

**PHYSIOLOGICAL EFFECTS OF 1-MCP ON THE COTTON FLOWER AND SUBSEQUENT BOLL DEVELOPMENT UNDER NORMAL AND HIGH TEMPERATURES**

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**Abstract**

Cotton (*Gossypium hirsutum*) yields in the US Cotton Belt are well below the potential economical yield. In addition, extreme year-to-year variability in yield is a major concern for the sustainability of cotton production. Many stress factors are associated with low cotton yield, among which temperature appears to play a major role. During stress, natural ethylene levels increase and cause fruit shed, pollen sterility and consequently poor fertilization. The current project was designed to evaluate the possible use of the plant growth regulator 1-Methylcyclopropene (1-MCP) to alleviate the adverse effect of environmental stresses on boll set, and thereby reduce year-to-year yield variability, and allow the cotton crop to yield closer to its potential. Field and controlled environment studies were conducted in Arkansas in 2006 and 2007. An untreated control was compared with 1-MCP @ 10 g ai/ha applied at pinhead square (PHS), first flower (FF) and two weeks later (FF+2 weeks). Measurements were made on boll weight, boll number and yield, as well as on plant physiological and biochemical responses. Results indicated that plants that received 1-MCP at FF and FF+2 weeks had significantly higher seed cotton and lint yields than untreated control treatment. This occurred due to a combination of numerical increases in the number and size of cotton bolls in the 1-MCP treatments. 1-MCP application also positively changed the pattern of ethylene synthesis by cotton flowers, increased leaf chlorophyll fluorescence ( $F_v'/F_m'$ ), and decreased the Glutathione antioxidant enzyme activity which could explain the beneficial effects of 1-MCP on the growth and yield of cotton.