

*Reprinted with permission from: Research Progress Report – Western Society of Weed Science [S.I.]: The Society. 1992. pp. I-35-I-37.*

*Published and copyrighted by: Western Society of Weed Science.*

<http://www.wsweedscience.org>

---

## **Evaluation of various herbicides and herbicide-insecticide combinations for leafy spurge control<sup>1</sup>**

RODNEY G. LYM and CALVIN G. MESSERSMITH

Over 100 herbicides were screened for activity on leafy spurge in a series of greenhouse experiments conducted at North Dakota State University. The herbicides that showed potential for leafy spurge control were evaluated in field trials and compared to picloram, 2,4-D, and glyphosate applied alone or in various combinations. Certain herbicide-insecticide combinations, especially with ALS-inhibiting herbicides cause excessive broadleaf crop injury. It was hypothesized that adding an insecticide to an ALS-inhibiting herbicide that is phytotoxic to leafy spurge would increase control. The purpose of these experiments was to evaluate various herbicides applied alone and combined with other herbicides or insecticides for leafy spurge control.

The first screening experiment was established at West Fargo, ND, on June 14, 1990, in a dense stand of leafy spurge in the flower to early seed-set growth stage. The weather was partly cloudy with 65° F and 70% relative humidity. The soil was a loamy-clay with 7.5 pH. The second screening trial was established on September 24, 1990 near Amenia, ND. The leafy spurge was a dense stand in the fall regrowth stage, and vigorous. The weather was clear, 87°F, with 34% relative humidity, and the soil was similar to the West Fargo site. The herbicide-insecticide experiment was established on June 13, 1990 near Chaffee, ND, on a sandy soil with 7.8 pH. The weather was clear, 84°F, and 44% relative humidity, and the leafy spurge was in the flower to seed-set growth stage and vigorous.

Herbicides were applied using a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. The plots were 10 by 30 ft in a randomized complete block design with four replications. Leafy spurge control evaluations were based on a visual estimate of percent stand reduction as compared to the untreated check.

No herbicide treatment in the June applied screening experiment provided satisfactory leafy spurge control 3 or 12 months after treatment (MAT) (Table 1). However, several compounds provided good to excellent control when fall applied. Imazaquin at 4 oz/A provided 99 and 88% control 9 and 10 MAT with no grass injury. Nicosulfuron at 1 to 2 oz/A and quinclorac at 16 oz/A averaged 85% control 9 MAT but nicosulfuron injured

---

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

**Table 1. Evaluation of various herbicide treatments spring or fall applied for leafy spurge control (Lym and Messersmith).**

Treatment	Rate	Application date/evaluation (MAT)								
		14 June 90			24 Sept 90			24 Sept 1990		
		3	12		9	10	11	9	10	11
	— oz/A —	— % control —						— % grass inj —		
Imazamethabenz + X-77	1 + 0.5%	10	0	6	..	..	0	..	..	
Imazamethabenz + X-77	2 + 0.5%	0	0	13	..	..	0	..	..	
Imazamethabenz + 2,4-D + X-77	2 + 16 + 0.5%	30	5	28	..	..	0	..	..	
AC-310488 + X-77	1 + 0.5%	9	5	5	..	..	0	..	..	
AC-310488 + X-77	2 + 0.5%	3	0	0	..	..	0	..	..	
AC-310488 + 2,4-D + X-77	1 + 16 + 0.5%	19	9	20	..	..	0	..	..	
Imazethapyr + X-77	1 + 0.5%	10	0	67	39	27	0	0	0	
Imazethapyr + X-77	2 + 0.5%	1	0	79	56	11	0	0	0	
Imazethapyr + 2,4-D + X-77	1 + 16 + 0.5%	10	6	59	23	8	0	0	0	
Imazaquin + X-77	2 + 0.5%	0	0	92	62	33	5	0	4	
Imazaquin + X-77	4 + 0.5%	0	0	99	88	54	0	0	1	
Imazaquin + 2,4-D + X-77	2 + 16 + 0.5%	20	8	69	33	28	0	0	0	
EPTC + X-77	96 + 0.5%	0	0	9	..	28	0	..	..	
EPTC + picloram	96 + 8 + 0.5%	49	35	81	..	..	0	..	..	
Nicosulfuron + X-77	1 + 0.5%	5	0	85	68	53	38	11	10	
Nicosulfuron + X-77	2 + 0.5%	0	0	85	79	67	76	26	28	
Nicosulfuron + 2,4-D + X-77	1 + 16 + 0.5%	72	28	80	59	24	48	10	21	
Quizalofop + X-77	1 + 0.5%	0	0	21	..	..	19	..	..	
Quizalofop + X-77	2 + 0.5%	0	0	8	..	..	46	..	..	
Quizalofop + 2,4-D + X-77	1 + 16 + 0.5%	23	23	15	..	..	0	..	..	
Thifensulfuron + tribenuron	0.65 + 0.35 + 0.5%	14	0	0	..	..	0	..	..	
Thifensulfuron + tribenuron	1.5 + 0.5 + 0.5%	5	0	5	..	..	0	..	..	
Thifensulfuron + 2,4-D + X-77	0.65 + 0.35 + 16 + 0.5%	17	9	6	..	..	0	..	..	
Primisulfuron + Agridex	0.29 + 1 qt	0	5	0	..	..	0	..	..	
Primisulfuron + Agridex	0.6 + 1 qt	0	0	4	..	..	0	..	..	
Primisulfuron + 2,4-D + Agridex	0.6 + 1 + 1 qt	11	5	23	..	..	0	..	..	
Quinclorac	16	27	21	100	86	68	0	0	0	
Quinclorac + Surftac (BAS-090) <sup>a</sup>	16 + 0.5%	3	4	85	80	67	3	0	0	
Glyphosate + 2,4-D + X-77	0.4 + 0.7 + 0.5%	37	50	69	40	31	91	40	58	
Glyphosate + 2,4-D + picloram + X-77	0.2 + 0.3 + 6 + 0.5%	57	75	..	..	..	11	..	..	
Glyphosate + 2,4-D + picloram + X-77	0.4 + 0.7 + 8 + 0.5%	..	..	98	81	54	94	54	52	
Picloram + 2,4-D	4 + 16	24	10	76	27	19	0	0	0	
Picloram + 2,4-D	8 + 16	41	34	94	52	25	4	1	0	
LSD (0.05)		18	18	21	24	28	15	17	14	

