Fruiting Profiles of Cotton Treated with Various 1-Methylcyclopropene Formulations

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ABSTRACT

Environmental stresses such as drought, cloud cover, and low nutrient levels are limiting factors of cotton (*Gossypium hirsutum*) yield. Ethylene has been shown to be synthesized at higher rates during stress and is correlated with fruit abscission. The compound 1-methylcyclopropene (1-MCP) has proven to be an effective ethylene inhibitor in horticultural crops. A field experiment was conducted at the Texas A&M AgriLife Research Farm in Burleson County, Texas to evaluate the response to four formulations of 1-MCP applied at differing rates of 1x, 2x, and 5x (Fig. 1 & 2) to cotton when imposed with a synthetic stress, ethephon. Lint yield differences were observed to be significant within the plots treated with 526 grams ai/ha of ethephon at a *P Value= 0.1091*. Numerical differences were observed in the plot area not treated with ethephon, though not statistically different. Square abscission data was also collected and showed only numerical differences.

INTRODUCTION

Cotton is subjected to numerous biotic and abiotic stress during the cropping season. Factors, such as drought (McMichael and Jordan, 1973); low light (Zhao and Oosterhuis, 2000); and low nutrient levels (Hake et al., 1989) play key roles in reducing cotton lint yield (Baker, 1966). Stress also elicits increases in ethylene synthesis, which has been shown to promote cotton fruit abscission (Suttle and Hulstrand, 1991). Recent work has shown that 1-MCP is an effective ethylene inhibitor, suggesting its potential to counter the effects of biotic and abiotic stress.

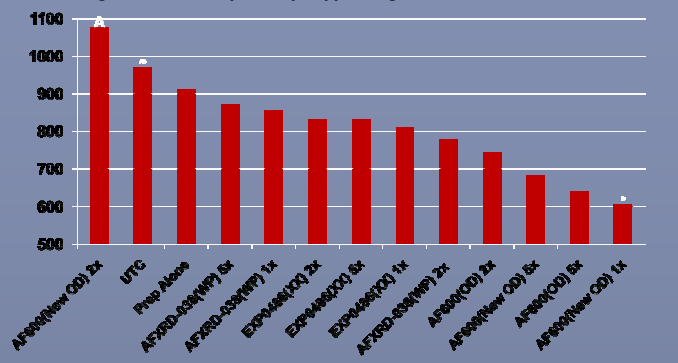
OBJECTIVE

To evaluate which formulation candidate best mitigates an ethephon (Prep) stress effect at a rate that mimics realistic field crop stress.

Harvesting two middle treated rows from six row plots.

LINT YIELD (Lbs/A)

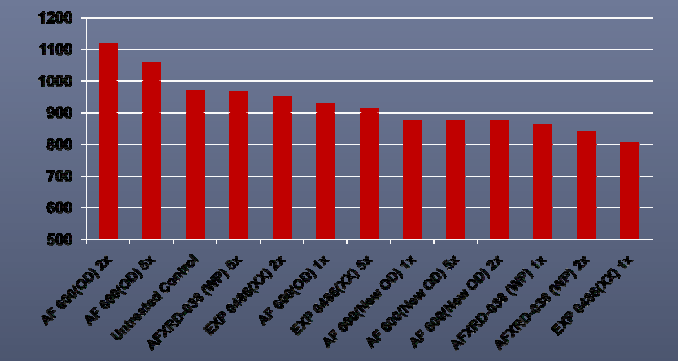
High Rate of Ethephone (Prep): 526 grams ai/ha or 10 fluid oz/A



P Value= 0.1091 Coefficient of Variance= 25.0501 R-Squared= 0.4488

LINT YIELD (Lbs/A)

No Ethephon (Prep)



P Value= 0.6704 Coefficient of Variance= 24.1055 R-Squared= 0.2499

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METHODS AND MATERIALS

The study was conducted by Texas A&M on a Weswood silt loam field at the Texas AgriLife Research Farm in Burleson County, Texas. The cotton variety used was Delta and Pineland 0935 Bollgard II Roundup Ready Flex®. A randomized complete block design was used, with four replications. The center two rows of each six row plot were treated and evaluated. Application of 1-MCP was applied at an output of 20 gallons/acre using a backpack sprayer at pinhead square plus twenty-one days. The formulas used were AF 600 (OD), AF 600 (New OD), EXP0486 (XX), and AFXRD-038 (WP). The formulas were applied at rates of 5, 10, and 25 grams ai/ha. Prep (ethephon) was applied at the rate of 526 grams ai/ha three hours after treatment with 1-MCP to induce a crop stress. Ten days prior to treatment, fifty first position and fifty second position squares were marked using paper tags to determine abscised squares after ethephon application. Dropped squares with a tag attached were measured at three days, seven days and ten days after treatment. The center two rows of each plot were harvested using a John Deere 9910 2-row plot picker. Yield and abscised square data was analyzed using the SAS© 9.2 system with PROC GLM.

RESULTS & DISCUSSIONS

Lint yields from plots treated with the highest rate of ethephon showed *P-Value* significance at the 0.1091 level. Lint yields ranged from 1077 to 606 Lbs/A (Fig. 1). Lint yields from plots with no imposed ethephon stress showed no statistical significance (Fig. 2). Fiber analysis failed to show statistical differences. All treatment means for dropped square counts were numerically different, but proved to be non-significant through statistical analysis.

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