EXPRESSION OF ANTIOXIDANTS IN COTTON ALTERS LINT YIELD AND QUALITY

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Abstract

Water is the primary factor limiting cotton production in West Texas. The increasing costs to irrigate coupled with inadequate seasonal rainfall demands greater inquiry into technologies that may enhance cotton yield under water-limited (dryland) conditions. The objective of this research was to determine the efficacy of three genes implicated in physiological responses to abiotic stress. Transgenic cotton plants that express the enzymes catalase (CAT), ascorbate peroxidase (APX), and glutathione reductase (GR) were created and evaluated. These enzymes play a key role in the removal of reactive oxygen intermediates which develop in response to stress and can affect photosynthesis, respiration, and other metabolic processes. Seven advanced lines (APX, 3 CAT, 2 GR and 1 non-transgenic (Null)) were evaluated under three irrigation treatments over three seasons. Fiber production and quality was determined for each plot. The performance of these genes showed significant deviation from the non-transgenic line for a number of fiber traits. While the efficacy of each transgene has been evaluated independently, their additive relationship may be greater. Therefore, populations segregating for different gene combinations (i.e. APX x GR) are being developed.