<sup>a</sup>The additive BAS-090 at 1 qt/A was applied in place of Surftac with quinclorac applied in September.

grass severely, especially at the 2 oz/A rate. Glyphosate plus 2,4-D plus picloram provided 98% control 9 MAT but also caused 94% grass injury. Imazaquin at 4 oz/A, nicosulfuron at 1 and 2 oz/A, quinclorac at 16 oz/A, and the glyphosate plus 2,4-D plus picloram treatments fall-applied all provided better leafy spurge control 11 MAT than the standard treatment of picloram plus 2,4-D at 8 plus 16 oz/A, respectively. The addition of 2,4-D to most herbicides decreased control compared to the herbicides alone except when applied with glyphosate or picloram.

Imazamethabenz, AC-310488, EPTC, thifensulfuron plus tribenuron and primisulfuron did not provide satisfactory leafy spurge control either spring or fall applied (Table 1). The insecticides malathion and disulfoton applied with various herbicides in June did not increase leafy spurge control 3 or 12 MAT compared to the herbicides applied alone (Table 2).

Imazethapyr, imazaquin, nicosulfuron and quinclorac provided good to excellent leafy spurge control when fall applied and maintained control longer than picloram plus 2,4-D. Of these, only glyphosate plus 2,4-D and icosulfuron injured grass which would limit their use in a leafy spurge control program.

**Table 2. Evaluation of herbicide plus insecticide mixtures for leafy spurge control (Lym and Messersmith).**

Treatment	Rate oz/A	Control/MAT	
		3	12
		%	
Picloram + X-77	4 + 0.5%	49	21
Dicamba + X-77	32 + 0.5%	36	10
Imazethapyr + X-77	1 + 0.5%	4	0
Imazaquin + X-77	2 + 0.5%	0	3
Sulfometuron + X-77	1 + 0.5%	2	0
Picloram + malathion + X-77	4 + 8 + 0.5%	21	6
Dicamba + malathion + X-77	32 + 8 + 0.5%	28	0
Imazethapyr + malathion + X-77	1 + 8 + 0.5%	5	0
Imazaquin + malathion + X-77	2 + 8 + 0.5%	0	0
Sulfometuron + malathion + X-77	1 + 8 + 0.5%	0	0
Picloram + disulfoton + X-77	4 + 8 + 0.5%	51	9
Dicamba + disulfoton + X-77	32 + 8 + 0.5%	57	13
Imazethapyr + disulfoton + X-77	1 + 8 + 0.5%	6	3
Imazaquin + disulfoton + X-77	2 + 8 + 0.5%	5	0
Sulfometuron + disulfoton + X-77	1 + 8 + 0.5%	2	0
Malathion + X-77	8 + 0.5%	0	0
Disulfoton + X-77	8 + 0.5%	0	0
LSD (0.05)		17	8