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## **Leafy spurge control with imazethapyr, imazaquin, quinclorac, and nicosulfuron<sup>1</sup>**

RODNEY G. LYM and CALVIN G. MESSERSMITH

Previous research at North Dakota State University has shown that nicosulfuron at 1 to 2 oz/A, imazethapyr and imazaquin at 2 to 4 oz/A, and quinclorac at 16 to 24 oz/A provide good leafy spurge control when fall-applied. Also, control has occasionally been increased when these herbicides have been applied with an adjuvant. The purpose of this research was to evaluate imazethapyr, imazaquin, quinclorac, and nicosulfuron with several spray adjuvants fall-applied for leafy spurge control.

The experiment was established at Hunter and Chaffee, ND on September 2 and 6, 1991, respectively. Leafy spurge at Hunter was 16 to 20 inches tall with 4- to 6-inch sparse fall regrowth, red leaves and moisture stressed, while at Chaffee it was 28 to 36 inches tall, with lush, dense fall regrowth with green leaves and adequate soil moisture. The soil at Hunter was sandy with pH 7.4 and 2.3% organic matter and at Chaffee was a sandy loam with pH 7.8 and 6.7% organic matter. Herbicides were applied using a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. Plots were 10 by 30 feet, and each treatment was replicated four times in a randomized complete block design. A follow-up treatment of picloram plus 2,4-D at 8 + 16 oz/A was spring-applied on June 22, 1992 to the rear one-third of all plots. Visual evaluations were based on percent stand reduction as compared to the control.

Quinclorac tended to provide the best leafy spurge control at both locations and averaged 97 and 69% control 9 and 12 months after treatment (MAT), respectively, regardless of adjuvant (Table). Control at Chaffee was higher than at Hunter with imazethapyr, imazaquin, and nicosulfuron and averaged 27 and 92, 61 and 93, 42 and 74%, respectively, 9 MAT averaged over rate and adjuvant. The quinclorac treatments and imazaquin plus Scoil (a methulated-seed oil adjuvant) were the only treatments to provide similar control at Chaffee and Hunter.

Nicosulfuron provided an average of 58 and 22% control 9 and 12 MAT, respectively, and control was similar regardless of application rate or adjuvant (Table). Imazaquin and imazethapyr tended to provide better leafy spurge control when applied with Scoil than X-77 surfactant, especially at Hunter. However, control with quinclorac was similar at both locations when applied with BAS-090 or Scoil regardless of herbicide rates.

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<sup>1</sup> Published with approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo 58105.

Retreatment with picloram plus 2,4-D provided 90% control 2 MAT, averaged over both locations, and was similar regardless of the original treatment. In summary, quinclorac and imazethapyr show the most promise for consistent leafy spurge control of the herbicides evaluated. Control was similar to picloram plus 2,4-D at 8 + 16 oz/A, the standard fall-applied treatment. Nicosulfuron may be useful for leafy spurge control in cropland, but previous research has shown this herbicide injures grass and would not be acceptable for pasture and rangeland use.

**Table. Leafy spurge control with various herbicides applied September 1991 alone and then retreated with picloram plus 2,4-D in June 1992 (Lym and Messersmith).**

Treatment	Rate --- oz/A ---	Hunter			Chaffe			Mean		
		May	August		May	August		May	August	
		Control	Control	Retreat- ment <sup>a</sup>	Control	Control	Retreat- ment <sup>a</sup>	Control	Control	Retreat- ment <sup>a</sup>
		----- % -----								
Imazethapyr + X-77	2 + 0.5%	5	0	98	76	8	86	41	4	92
Imazethapyr + X-77	4 + 0.5%	36	6	99	85	14	71	61	10	85
Imazethapyr + Scoil	2 + 1 qt	20	1	97	90	29	82	55	15	89
Imazethapyr + Scoil	4 + 1 qt	47	9	93	88	43	86	68	26	89
Imazaquin + X-77	2 + 0.5%	34	3	94	85	10	90	60	6	92
Imazaquin + X-77	4 + 0.5%	38	6	92	98	36	91	69	21	91
Imazaquin + Scoil	2 + 1 qt	84	8	83	92	38	95	88	23	89
Imazaquin + Scoil	4 + 1 qt	87	13	89	96	49	82	92	31	85
Quinclorac + BAS-090	16 + 1 qt	91	38	97	100	82	97	95	60	97
Quinclorac + BAS-090	24 + 1 qt	95	65	99	100	93	98	97	79	99
Quinclorac + Scoil	16 + 1 qt	93	44	99	99	72	97	96	58	98
Quinclorac + Scoil	24 + 1 qt	97	67	99	100	94	96	98	80	98
Nicosulfuron + X-77	1 + 0.5%	34	5	98	72	28	83	53	17	91
Nicosulfuron + X-77	2 + 0.5%	27	26	98	75	15	81	51	20	89
Nicosulfuron + Scoil	1 + 1 qt	60	14	85	80	30	86	70	22	86
Nicosulfuron + Scoil	2 + 1 qt	46	42	87	70	12	74	58	27	81
Picloram + 2,4-D	8 + 16	88	70	97	82	36	87	85	53	92
LSD (0.05)		23	25	NS	14	22	17	14	34	NS

<sup>a</sup> Picloram plus 2,4-D at 8 + 16 oz/A applied to the rear one-third of each plot on June 22, 1992.