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Forage production in pasture and rangeland following two years of leafy spurge control

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An experiment to evaluate long-term leafy spurge management with resulting forage production was established at four sites in North Dakota in 1980. The sites included a bluegrass pasture near Sheldon, an exclosure area on the Sheyenne National Grasslands near McCloud, and two sites on a state game management area near Valley City. The main population of grasses was bluegrass (*Poa* spp.) with occasional crested wheatgrass, smooth brome, big bluestem or other native grasses. All sites were established in early June except one site at Valley City which was established in September 1980. The herbicides applied in 1980 (Year 1) included 2,4-D, dicamba, picloram liquid (2S), picloram granule (2%G), and picloram applied using the roller and 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. The roller and wick applicator height was adjusted to treat the top one-half of the taller leafy spurge stems. The additive in the roller and wick treatments was a 5% (v:v) oil concentrate (83% paraffin-based petroleum oil + 15% emulsifier). The plots were 15 by 150 feet and replicated twice at each site in a randomized complete block design. In 1981 (Year 2), each plot was divided into six 7.5 by 50 feet subplots for retreatments of 2,4-D, picloram 2S, dicamba or no retreatment. In July 1981, a 3 by 25 feet section of each plot was harvested with a flail mower. Sub-samples were taken by hand along each harvested strip so that leafy spurge and forage weight could be separated. The samples were oven dried. All data are shown in the table and each mean is an average of eight plots, i.e. four sites with two replications per site.

Picloram 2S at 2 lb/A provided the best leafy spurge control after two years averaging 84% without a retreatment and up to 91% with a retreatment of picloram 2S at 0.25 lb/A. Picloram 2%G at 2 lb/A was the only other original treatment that provided fair control by August 1981 without a retreatment. The best retreatments for leafy spurge control were picloram at 0.25 lb/A alone or in combination with 2,4-D at 1.0 lb/A which provided 60 and 63% control, respectively. Retreatment with dicamba at 2.0 lb/A averaged 46% control, but dicamba at 1.0 lb/A and 2,4-D at 1.0 lb/A did not improve control compared to no retreatment.

Forage yield increased for 50 of the 59 treatments compared to the control, and the yield increased over 250% for five treatments. The five highest yielding treatments (Year 1 + Year 2) were: control + (picloram + 2,4-D at 0.25 + 1.0 lb/A), 2,4-D at 2 lb/A + picloram at 0.25 lb/A, control + picloram at 0.25 lb/A, picloram 2S at 1 lb/A + (picloram + 2,4-D at 0.25 + 1.0 lb/A), and picloram 2%G at 2 lb/A + dicamba at 1.0 lb/A. The treatment with the best overall leafy spurge control at 91% was picloram 2S at 2.0 lb/A but

the forage yield was intermediate at 1354 lb/A. The highest yielding treatment at 1870 lb/A was picloram + 2,4-D at 0.25 1.0 lb/A in Year 2 without a Year 1 treatment and had 52% leafy spurge control. The latter treatment is more economical, and yearly applications can be expected to reach leafy spurge control of 80 to 90% after three to four years. If the terrain makes yearly treatments unfeasible, the picloram at 2.0 lb/A treatment can be expected to give good leafy spurge control for two to three years.

Table. Leafy spurge control with resulting forage production after two years (Lym and Messersmith).

Year one treatment	Rate (lb/A)	Soln ^a conc	Year two treatment/rate (lb/A)						Mean
			2,4-D 1	Dicamba 1	Dicamba 2	Picloram 0.25	2,4-D+ Picloram 1+0.25	Control 0	
			(Percent control)						
2,4-D	2		13	25	19	48	56	9	28
Picloram	2%G	1	11	23	38	38	56	15	31
Picloram	2%G	2	71	78	75	90	89	79	80
Picloram	2S	1	51	45	61	68	69	53	59
Picloram	2S	2	90	85	89	91	86	84	88
Roller		1:7	28	40	40	51	55	40	42
Roller+oil conc		1:7	44	46	51	62	63	33	50
Wick		1:3	31	13	24	46	50	31	33
Wick+oil conc		1:3	30	35	42	62	57	27	42
Control			5	12	18	41	52	0	21
Mean			38	41	46	60	63	37	
			(Yield/lb/A)						
2,4-D		2	1409	1142	1293	1712	1233	1360	
Picloram	2%G	1	1343	1112	1195	1164	1124	1177	
Picloram	2%G	2	1464	1554	1247	1313	1264	1284	
Picloram	2S	1	936	1223	1293	1101	1569	1315	
Picloram	2S	2	1159	1080	1013	1354	1159	1114	
Roller		1:7	1423	1230	1301	1387	1150	1233	
Roller+oil conc		1:7	1360	1344	1093	1338	1018	1250	
Wick		1:3	1278	1373	1146	1141	1223	915	
Wick+oil conc		1:3	1181	1157	1039	886	907	881	
Control			1082	1178	881	1681	1870	623	
			LSD (0.05)=421						

^aHerbicide:water (v:v).