Optimization of a Polymerase Chain Reaction Based Technique to Detect Genetically Modified Foods

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Genetically Modified foods are an important outcome in the genetic improvement procedures in plants. Nowadays it has become a significant problem regarding authentication of such foods since non-labelled genetically modified foods are existing in the market. The aim of this study was to optimize a Polymerase Chain Reaction (PCR) based technique to detect Cauliflower Mossaic Virus 35S promoter and Nopaline Synthase terminator, which are intentionally introduced to various crops to create genetically modified foods. Three pairs of primers were used for PCR amplification. Chloroplast tRNA primers were used to amplify chloroplast DNA with 571 bp amplicon length to prove the presence of plant origin DNA. Cauliflower Mossaic Virus 35S and Nopaline Synthase forward and reverse primers with 243 and 118 by amplicon length were respectively used to detect promoter and terminator regions. PCR optimized condition for CaMV 35S promoter (annealing condition- 56 ℃, 40 sec.) and NOS terminator (annealing condition- 62 ℃, 30 sec.) was carried out in 30 cycles each. Fresh and processed food samples (10 each) were collected from super markets and were analyzed in triplicates. During the analysis of post PCR products using 1% agarose gel, four food samples including corn, biscuit, corn flakes and processed potato samples were detected positive for promoter and terminator regions while a processed cereal mixture was detected as positive only for the terminator region. None of the foods were labelled as GM and it indicates that non labelled genetically modified foods are presence in the market. Therefore, this method could be used as simple and reliable assay for screening of unauthorized genetically modified crops and the processed food products.

Keywords: Genetically modified foods, Cauliflower mossaic virus 35S promoter, Nopaline synthase terminator, Polymerase chain reaction