



Category: Bioinformatics

In silico Allergenicity Study of Insect resistant genetically Modified Rice (*Oryza sativa* L.) for assessment of biosafety

S.K. Das^{1,2}, K.C. Samal³ and N.R. Singh⁴

¹Department of Bioinformatics, Orissa University of Agriculture & Technology, Bhubaneswar, INDIA

²Department of Zoology, School of Life Sciences, Ravenshaw University, Cuttack, INDIA

³Department of Agricultural Biotechnology, College of Agriculture, OUAT, INDIA

⁴Department of Botany, Ravenshaw University, Cuttack, INDIA

Presenting author: das.sujitkumar@gmail.com

Abstract

India is one of the world's largest producers of rice (*Oryza sativa*), accounting for 20% of all world rice production. However, lepidopteran pests severely impact the harvest of rice, which leads to environmental pollution and increase production cost. Alternatively, genetic engineering methods may be used to prevent rice pests and increase production of rice in a safe and environmentally friendly manner. *Bacillus thuringiensis* (Bt) genes have been widely used to generate genetically modified (GM) crops because the expressed cry1Ab protein confers resistance to lepidopteron pests. The proteins expressed by these genes may lead to food safety problems. Thus, safety evaluations are necessary prior to commercialization. Bioinformatics analysis for allergenicity assessment of cry1Ab protein is performed using different allergen databases viz. FARRP SDAP, Allergome, and Algpred to identify any potential sequence matches to allergen proteins that might indicate allergenic cross-reactivity with the query sequence. A full FASTA search was performed to identify highly similar proteins. However; the full length search cannot identify discontinuous or conformational epitopes that depend upon the tertiary structure of the protein. So every possible contiguous 80-amino acid sequence of each query protein was searched for determining the similarity. The proteins sequence can be searched using FASTA/BLAST for broad homology to known allergens to identify any short sequence that might represent an allergenic epitope. The domains in the Cry protein sequences were searched using Interproscan for potential similarity at the domain level. The results showed neither significant alignment nor similarity of cry1Ab protein at full sequence, domain, and epitope level with any of the known allergen proteins in the full sequence matching. Matching the 80 amino acid and matching of 8 amino acids showed no similarity to determine the epitope potential. From literature survey, it is observed that no allergic problem is reported in animals. The results of allergenicity study suggests that Bt rice is found to be safe for commercial release.

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