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RESEARCH ARTICLE

STUDY OF TOXICITY OF BACILLUS THURINGIENSIS CRY PROTEIN ISOLATED FROM 1953 STRAIN OF BACILLUS THURINGIENSIS ON THE RAT HEPATIC AND RENAL TISSUES IN A 90 DAY FEED DESIGN

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ABSTRACT

Bacillus thuringiensis is a spore forming gram positive bacteria that have a number of different chemical compounds which are used for different types of insecticidal purposes. Though other various species of *Bacillus* are used for insecticidal purpose the effect on mammalian system has not been elaborated till now. In our study we observed some adverse effects of the cry toxins on the mammalian tissues i.e. specifically in the renal and hepatic tissues. The renal tissues and the hepatic tissues are the markers of toxin excretion and accumulation in physiological systems. Some results show no significant differences at all while some showed potent differences. Our study in brief reflects the different biochemical and histological changes that occurred by Bt Cry proteins in daily diet to the group of animals for observing the toxicological effects of the said insecticidal protein.]

INTRODUCTION

Bt is an aerobic or anaerobic facultative and sporulating bacterium. It can remain latent in the environment even in adverse conditions for its development. *Bt* can be found in soil, insects and their habitats, stored products, plants, forest, and aquatic environments. The insecticidal bacterium *Bt* is a Gram-positive bacterium that produces proteinaceous inclusions during sporulation [Apaydin *et al.*, 2004]. These inclusions can be distinguished as distinctively shaped crystals by phase-contrast microscopy. The inclusions are composed of proteins known as crystal proteins, Cry proteins, or δ -endotoxins, which are highly toxic to a wide variety of important agricultural and health-related insect pests as well as other invertebrates. Because of their high specificity, crystal proteins are a valuable alternative to chemical pesticides for control of insect pests in agriculture and forestry and in the home. It has been proposed that the rational use of *Bt* toxins will provide a variety of alternatives for insect control and for overcoming the problem of insect resistance to pesticides. *Bt* cotton refers to transgenic cotton which contains endotoxin protein inducing gene from soil bacterium *Bacillus thuringiensis* (Bernhard, 1997). It has been reported that in pigs and calves, Cry protein fragments are detectable but are

progressively reduced in size as they travel down the GI tract. None were detected in the liver, spleen, or lymph nodes (Bradford, 1976) indicating they were too large to be systemically absorbed from the GI tract. It has been suggested that transgenic nucleic acids and proteins from GM crops are handled in the gut like their conventional counterparts, with no evidence for systemic absorption of intact proteins or genes (Cannon, 1996). *Bt* cry protein that has non-insecticidal effect which is the strong cytotoxic activity against various cell with a markedly divergent target specificity to the normal hepatic tissue & in renal tissue. It has been reported to form liver & kidney cancer cells. *Bt* toxin can induce hepatotoxicity & renal toxicity. Hence in our work we coined the observations after the treatment of the protein in case of the toxicologically important organs i.e liver & kidney.

MATERIALS AND METHODS

Purification of the crystal proteins: After attaining the autolysis phase of the bacterium (Strain-1953, *Bacillus thuringiensis*) at 110 hour of incubation, the crystal proteins from all the strains were isolated after the specified time. It was then subjected to ammonium sulphate $[(\text{NH}_4)_2\text{SO}_4]$ precipitation followed by filtration through dialysis membranes