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RESEARCH ARTICLE

Cry 1 Ac delta-endotoxin expression in transgenic Bt cotton hybrids as influenced by fertilizer levels for targeted yields

■ A.S. POLICE PATIL[1*], B.M. CHITTAPUR[2] AND BHUPAL REDDY SHARAN[3]

*[1]Zonal Project Directorate, Zone VIII, MRS, H.A. Farm Post Hebbal, BENGALURU (KARNATAKA) INDIA
[2]College of Agriculture, BHEEMARAYANAGUDI (KARNATAKA) INDIA
[3]NICRA project, Central Research Institute for Dryland Agriculture, HYDERABAD (A.P.) INDIA

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*Corresponding author:
ppasnduas@gmail.com

ABSTRACT

A field experiment was carried out at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad to estimate the delta endotoxin concentration in transgenic cotton hybrids as influenced by fertilizer levels. The field trial was laid out in Complete Randomized Block Design with four Bt cotton hybrids and three target yield levels. Delta-endotoxin concentration in different cotton hybrids differed significantly at 75 DAS. Significantly higher endotoxin content (1.97 µg g^{-1} fw) was recorded with MRC-7201, inturn it resulted in less number of bad opened bolls per plant and lowest was observed in MRC-6918, it resulted in significantly higher number of (8.89) bad opened bolls per plant. Increase in fertilizer levels increased the delta-endotoxin concentration and significantly higher delta-endotoxin concentration was recorded with F_3 level (2.04 µg g^{-1} fw) followed F_2 (1.80 µg g^{-1} fw) and F_1 (1.62 µg g^{-1} fw) level and the latter being the lowest. Higher endotoxin concentration was recorded particularly in Bollgard-II (2.19 µg g^{-1} fw) with F_3 level.

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INTRODUCTION

The *Bacillus thurerngiensis* (Bt) transgenic cotton expressing Cry 1 Ac delta-endotoxin is rapidly dominating world agriculture, which is called as first generation Bt cottons. They have been regarded as novel alternative for management of certain lepidopteron pests. Second generation transgenic Bt cotton produced two endotoxins, Cry 1 Ac and Cry 2 Ab. The duel-gene cottons produced approximately the same level of the Cry 1 Ac protein as the single-gene Bollgard cultivars, but were further protected by the Cry 2 Ab protein (Greenplate *et al*., 2000 and Adamczyk *et al*., 2001). There is potential increase efficacy against bollworm due to the additional cry toxin compared with Bollgard cultivars. All the cultivars of transgenic cotton however, did not provide the same level of bollworm control as delta-endotoxin expression level varied.

The introduction of commercial cotton varieties producing the insecticidal protein was expected to improve grower profitability, reduce environmental pollution from synthetic insecticides. The synthesis of Bt protein and its cycle in plant are also the physiological process of nitrogen metabolism, which were controlled by several key enzymes such as NR, GPT, GOT protease and peptidase. Chen *et al.* (2003) showed that the leaf insecticidal proteins content of Bt cotton had close correlation with key enzymes and nitrogen metabolism key enzymes and nitrogen metabolism of Bt cotton affected the Bt protein content. Increase in the nitrogen level increased the endotoxin concentration in the transgenic cotton hybrids to certain extent. Next to bollworm, the important issue that needs to be addressed in crop production is nutrient usage. Cotton, particularly hybrids being exhaustive draw plenty of soil nutrients and thus under continuous cropping systems/