

**BOLLGARD® AND BOLLGARD II® EFFICACY IN NEAR
ISOGENIC LINES OF 'DP50' UPLAND COTTON IN ARIZONA**

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Abstract

The Cry1Ac gene (Bollgard®) is available in cotton either alone ('B') or in combination (Bollgard II®) with a second gene, Cry2Ab ('X'). We evaluated these two different transgenes, separately and together, in near isogenic lines of the upland cotton variety 'DP50'. DP50B was previously transformed with the Cry2Ab gene to give rise to the experimental line 985BX which was then back-crossed to DP50 to produce near isogenic single gene variants, 985B and 985X. The lepidopteran target was pink boll-worm (PBW), *Pectinophora gossypiella* (Saunders), which was evaluated in two field studies through a series of samples from artificially and naturally infested bolls. In one study (NTO), three cotton lines (DP50, DP50B, 985BX) were evaluated under three spray regimes. In the second study (Isoline), five near isogenic lines (DP50, DP50B, 985B, 985X, 985BX) were evaluated under two spray regimes: fully sprayed and lepidopteran unsprayed. In lines containing only one transgene, Cry1Ac or Cry2Ab, bolls had consistently fewer PBWs than the non-*Bt* variety. Very few PBWs developed into large (3rd instar) larvae in these *Bt* varieties. The majority (NTO: 83%; Isoline: 94%) of PBWs recovered were dead first instar larvae. Less than 5% of the DP50B bolls in the NTO study were infested with feral large (3rd instar) larvae, and large larvae were present in less than 2% of naturally-infested bolls of single-gene lines in the Isoline study. PBW age and mortality distributions confirmed that the single transgenes were effective in stopping PBW development and killing young instars. Cry2Ab displayed a broader spectrum of efficacy as it was significantly more effective against citrus peelminer (*Marmara spp.*), an incidental lepidopteran present in high densities in the tests. The two-gene (Cry1Ac + Cry2Ab) line showed better (at least 10-fold) efficacy than the single-gene lines against PBW large larvae infestation. The PBW age distributions found in this variety consisted almost entirely (98%) of dead first instar larvae. Less than 0.6% of the bolls of the two-gene variety in the NTO study were infested with large (3rd instar) larvae, and there was no infestation by large larvae in any of the naturally-infested bolls in the Isoline study. Yields and other agronomic parameters of the two-gene and single-gene varieties were superior or similar to the null parent. Second pick yields of all *Bt* varieties were significantly higher than the recurrent parent non-*Bt* line, suggesting a high degree of efficacy against typically high PBW densities during the late season. Cotton lines with transgenes (Cry1Ac & Cry2Ab) separately and combined demonstrated a high degree of efficacy and agronomic performance for usage in Arizona against PBW.