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Long-term management of leafy spurge in pasture and rangeland – Year one

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Seven experiments were established around North Dakota in 1980 to evaluate long-term leafy spurge management alternatives on pasture and rangeland. All experiments were established in late June and early July 1980 except the fall Valley City experiment which was established in Sept. 1980. The herbicides in the study included 2,4-D, dicamba, picloram liquid (2S) and granular (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 were adjusted to treat the top one-half of the taller leafy spurge stems. The wick was made of two 0.75 inch PVC pipes, with small holes covered with poly-foam and a 50% cotton:50% polyester canvas material. The additive in the roller and wick treatments was a 5% (v:v) oil concentrate (83% paraffin based petroleum oil + 15% emulsifier). The plots at each site were 15 by 150 ft and replicated twice in a randomized complete block. Visual evaluations were based on percent stand reduction as compared to the control and were taken in the spring and fall of 1981. Also, stand counts of leafy spurge were taken in each plot in the spring of 1981. The number of stems in six 1 yd² samples was counted in each plot. Data from the Dickinson site are limited, due to extreme drought in 1980 and early 1981. All data are shown in the table.

ANOVA showed significant treatment by site interaction, so treatments will be discussed by sites. The 2,4-D at 2 lb/A treatment did not provide long-term leafy spurge control. Control in spring 1981 ranged from 47% at the spring Valley City site to 3% at Minot. The stand counts at four sites for the 2,4-D treated plots and the control were similar, and there was a significant increase at Minot in the number of stems/yd² compared to the control when treated with 2,4-D at 2 lb/A.

Picloram 2%G at 1 and 2 lb/A at four sites provided excellent leafy spurge control when evaluated after 12 months, except 1 lb/A at Sheldon. Leafy spurge control with picloram 2%G at 1 lb/A was good after 12 months but poor after 15 months at all sites. Stand counts revealed that picloram 2%G at 1 and 2 lb/A significantly reduced the number of stems/yd² at all sites except with picloram 2%G at 1 lb/A at Sheldon.

Table. Long-term management of leafy spurge. (Messersmith and Lym).

Evaluation date	Treatment	Herbicide		Location							Avg	
		Rate (lb/A)	Sol'n ^a conc	Sheyenne	Valley City		Tolna	Minot	Dickinson			
				Sheldon	(Spring)	(Fall)				(percent control)		
<u>Spring 1981</u>												
2,4-D (LVE)	2	1:15	19	18	47	14	8	3			18	
Picloram 2%G	1	----	96	24	87	93	--	--			76	
Picloram 2%G	2	----	98	98	99	96					98	
Picloram 2S	1	1:15	94	95	99	100	65	80			88	
Picloram 2S	2	1:7	100	100	99	99	99	99			99	
Roller	-	1:7	90	78	71	97	6	53			65	
Roller+oil conc.	-	1:7	65	53	61	100	8	36			54	
Wick	-	1:3	59	69	79	71	64	54			66	
Wick+oil conc.	-	1:3	44	71	75	94	73	45			67	
Dicamba 4S	4	1:7					26	31			29	
Dicamba 4S	8	1:3					60	80			29	
LSD (0.05)			33	32	39	9	42	22				
<u>Fall 1981</u>												
2,4-D (LVE)	2	1:15	23	0	1	11	0	5	0	6		
Picloram 2%G	1	----	41	3	8	0	----	----	----	13		
Picloram 2%G	2	----	89	76	86	69	----	----	----	80		
Picloram 2S	1	1:15	43	21	51	97	55	0	87	50		
Picloram 2S	2	1:7	99	63	77	97	100	80	96	87		
Roller	-	1:7	78	5	5	74	10	10	0	26		
Roller+oil conc.	-	1:7	30	11	1	91	5	20	28	27		
Wick	-	1:3	35	21	39	28	40	15	0	25		
Wick+oil conc.	-	1:3	0	4	50	55	0	25	30	23		
Dicamba 4S	4	1:7	----	----	----	----	75	20	51	48		
Dicamba 4S	8	1:3	----	----	----	----	75	13	35	41		
LSD (0.05)			75	36	47	7	65	51	38			
<u>Spring 1981</u>												
2,4-D (LVE)	2	1:15	378	721	555	373	1376	2925	----	----		
Picloram 2%G	1	----	29	451	132	178	----	----	----	----		
Picloram 2%G	2	----	5	2	2	122	----	----	----	----		
Picloram 2S	1	1:15	44	14	2	0	284	519	----	----		
Picloram 2S	2	1:7	0	1	2	1	5	18	----	----		
Roller	-	1:7	26	151	308	33	1460	1148	----	----		
Roller+oil conc.	-	1:7	71	197	264	3	1241	947	----	----		
Wick	-	1:3	279	207	325	98	292	548	----	----		
Wick+oil conc.	-	1:3	291	159	200	82	591	774	----	----		
Dicamba 4S	4	1:7	---	---	---	---	811	2165	----	----		
Dicamba 4S	8	1:3	---	---	---	---	274	297	----	----		
Control	---	----	557	538	872	496	1308	1469	----	----		
LSD (0.05)			138	246	502	---	781	791	----	----		

^a Herbicide:water (v:v).

Picloram 2S at 2 lb/A provided the best leafy spurge control regardless of site. Spring evaluation showed that the treatment provided 99 or 100% control at all sites and stem counts ranged from 0 at Sheyenne to 18 at Minot after 1 year. Picloram 2S at 1 lb/A was less successful, especially at Tolna and Minot where control was rated at 65 and 80%, respectively. Fall evaluation revealed that the longevity of control ranged from 100% at Tolna to 63% at Sheldon.

The roller application of picloram at 1:7 (v:v) provided 90 and 97% leafy spurge control at Sheyenne and Valley City (fall applied), respectively, when evaluated in spring 1981. The picloram plus oil concentrate treatment provided slightly better control than picloram alone when fall applied at Valley City but leafy spurge control decreased when the oil concentrate was added at the other sites. The picloram plus oil concentrate treatment provided 91% control at Valley City when evaluated in the fall one year after roller application, but other roller applied treatments did not provide satisfactory control. The leafy spurge stand was reduced with the roller treatments at all sites except Tolna and Minot. The leafy spurge was very short at application at Minot and Tolna which greatly reduced the number of stems contacted by the roller and probably accounts for the reduced control.

Leafy spurge control with picloram at 1:3 (v:v) applied with the wick applicator ranged from 79% when spring applied at Valley City to 54% at Minot. As with the roller treatments, the oil concentrate decreased control at all sites except when fall applied at Valley City. The wick treatment did not provide satisfactory control when evaluated in the fall of 1981. Most wick treatments reduced the leafy spurge stand counts compared to the control.

Dicamba at 4 and 8 lb/A was applied at three sites. Dicamba at 4 lb/A did not provide good leafy spurge control. Dicamba at 8 lb/A reduced stand counts and control ranged from 75% at Tolna to 13% at Dickinson in fall 1981.

In summary, 2,4-D at 2 lb/A did not control leafy spurge after one year and the number of stems increased at several sites. Picloram 2%G and 2S at 2 lb/A gave excellent leafy spurge control after 1 year, but control decreased rapidly at several sites after 15 months. The roller and wick application of picloram provided significantly poorer control than broadcast application. The poor results from these applicator treatments may be due to the generally poor growing conditions in 1980. The leafy spurge was rather short and not growing vigorously so the short stems may not have been treated and herbicide translocation may have been poor in treated stems. Dicamba at 8 lb/A did reduce the stand count but gave only fair leafy spurge control.