

RESUMO - FITOSSANIDADE

FITNESS COSTS AND INHERITANCE OF CRY1F RESISTANCE IN OSTRINIA FURNACALIS ON BT MAIZE

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The Asian corn borer, *Ostrinia furnacalis*, is a devastating pest of maize in Asia, causing yield losses of up to 50%. Transgenic Bt maize expressing Cry1F toxin has been widely used for its control; however, the evolution of resistance threatens the sustainability of this technology. This study investigates the fitness

costs and inheritance pattern of Cry1F resistance in *O. furnacalis* to inform effective insect resistance management (IRM) strategies. Three strains of *O. furnacalis* were used: a susceptible strain (ACB-BtS), a Cry1F-resistant strain (ACB-FR), and their F1 hybrid progeny from reciprocal crosses. Fitness costs were assessed by rearing neonates on a non-Bt artificial diet under controlled conditions (25°C, 65% RH, 16:8 L:D). Key biological parameters (survivorship, development time, larval and pupal weight, growth rate, sex ratio, and fecundity) were recorded. Diet-overlay bioassays were conducted to determine LC50 values and the degree of dominance (D_{ML}) at a diagnostic concentration (320 ng/cm²). Data were analyzed using one-way and two-way ANOVA, followed by Tukey's HSD test. The resistant strain (ACB-FR) exhibited significant fitness costs, including a 38.5% reduction in egg-to-adult survivorship, a 62% reduction in fecundity (273.8 vs. 438.9 eggs/female), and significantly lower larval and pupal weights compared to the susceptible strain. The LC50 of ACB-FR was 287.27 ng/cm², a 96.17-fold resistance ratio compared to ACB-BtS (2.99 ng/cm²). The F1 hybrids showed high resistance levels (RR: 61-63), and the degree of dominance ($D_{ML} \sim 0.6-0.92$) confirmed that resistance is autosomal and incompletely dominant. Cry1F resistance in *O. furnacalis* is associated with substantial fitness costs and is inherited as an incompletely dominant, autosomal trait. These findings support the use of pyramided Bt toxins (e.g., Cry1F + Vip3Aa) and high-dose/refuge strategies to delay resistance evolution and sustain Bt maize efficacy in Asia.

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