^c	96.05	97	48	916	50	23	-178
		Control			0	0	779	778	0	
LSD (0-05)					11	14	280	173		

^aTotal production of 1984 and 1985 harvest.

^bAnnual retreatment.

^cApplied when control is less than 70%.