World Academy of Science, Engineering and Technology
International Journal of Nutrition and Food Engineering
Vol:10, No:10, 2016

The Qualitative and Quantitative Detection of Pistachio in Processed Food Products Using Florescence Dye Based PCR

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Abstract : Pistachio nuts, the fruits of the pistachio tree (Pistacia vera), are edible tree nuts highly valued for their organoleptic properties. Pistachio nuts used in snack foods, chocolates, baklava, meat products, ice-cream industries and other gourmet products as ingredients. Undeclared pistachios may be present in food products as a consequence of fraudulent substitution. Control of food samples is very important for safety and fraud. Mix of pistachio, peanut (Arachis hypogaea), pea (Pisum sativum L.) used instead of pistachio in food products, because pistachio is a considerably expensive nut. To solve this problem, a sensitive polymerase chain reaction PCR has been developed. A real-time PCR assay for the detection of pea, peanut and pistachio in baklava was designed by using EvaGreen fluorescence dye. Primers were selected from powerful regions for identification of pea, peanut and pistachio. DNA from reference samples and industrial products were successfully extracted with the GIDAGEN® Multi-Fast DNA Isolation Kit. Genomes were identified based on their specific melting peaks (Mp) which are 77°C, 85.5°C and 82.5°C for pea, peanut and pistachio, respectively. Homogenized mixtures of raw pistachio, pea and peanut were prepared with the ratio of 0.01%, 0.1%, 1%, 10%, 40% and 70% of pistachio. Quantitative detection limit of assay was 0.1% for pistachio. Also, real-time PCR technique used in this study allowed the qualitative detection of as little as 0.001% level of peanut DNA, 0,000001% level of pistachio DNA and 0.000001% level of pea DNA in the experimental admixtures. This assay represents a potentially valuable diagnostic method for detection of nut species adulterated with pistachio as well as for highly specific and relatively rapid detection of small amounts of pistachio in food samples.

Keywords : pea, peanut, pistachio, real-time PCR
Conference Title : ICFMS 2016 : International Conference on Food Manufacturing and Safety
Conference Location : Paris, France
Conference Dates : October 24-25, 2016