

ABSTRACT

ENVIRONMENTAL STRESS EFFECTS ON THE EXPRESSION AND EFFICACY OF BT TOXINS IN WIDESTRIKE® AND BOLLGARD II® BRANDS OF COTTON

Transgenic cotton has been engineered to express crystalline proteins from *Bacillus thuringiensis* (Bt) bacteria that include Cry1F, Cry2Ab, and Cry1Ac insecticidal toxins effective in killing Lepidopteran pests. Variations in environmental conditions may cause changes in Bt gene expression making host plants susceptible to insect damage. Transgenic Bt and non-Bt isolines were tested in a field trial with shaded (90% light blockage) and non-shaded sections of three different moisture regimes (normal, high, and low). Leaf caging assays infested with Beet Armyworm (*Spodoptera exigua*) showed lower survival on moisture-stressed leaves but damage was rated 1.9 ± 0.16 (on scale 0-5) on high-moisture leaves but only 0.75 ± 0.07 on low moisture leaves ($p < 0.01$). Under light stress, shaded plants had higher insect survival and leaf damage than their unshaded counterparts. ELISA results in both studies trended towards decreased Cry1Ac and Cry2Ab and increased Cry1F in stressed plants but results were not significant. Insect survival and leaf damage results were in agreement with previous studies that found that increased canopy temperature decreased insect survival, and drought stress increased Lepidopteran mortality on Bt cotton plants.

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