

Effects of Prep on Cotton Fruiting, Boll Opening and Boll Weevil Populations

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ABSTRACT

Prep applied to cotton on 15, 23, and 29 September reduced numbers of squares, immature green bolls < 1 inch in diameter, and accelerated mature boll opening. Reduced cotton fruiting forms in Prep-treated plots resulted in reduced boll weevil population development.

INTRODUCTION

Boll Weevil infestations in Arizona have spread throughout the state, particularly in the Western and Central growing areas. Late season populations reproduce and develop to high numbers in late season fruiting forms. These fruiting forms seldom mature to contribute to yield because of adverse cotton growing conditions in the fall.

Selectively removing late season fruiting forms with plant growth regulators eliminates the source of host material and prevents the development of the overwintering populations.

Preliminary studies were conducted using Prep (= Ethephon) to terminate cotton fruiting, accelerate mature boll opening and reduce boll weevil population development (Henneberry et al. 1986). Results showed reduced cotton fruiting and a dramatic reduction in numbers of boll weevils developing per acre of cotton. Treatments accelerated opening of mature bolls.

Cotton lint yield was slightly reduced in plots treated with 2 lb Prep on 6 September as compared to yields in the untreated check and plots treated with 1 lb Prep on 6 or 13 September. There were no significant differences in yield for plots treated with 1 lb Prep on 6 or 13 September and the untreated check.

These promising results prompted us to conduct further studies with Prep to more clearly define relationships between dates of application, boll opening, and boll weevil population development.

METHODS AND MATERIALS

Four commercial 'Deltapine 90' cotton fields located at Laveen, Arizona were divided into 6 equal size plots. Prep (1.5 lb a.i./a) was applied/plot in each field on 15, 23, and 29 September. Controls were 4 untreated plots on each treatment date.

Squares, <1 in. and >1 in. green bolls and open bolls were counted in 13.1 ft of cotton row in all plots at intervals after each Prep application through 29 October. Squares (1/3 grown) and green bolls, 100 in each case, were picked at random in each plot to determine boll weevil infestation levels.

The last insecticide application for boll weevil control was made 13 September to all fields in the study.

Cotton in all plots was machine-harvested with a spindle picker on 22 October to determine effects of treatments on cotton yields.

RESULTS

Prep applications significantly reduced numbers of squares and bolls <1 in. diameter within 3 days to 10 days after application and thereafter until harvest (Table 1). Treatments on each date also significantly accelerated boll opening.

Boll weevil populations in bolls increased throughout the sampling period of 10 September to 29 October and because of the higher numbers of fruiting forms in the control plots, populations on 29 October were 35 times as great in control plots as occurred in the Prep-treated plots (Table 2).

There were no significant differences in lint yield in Prep-treated compared to untreated control plots (Table 3). Lint yield ranged from 1740 to 1886 pounds per acre.

LITERATURE CITED

Henneberry, T. J., L. A. Bariola, J. E. Leggett, T. Meng, D. Akey and B. Deeter. 1986. Report on the effects of Prep on cotton fruiting, boll opening, and boll weevil populations. pp. 202-205. In Cotton: A College of Agriculture Report, University of Arizona, Tucson, AZ. 241 pp.

Table 1. Mean¹ numbers of squares and immature green bolls in Prep and untreated control cotton plots.

Prep (lb/A)	9/10	9/22	9/26	9/29	10/2	10/6	10/9	10/14	10/16	10/20	10/23
	Squares										
1.5	159A	169A	75B	126B	47B	29B	16B	15B	12B	6A	.4B
0(Ck)	198A	150A	135A	203A	255A	108A	91A	31A	52A	11A	3.3A
	Green Bolls <1 in.										
1.5	83A	34B	78A	60B	46B	33B	23B	25B	12B	19B	14B
0(Ck)	118A	79A	100A	92A	90A	90A	68A	51A	36A	34A	36A
	Green Bolls >1 in.										
1.5	104A	104A	75A	83A	82B	61A	61B	61B	66A	42B	50A
0(Ck)	121A	92A	82A	116A	116A	120A	86A	103A	83A	74A	71A
	Total Green Bolls										
1.5	187A	128A	152A	142A	119B	106B	83B	86B	78A	61B	64B
0(Ck)	239A	171A	188A	208A	206A	210A	153A	154A	110A	107A	107A
	Percentages of Mature Open Bolls										
1.5	66A	--	--	74A	77A	78A	83A	83A	84A	87A	--
0(Ck)	59A	--	--	68A	66B	63B	72B	72B	79B	79B	--

¹Means of 4 replications over all treatment dates. Means in a column for each fruiting type not followed by the same letter are significantly different. P = 0.05.

Table 2. Mean¹ number of boll weevils developed per 13.1 ft (x 100) of cotton row in Prep treated and untreated cotton plots.

Prep (lb/A)	9/18	9/26	10/2	10/9	10/16	10/23	10/29
1.5	1	90	3	60	80	190	290
0(Ck)	3	230	10	170	1500	1902	10400

¹ Means of 4 replications across all treatment dates, 100 bolls/plot/treatment on each sampling date.

Table 3. Mean¹ cotton lint yields in Prep treated and untreated cotton fields.

Treatment	Date of Application			Mean
	9/15	9/23	9/29	
Prep 1.5 lb/A	1847	1793	1886	1842
0(Ck)	1825	1740	1866	1810
Mean	1836	1776	1876	--

¹ Means of 4 replications. No statistically significant differences in cotton yields.