AGRONOMIC, PHYSIOLOGICAL AND BIOCHEMICAL EFFECTS OF 1-MCP ON THE GROWTH AND YIELD OF COTTON

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Abstract

Cotton yields in the Mississippi Delta 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 them temperature appears to play a major role (Burke et al., 1998). 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 1-Methylcyclopropene (1-MCP) to alleviate the adverse effect of environmental stresses on square and 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, first flower and two weeks later. Measurements were made on boll retention, boll weight, boll number and yield, as well as on plant physiological and biochemical responses. Results indicated that treated plants exhibited a numerical increase in yield and lower number of bolls. This occurred because treated plants had significantly ($P<0.05$) bigger bolls than the untreated treatment. There were also effects on ethylene measurements, fluorescence and antioxidant enzyme activity which could explain the effects of 1-MCP on the beneficial growth and yield of cotton.