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Evaluation of imazapic for leafy spurge control

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Imazapic: (Plateau) has been registered for leafy spurge control in non-cropland. The label states that imazapic should be applied with a methylated seed oil (MSO) adjuvant plus 28% urea nitrogen. Also, the manufacturer recommends imazapic be applied in the fall prior to a killing frost or as a split application in the fall and the following spring. The purpose of these experiments was to evaluate imazapic for leafy spurge control and grass injury applied alone or with a MSO adjuvant in the spring or fall for 3 years, or for leafy spurge control under trees.

The first experiment evaluated leafy spurge control with imazapic applied in mid-summer or fall for 3 years at two locations in North Dakota. The herbicide treatments were applied using a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. The plots were 10 by 30 feet and replicated four times with the herbicide treatments in a randomized complete block design. Herbicides were applied near Valley City or Jamestown on July 3, 1996, when the leafy spurge was in the flowering to seed-set growth stage. The air temperature was approximately 80° F and the soil temperature at the 4 inch depth was 57° F at Valley City and 69° F at Jamestown. The fall treatments were applied at both locations on September 9 when the leafy spurge was in the fall regrowth growth stage and the air temperature was in the mid 80°'s. Treatments were reapplied in 1997 and 1998 on similar dates.

Imazapic applied in mid-summer at Valley City did not control leafy spurge when visually evaluated the year of treatment (Table 1). However, control by imazapic at 2 and 4 oz/A averaged 94 and 99%, respectively in May 1997. Imazapic at 4 oz/A provided 93% leafy spurge control in September 1997 with minimal grass injury, but 4 oz/A is above the maximum labeled use rate of 3 oz/A. Imazapic fall-applied at 2 or 4 oz/A provided excellent leafy spurge control the following spring but grass injury was very noticeable and averaged 43%. Imazapic applied at 1 or 2 oz/A with MSO provided 92% leafy spurge control when evaluated in the fall 12 MAT, which was higher than the standard picloram plus 2,4-D treatment which averaged 47%.

Imazapic applied in July for 3 years averaged >90% leafy spurge control 1 month after the last August treatment date (Table 1), with no visible grass injury. The grasses had recovered from the injury observed following the initial treatment and were not injured by the subsequent treatments. Leafy spurge control from imazapic fall-applied averaged above 80% following two annual applications and was similar to the standard treatment of picloram plus 2,4-D.

Leafy spurge control with imazapic applied in mid-summer tended to be less at Jamestown than Valley City (Tables 1 and 2). Only imazapic at 4 oz/A provided greater than 90% control in May 1997 at Jamestown (Table 2). Control averaged 99% in September following a second application of picloram plus 2,4-D, but only was 71% or less with a second application of imazapic. Grass injury could not be evaluated in September 1997 because of severe hail damage at the research location.

Imazapic applied in the fall at Jamestown provided excellent (99%) leafy spurge control in May 1997 regardless of application rate (Table 2). In contrast to the high grass injury at Valley City (Table 1), imazapic at 4 oz/A fall-applied averaged 18% grass injury and was the only treatment to injure grass at Jamestown (Table 2). Leafy spurge control averaged 97% 12 and 24 MAT with both imazapic applied alone at 4 oz/A or at 2 oz/A with MSO compared to 26% with picloram plus 2,4-D.

The second experiment evaluated leafy spurge control with imazapic on a sandy soil at Camp Grafton South, near McHenry, North Dakota, under full-grown ash trees (Table 3). The experiment was established on August 29, 1996, when leafy spurge was in the fall regrowth stage. The air temperature was 79° F and the soil temperature was 72° F at the 4 inch soil depth.

Leafy spurge control in June 1997 averaged 100% with imazapic applied at 2 and 3 oz/A compared to 89% with picloram plus 2,4-D (Table 3). There was 23% grass injury with imazapic applied at 3 oz/A. Control remained high 12 MAT with both imazapic treatments and averaged 95% control compared to 48% with picloram plus 2,4-D, and the grass had recovered. Control 15 MAT with imazapic applied at 1 oz/A averaged 84% and was the only treatment to maintain good control. There was no visible injury to the ash trees regardless of application rate.

