

*Reprinted with permission from: Summary of Research: Low Volume Herbicide Application Methods for Leafy Spurge Control. 1982. pp. 27-28.*

*Published by: Department of Agronomy, North Dakota State University, Fargo, ND.*

---

## **Ethephon as a pretreatment to 2,4-D and picloram for leafy spurge control**

RODNEY G. LYM and CALVIN G. MESSERSMITH

Ethephon is an ethylene releasing plant growth regulator (Ethrel™ manufactured by Union Carbide) that is absorbed through the foliage and translocated throughout the plant. Plant responses include abscission, flower induction and the breaking of apical dominance. Reports have indicated that the translocation of auxin type herbicides have been increased in perennial plants when the plants received a pretreatment of ethephon 24 hours earlier. The purpose of these experiments was to evaluate leafy spurge control by 2,4-D and picloram in combination with an ethephon pretreatment.

In the first greenhouse experiment leafy spurge plants were treated with various rates of ethephon 24 hours prior to treatment of 2,4-D at 8 oz/A or picloram at 2 oz/A. The plants were 10 to 14 inches tall and in a vegetative stage of growth. The treatments were applied using a moving nozzle pot sprayer delivering 17.5 gpa at 35 psi. The experiments were a randomized complete block with four replications. Plants were evaluated for injury compared to the control 3, 14 and 28 days after treatment.

Leafy spurge topgrowth control increased when 2,4-D application was preceded by ethephon compared to no ethephon pretreatment (Table 1). Ethephon treatments at rates higher than 8 oz/A caused greater injury at 3 days, but did not result in increased leafy spurge control at 14 and 28 days. Initial injury to leafy spurge by picloram was greater following a pretreatment of ethephon compared to no pretreatment, but all picloram treatments gave similar leafy spurge control by 28 days.

In the second experiment, <sup>14</sup>C-picloram translocation in leafy spurge was evaluated with and without ethephon as a pretreatment. Leafy spurge plants attached by a common root were grown in separate 1 L plastic pots with 1 N Hoaglands solution and aerated. The common root connected the taller (parent) plant with the shorter (daughter) plant via holes drilled in the side of each pot and sealed with a Vaseline:paraffin wax in a 30:70 ratio. Ethephon at 8.0 oz/A was applied to the parent plant 24 hours prior to the <sup>14</sup>C-picloram treatment. The parent plant was treated on three leaves midway between the apex and the base of the stem. Each parent plant received a total of 280,000 dpm of <sup>14</sup>C-picloram, plus 10 µl of surfactant WK at 0.04% (v/v) was applied to the treated leaves prior to and 15 minutes after treatment. The plants were harvested one week after treatment and separated into treated leaves, stem and leaves, and root tissue. The nutrient solution was condensed to 40 ml and a 1 ml aliquot was assayed for radioactivity. There were five replications in a completely random design.

<sup>14</sup>C translocation to the daughter plant was increased and less <sup>14</sup>C remained in the parent plant when ethephon preceded <sup>14</sup>C-picloram applications (Table 2). Pretreatment of ethephon had little effect upon total <sup>14</sup>C-picloram remaining in the root of the parent leafy spurge plant. Total <sup>14</sup>C-picloram translocated to the parent plant root system (<sup>14</sup>C in daughter plant plus parent plant roots and nutrient solution) was 7.1 and 8.6% without and with ethephon, respectively; however, 52 and 62% of the translocated herbicide, respectively, was excreted into the nutrient solution by the parent and daughter plants. In summary 2,4-D toxicity to leafy spurge and <sup>14</sup>C-picloram translocation in leafy spurge were increased following a pretreatment of ethephon under greenhouse conditions.

**Table 1. Ethephon as a pretreatment to 2,4-D and picloram for leafy spurge control. (Lym and Messersmith).**

Treatment	Rate oz/A	Injury rating <sup>a</sup>		
		3 days	14 days	28 days
Ethephon+2,4-D	8+8	43	90	85
Ethephon+2,4-D	16+8	65	78	80
Ethephon+2,4-D	32+8	66	78	75
2,4-D	8	23	45	33
Ethephon+picloram	8+2	35	30	25
Ethephon+picloram	16+2	48	50	33
Ethephon+picloram	32+2	48	30	23
Picloram	2	5	8	25
Control	----	0	0	0

<sup>a</sup>0=no injury 10=death.

**Table 2. <sup>14</sup>C-picloram translocation in leafy spurge following a pretreatment of ethephon. (Lym and Messersmith).**

Plant part	Treatment	
	<sup>14</sup> C-picloram	Ethephon + <sup>14</sup> C-Picloram
	(% of total <sup>14</sup> C applied)	
Daughter plant		
Stem and leaves	1.1	1.0
Roots	0.2	0.7
Nutrient solution	0.3	1.7
Parent plant		
Stem and leaves	16.4	10.1
Roots	2.1	1.6
Treated leaves	36.9	33.4
Nutrient solution	3.4	3.6