EFFECT OF 1-MCP ON HIGH TEMPERATURE STRESSED COTTON DURING REPRODUCTIVE DEVELOPMENT

J. B. Phillips
D. M. Oosterhuis
E. M. Kawakami
University of Arkansas
Fayetteville, AR

Abstract

1-Methylcyclopropene (1-MCP) is a plant growth regulator that works by decreasing or delaying the effect of ethylene which normally acts as an endogenous stress and senescence phytohormone. One of the main problems in cotton production is the extreme year-to-year variability in yield, which is a major concern to cotton farmers and the industry in general. Variability in cotton yield is associated with many factors and temperature appears to play a major role. There is also a correlation between high temperature during flowering and low cotton yields. High temperatures greatly influence the development of flowers, pollination and fertilization, and often result in reduced seed number and lower yields. The objective of these studies was to evaluate the effectiveness of 1-MCP to counteract the effects of stress and maintain fruit and seed numbers for increased yield. It was hypothesized that plants treated with 1-MCP would have less stress, resulting in less fruit abscission and higher growth rates. As a result, higher and less variable yields could be achieved without undue changes in management and production costs. Five years of field trials were conducted to evaluate the effect of foliar application of 1-MCP on growth, stress response and yield of cotton. Treatments consisted of an untreated control and 1-MCP applied @10g ai/ha at first flower. Measurements were made of growth analysis, antioxidant enzymes, and yield. 1-MCP applications had significant effects on cotton yields, which resulted from the positive influence of 1-MCP on the physiological stress response of the plants. Results also showed that 1-MCP had a short period of activity which lasted for about 5 days. Overall, our studies indicated that 1-MCP application has the potential to be used in cotton production to overcome environmental stress problems and achieve higher and more stable yields.