ETHEPHON EFFECTS ON BOLL OPENING AND EARLINESS OF EARLY- AND LATE-PLANTED 'DELTAPINE 50'

C. O. Gwathmey and R. M. Hayes
University of Tennessee
Dept. of Plant and Soil Science
Jackson, TN

Abstract

Planting date of cotton may affect harvest-aid performance due to differences in ambient temperatures during and after chemical application. Boll opening activity of ethephon ([2-chloroethyl] phosphonic acid) is known to be temperature-sensitive. Objectives of this study were: (i) to determine the relationship between heat units after treatment (HUAT, base 60° F) and boll opening for early- and late-planted cotton; (ii) to determine effects of ethephon on boll opening, earliness, and lint yields as influenced by HUAT; and (iii) to detect possible interactions between ethephon and commercial defoliants. Deltapine 50 was planted on 26 Apr and 19 May 1994, and on 28 Apr and 16 May 1995 at the West Tennessee Experiment Station. In each planting, ethephon (Prep™) was applied alone and in tank mixtures with defoliants S,S,S tributyl phosphorotrithioate (Folex®), thidiazuron (Dropp®), and dimethipin (Harvade® + crop oil) to 4-row plots. Each of the defoliants was also applied alone to plots in a RCB factorial design, along with an untreated check. Ethephon was applied at 1.0 lb a.i./acre in all cases. Treatments were applied on 16 Sep and 6 Oct 1994, and 14 Sep and 25 Sep 1995, between 49% and 57% open bolls. Boll opening was monitored in 40-inch row sections of each plot at 7 and 14 days after treatment (DAT). Plots were spindle picked twice (at 14 and 28 DAT) to determine lint yields and earliness.

At 7 DAT, HUAT ranged from 70 to 92 in the early plantings and from 24 to 40 in the later plantings. In only one early-planted test (with 70 HUAT) did ethephon increase boll opening by 7 DAT. By 14 DAT, it increased boll opening in all experiments (52 to 108 HUAT). No significant ethephon-by-defoliant interactions for boll opening were detected. Boll opening was correlated with HUAT ($r=0.59$, $P<0.01$ in early-planted tests; $r=0.83$, $P<0.01$ in late planted tests). However, ethephon applied to early-planted Deltapine 50 reduced this correlation ($r=0.51$, $P=0.05$). Ethephon increased total lint yields in three of four tests where HUAT ranged from 68 to 142, but not in one early-planted test with 159 HUAT to second harvest. Ethephon-by-defoliant interactions affected total yield in one early-planted test with 142 HUAT to second harvest. In this test, ethephon increased yields when tank-mixed with defoliants, but not when applied alone. No other significant ethephon-by-defoliant interactions were detected. Ethephon increased first-harvest yields and earliness in all tests, from 75% first harvest without ethephon to 83% first harvest with ethephon. Percent first harvest was correlated with percent open bolls at 14 days in early ($r=0.72$, $P<0.01$) and late ($r=0.96$, $P<0.01$) planted Deltapine 50.

Results suggest that differences in planting date can alter boll opening responses to ethephon if they result in too few HUAT for physiological activity, or so many HUAT that natural boll opening produces as many open bolls by harvest. Significant boll opening responses to ethephon consistently occurred in a range of 52 to 108 heat units accumulated in 14 days after treatment in these experiments, and these responses were strongly associated with earliness.

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