In general, imazapic applied in the fall provided better leafy spurge control than the mid-summer treatment and control was sometimes improved when the herbicide was applied with a MSO or MSO plus 28% N compared to imazapic applied alone. Grass injury to cool season species tended to be higher when imazapic was applied in July compared to fall-applied, but the grasses recovered by 12 MAT.

Table 1. Imazapic for leafy spurge control annually applied in mid-summer or fall for 3 years at Valley City, ND.

Treatment ^a	Rate – oz/A –	Evaluation/year							
		Sept. 1996		May 1997		Sept. 1997		June 98	Aug. 98
		Control	Grass inj.	Control	Grass inj.	Control	Grass inj.	Control	Control
%									
<u>Applied annually in July</u>									
Imazapic	2	0	0	94	10	74	5	90	95
Imazapic	4	0	0	99	28	93	5	50	93
Imazapic + MSO ^b	1 + 1 qt	0	0	0	8	87	3	82	96
Imazapic + MSO ^b	2 + 1 qt	0	0	99	28	73	16	59	96
Picloram + 2,4-D	4 + 16	74	4	75	0	38	0	26	96
<u>Applied annually in Sept.</u>									
Imazapic	2			100	36	71	0	99	85
Imazapic	4			100	53	99	0	100	98
Imazapic + MSO ^b	1 + 1 qt			100	20	92	0	99	82
Imazapic + MSO ^b	2 + 1 qt			100	40	92	0	99	85
Picloram + 2,4-D	8 + 16			99	13	47	0	95	86
LSD (0.05)		34	NS	20	25	25	NS	26	10

^aInitial investments applied July 2 (summer) and September 9, 1996 (fall). All treatments were reapplied in 1997 and 1998.

^bMethylated seed oil was Sun-It by AGSCO.

Table 2. Imazapic for leafy spurge control annually applied in mid-summer or fall for 3 years at Jamestown, ND.

Treatment ^a	Rate – oz/A –	Evaluation/year							
		Sept. 1996		May 1997		Sept. 1997	June 1998		Aug. 1998
		Control	Grass inj.	Control	Grass inj.	Control	Control	Grass inj.	Control
%									
<u>Applied annually in July</u>									
Imazapic	2	0	0	0	0	0	34	0	22
Imazapic	4	13	14	92	1	71	96	2	99
Imazapic + MSO ^b	1 + 1 qt	28	0	33	0	13	58	0	36
Imazapic + MSO ^b	2 + 1 qt	17	0	72	0	45	85	0	82
Picloram + 2,4-D	4 + 16	46	0	15	0	99	42	0	87
<u>Applied annually in Sept.</u>									
Imazapic	2			99	5	28	97	0	45
Imazapic	4			100	18	97	100	23	99
Imazapic + MSO ^b	1 + 1 qt			99	6	70	99	0	29
Imazapic + MSO ^b	2 + 1 qt			100	6	96	100	6	96
Picloram + 2,4-D	8 + 16			95	0	26	97	0	26
LSD (0.05)		14	10	19	6	18	10	5	17

^aInitial treatments applied July 2 (summer) and September 9, 1996 (fall). All treatments were reapplied at a similar date in 1997 and 1998.

^bMethylated seed oil was Sun-It by AGSCO.

Table 3. Imazapic for leafy spurge control near trees established on Camp Grafton South near McHenry, ND.

Treatment ^a	Rate	June 1997		Sept 1997		June 98
		Control	Grass injury	Control	Grass injury	Control
	– oz/A –			%		
Imazapic + MSO ^b + 28% N	2 + 1 qt + 1 qt	100	11	93	0	56
Imazapic + MSO ^b + 28% N	3 + 1 qt + 1 qt	100	23	96	3	84
Picloram + 2,4-D	8 + 16	89	0	48	0	6
LSD (0.05)		8	9	14	NS	32

^aTreatments applied August 29, 1996.

^bMethylated seed oil was Sun-It by AGSCO.