

## **1-MCP EFFECTS ON ANTIOXIDANT ACTIVITY AND GENE EXPRESSION OF ACC-SYNTHASE AND ACC-OXIDASE IN COTTON FLOWERS**

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### **Abstract**

Cotton remains an important cash crop for farmers in the southern United States. When temperatures rise above 32°C the *in vivo* fertilization efficiency of cotton is reduced resulting in decreased seed production and potentially decreased yields. Under stress, the plant hormone ethylene is manufactured. 1-Methylcyclopropene (1-MCP) is a synthetic plant growth regulator that binds to the ethylene receptors within the cell preventing the plant from fully recognizing the increased stress levels. 1-MCP was evaluated at the Arkansas Agricultural Research and Extension Center in Fayetteville, AR during the 2009 growing season. Open flowers were treated with 1-MCP on the day of anthesis and compared to an untreated control. Flowers were collected the following day and the levels of antioxidants glutathione reductase and superoxide dismutase, and also malondialdehyde recorded. The ACC-Synthase and ACC-Oxidase gene expressions were also analyzed. Measurements of the antioxidant levels within the cell showed significant differences in glutathione reductase and superoxide dismutase between the two treatments, indicating the 1-MCP was reducing the plant's response to ethylene. Malondialdehyde levels did not differ between the control and 1-MCP treatment. ACC-Synthase gene expression revealed that the control displayed a higher activity when compared to the 1-MCP treated flowers. Expression of ACC-Oxidase was significantly lower in 1-MCP treated plants than that of the control. The research indicated that 1-MCP is effective at reducing the cotton plant's perception of stress by reducing oxidative stresses and ethylene production.