Nelly Datukishvili et al., J Food Process Technol 2017, 8:9(Suppl)
DOI: 10.4172/2157-7110-C1-068

Multiplex approach for detection of genetically modified foods

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In recent years, global distribution of genetically modified (GM) crops resulted in an increasing share of GM foods in agro-food industry. Detection of genetically modified foods is important in many aspects of food quality and safety, labeling regulation, health protection, consumer information and food production. This study presents new multiplex PCR methods for rapid and reliable screening of GM ingredients in foods. The multiplex approach enabling simultaneous detection of several targets was applied to meet challenges for effective detection of increasing number of GM crops. Soybean, maize, potato and tomato were investigated as significant GM food crops. The certified reference materials of Roundup Ready soybean (RRS), potato EH92-527-1, maize MON 810 and Bt-176 were used for the optimization of multiplex PCR systems. The seeds and different foodstuffs were analyzed. The analytical procedure includes several steps, such as design of GMO-specific and species-specific PCR primers; genomic DNA extraction; evaluation of DNA quantity and integrity by spectrophotometer and agarose gel electrophoresis; development and optimization of all standard and real-time uniplex and multiplex PCR systems; analysis of GM ingredients in foods by multiplex PCR. The results analysis and interpretation exhibited that new multiplex PCR methods allowed identification of common transgenic sequences, such as: cauliflower mosaic virus (CaMV) 35S promoter, agrobacterium tumefaciens nopaline synthase (NOS) terminator, 5-enolppyruvylshikimate-phosphate synthase (epsps) gene, Cry1Ab delta-endotoxin (cry1Ab) gene, the junction between the nopaline synthase promoter and the neomycin phosphotransferase II gene (Pnos-nptII), phosphinothricin N-acetyltransferase (bar) gene as well as species specific genes, in particular soybean lectin, tomato LAT52, maize zein and invertase, potato sucrose synthase and UDP-glucose pyrophosphorylase genes. Testing of different foodstuffs demonstrated that new PCR methods developed in this study are useful for fast and reliable analysis of GM ingredients in foods.

Biography

Nelly Datukishvili obtained the Doctoral degree in 1997 from I. Javakhishvili Tbilisi State University, Georgia. She has worked in Molecular Biology and Biotechnology at Institute of Molecular Biology and Biological Physics (Tbilisi), Engelhardt Institute of Molecular Biology (Moscow), Agricultural Biotechnology Center (Godollo, Hungary), Gent Agricultural Research Centre (IVLO, Belgium). Since 2004, she has initiated molecular study and analysis of genetically modified plants and foods in Georgia. Currently, she leads the GMO group and; Manager of Scientific Projects. She has more than 40 publications and presentations.

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