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Published by: Great Plains Agricultural Committee.

Leafy spurge control using the controlled droplet applicator with picloram plus additives

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Several experiments were established to evaluate leafy spurge control with picloram using the controlled droplet applicator (CDA). The CDA is designed to deliver herbicide in a precise spray pattern with a uniform droplet size of 200-microns. The CDA delivers much less herbicide per acre than the conventional broadcast sprayer. Thus the CDA would be a more economical method of application if control were comparable to conventional broadcast application.

The first experiment was established near Walcott, ND on 30 June 1980. The weather was dry and 72° F, 64% relative humidity, and 82° F soil temperature at one inch. The leafy spurge was 20 to 30 inches tall and the soil was moist. Picloram was applied to leafy spurge in picloram:water (v:v) solution concentrations ranging from 1:1 to 1:15. A surfactant (Surfel) and an oil (85% paraffin base petroleum oil plus 15% emulsifier) were added at a 5% concentration (v:v). The CDA was calibrated to deliver 60 ml/min for all solution concentrations. The spray width of the hand-held CDA was 4 ft and the plot size was 5 by 30 ft replicated four times in a randomized complete block design. Evaluation was based on stand reduction as compared to the control.

The solution concentration of 1:1 delivered approximately 0.1 lb/A of picloram. The 1:1 treatment provided 79% control when averaged across all additives which was significantly higher than any other treatment when evaluated 11 months after application (Table 1). Leafy spurge control was not improved by including a surfactant or oil additive. By August 1981, leafy spurge control for the 1:1 treatments had decreased to 53%, and all other treatments showed similar decreases.

An experiment to evaluate leafy spurge control with picloram alone using the CDA was established at two sites. The first site was near Minot, ND and the experiment was established on 10 July 1980 with the leafy spurge 6 to 12 inches tall and under drought stress. The soil temperature at 1 inch was 82° F, 69% relative humidity, and 79° F at treatment and 102° F later in the day. The second site was near Dickinson, ND where the leafy spurge was 10 to 12 inches tall and drought stressed. The experiment was established on 15 July 1980 with conditions of 65° F, 51% relative humidity, and 70° F soil temperature at 1 inch. The plots were 10 by 30 feet and replicated four times in a randomized complete block design.

Leafy spurge control varied at these sites (Table 2). Picloram at 1:1 and 1:3 concentrations gave 35 and 31% control, respectively, at Dickinson, and 90% and 0% control, respectively, at Minot. The results from Dickinson are similar to the August evaluations at Walcott. The large difference in the control between Minot and the other two sites may be due to an environmental effect. Both the Dickinson and Minot sites were under drought stress but the air was very hot and dry after treatment at Minot which may have reduced picloram absorption.

Leafy spurge control by picloram using the CDA applicator was fair at the highest solution concentration tested. The light weight and ease of operation of the CDA is an advantage of the equipment over the traditional hand held sprayer for use in special situations like shelterbelts and spot treatments. Further research is necessary to evaluate the effectiveness of the CDA.

Table 1. Leafy spurge control using the CDA applicator with picloram plus additives – Walcott, ND. (Lym and Messersmith).

Evaluation date	Picloram concentration ^a /(lb/A)		Additive/control			Mean
			None	Surfactant ^b	Oil ^c	
			(%)			
22 May 1981	1:1	0.1	70	84	84	79
	1:3	0.025	70	66	43	60
	1:7	0.0125	51	64	56	57
	1:11	0.008	20	46	29	32
	1:15	0.00625	43	28	43	38
LSD (0.05)=Conc=19; Add=14; Conc x Add=33						
19 Aug. 1981	1:1	0.1	34	70	56	53
	1:3	0.025	29	19	11	19
	1:7	0.0125	3	4	13	7
	1:11	0.008	0	0	1	0
	1:15	0.00625	0	0	0	0
LSD (0.05)=Conc=13; Add=10; Conc x Add=22						

^aPicloram (Tordon 22K):water (v:v).

^b5% surfactant (Surfel) (v:v).

^c5% oil (v:v) (83% paraffin base petroleum oil + 15% emulsifier).

Table 2. Leafy spurge control with picloram using the controlled droplet applicator, Dickinson and Minot, ND. (Lym and Messersmith).

Solution concentration ^a (lb/A)		Control		
		Dickinson 25 Aug. 1981	Minot 11 June 1981	Minot 15 Sept. 1981
		(%)		
1:1	(0.1)	35	97	90
1:3	(0.025)	31	0	0
1:7	(0.0125)	16	0	0
1:11	(0.008)	0	0	0
1:15	(0.006)	6	0	0
LSD (0.05)		16		--

^aPicloram (Tordon 22K):water (v:v).