1930 Overexpression of antioxidants in cotton alters lint yield and quality

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Increased irrigation costs coupled with inadequate seasonal rainfall demands greater inquiry into technologies that may enhance cotton yield under water-limited (dryland) conditions. Transgenic cotton plants that overexpress 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 (ROI's) which develop in response to stress and limit crop productivity. The project objective was to quantify the effect of enhanced antioxidant production on fiber production (yield and lint %) and quality (HVI and AFIS) under variable water management practices. Five transgenic (APX, 2 CAT, 2 GR) and three non-transgenic (2 null and Coker 312) lines were evaluated under three irrigation treatments over two seasons. Significant deviations were observed between transgenic and null lines for most fiber traits. In most instances, the transgenic line had altered fiber quality relative to the null. While the efficacy of each transgene has been evaluated independently, the synergistic response from combining multiple antioxidants is currently being tested.