# Early-Season Cotton Square Removal with Ethephon And Initiation of Pink Bollworm Infestations

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## ABSTRACT

*Ethephon applied at rates of 0.50 or 0.75 lb AI/acre removed early-season squares and delayed initiation of pink bollworm, Pectinophora gossypiella (Saunders) infestations and reduced the number of infested bolls on early-season fruiting branches, without affecting yield except for ethephon at 0.75 lb AI/acre at one location. Higher rates of application reduced yields. In most cases, ethephon treatments delayed flowering but plants compensated for removal of early-season squares and equalled or surpassed accumulated flowering of untreated control plants later in the season.*

## INTRODUCTION

Pink bollworm moth emergence that occurs before fruiting forms of cotton are available as a source of larval food is suicidal (Chapman et al. 1960, Bariola 1978). We conducted studies to determine the potential of using ethephon to remove early-season hostable cotton squares to extend the pink bollworm suicidal emergence period and delay initiation of early-season infestations.

## PROCEDURES AND RESULTS

The studies were conducted at the University of Arizona's Maricopa Agricultural Center, Maricopa, AZ, with 'Deltapine 61' cotton. Seed was planted on 28 March in a randomized block design of four replications. Plots were 4 rows wide by 50 ft. long. Ethephon applications were made on 10 June with a backpack sprayer. Rates were 0.50, 0.75, 1.00 and 1.25 lb AI/acre in 20 gal. of water/acre. Untreated plots were controls. Pretreatment counts of 1/3-grown or larger squares on all plants at nine sites of 13.1 ft. of cotton row randomly selected throughout the field were made on 10 June. Gossyplure-baited Delta sticky traps were placed two per field quadrant to monitor pink bollworm male moth populations. No insecticides were applied to any of the plots.

Numbers of aborted and healthy squares were counted on all plants in 3 ft. of row in all plots on Day 6 following treatment. The effects on cotton flowering were determined by counting all flowers daily on 50 ft. of row in the plots beginning five days after treatment and continuing to 18 September. The effect of early-season ethephon applications on the initiation and distribution of pink bollworm infestations on cotton plants was determined by picking 5 whole plants from each plot on 17 September. All open mature cotton bolls and immature green cotton bolls were counted on each fruiting branch. Each boll was examined for pink bollworm exit holes and other evidence of pink bollworm feeding damage.

Cotton was hand harvested in 13.1 ft. of row on 26 October to determine the effects of treatments on yields.

Pre-treatment counts showed an average of 9.7 one-third-grown squares per 14 m of cotton row. Numbers of healthy squares six days after treatment ranged from 0.5 to 3.4/plant in plots treated with ethephon at 1.25 and 0.50 lb AI/acre, respectively, as compared to 4.6/plant in the untreated control plots (Table 1). Numbers of pink bollworm male moths caught in gossyplure-baited traps showed moth emergence from overwintering larvae was increasing from 1 to 8 June, and decreasing thereafter to 1 July. Numbers of 1/3-grown pink bollworm hostable

squares beginning just after the peak of moth emergence were more than 14x greater in control plots than in plots treated with 1.00 or 1.25 lb AI/acre of ethephon.

The number of the node of first fruiting branch with a fruiting structure increased with increasing rates of ethephon application (Table 2). Also, the first fruiting branches with pink bollworm-infested bolls occurred 2.9 to 4.1 nodes later in ethephon-treated plots as compared to control plots.

Cotton lint yields from plots treated with ethephon on 10 June with 0.50 or 0.75 lb AI/acre were not significantly different from the untreated controls, but yields were reduced at rates of 1.00 and 1.25 lb AI/acre (Table 3).

Reducing pink bollworm infestations in early-season bolls could have a significant impact on the population dynamics of the pink bollworm and delay the development of economic infestation levels. The adverse effect on cotton yield at some rates of application and time of application is unacceptable, but may be related in our studies to time or rate of application, cotton variety or other factors. The potential benefits of developing early-season pink bollworm reproduction suppression technology to complement cultural and other methods to reduce late-season overwintering populations justify continued research to investigate this concept further.

## LITERATURE CITED

Bariola, L. A. 1978. Suicidal emergence and reproduction of overwintered pink bollworm moths. Environ. Entomol. 7: 189-192.

Chapman, A. J., L. W. Noble, O. T. Robertson, & L. C. Fife. 1960. Survival of the pink bollworm under various cultural and climatic conditions. USDA, Prod. Res. Rept. 34, 21 pp.

Table 1. Effect of early-season ethephon applications on removal of cotton squares at Maricopa, AZ

| Treatment | Post-treatment[a/] (6 days) | | |
|---|---|---|---|
| Ethephon (Lb AI/Ac) | No. squares/plant | | |
| | Healthy | Aborted | % Aborted |
| Control | 14.6 a | 1.0 c | 21 c |
| 0.50 | 3.4 b | 2.6 b | 43 b |
| 0.75 | 2.1 cd | 2.4 bc | 54 b |
| 1.00 | 0.8 d | 3.3 a | 80 a |
| 1.25 | 0.5 d | 4.6 a | 91 a |

a/ Means of 4 replications. Means in a column not followed by the same letter are significantly different (Duncan's [1955] Multiple Range Test, $P \leq 0.05$).

Table 2. Effects[a/] of early-season ethephon treatments on cotton fruiting branch and the initiation of first pink bollworm infestations

| Ethephon rate (Lb AI/Ac) | Node Number of First Fruiting Branch | |
|---|---|---|
| | With cotton bolls | With a PBW infested boll |
| Control | 8.9 b | 10.8 b |
| 0.50 | 11.8 ab | 13.7 ab |
| 0.75 | 10.7 ab | 13.2 ab |
| 1.00 | 12.5 a | 14.9 a |
| 1.25 | 12.7 a | 14.5 ab |

a/ Means of 4 replications. Means in a column not followed by the same letter are significantly different (Duncan's [1955] multiple range test, $P \leq 0.05$.

Table 3. Mean[a/] seed cotton and cotton lint yield in ethephon-treated and untreated control cotton plots

| Ethephon (Lb AI/Ac) | Cotton Lint Yield (Lb/Ac) Maricopa, AZ |
|---|---|
| Control | 861 ab |
| 0.50 | 894 a |
| 0.75 | 928 a |
| 1.00 | 671 c |
| 1.25 | 701 bc |

a/ Means in a column not followed by the same letter are significantly different, $P \leq 0.05$ (Duncan's [1955] multiple range test.