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Detectability of papaya, tomato, apple and banana DNA in dried fruit products processed with food additive sulfites

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Abstract

Deoxyribonucleic acids (DNAs) in dried fruit products were examined for detectability using real-time polymerase chain reaction (PCR). Endogenous genes with low copy numbers in *Carica papaya* L. (papaya), *Solanum lycopersicum* L. (tomato) and *Malus domestica* (apple) genomic DNAs, i.e., *Chymopapain*, *LAT52* and *Apo 5*, respectively, were targeted for detection in dried fruit products that were processed with and without food additive sulfites as a bleaching agent, preservative or antioxidant. A total of 13/14 dried papaya, 8/8 dried tomato and 3/3 dried apple products that were processed with sulfites were not detected under a Cq value of 40 in a duplicate real-time PCR test. Despite their undetectability, endogenous 18S rDNA with high copy numbers in the genomic DNA of these fruits was detected at approximately the same amplicon size as the endogenous genes with low copy numbers. Furthermore, *BAN*, a single-copy endogenous gene found in all dried *Musa acuminata* (banana) products, was detected using a 50 ng DNA template at a Cq value of 22.33–35.80 regardless of whether the fruit was processed with or without sulfites. Although the dried fruit products that were processed with sulfites may contain DNAs, the yields of extracted and purified DNAs were reduced to the degree that not all endogenous genes could be detected reliably using real-time PCR. This may affect the reliability of real-time PCR testing for detecting specific ingredients in dried fruit products, such as genetically modified fruit and food allergens.

Keywords : dried fruit, DNA, detection, sulfites, food additives

I Introduction

Demand from consumers for high standards of quality and transparency with regard to the ingredients used to produce food products is increasing globally. Food labeling has been an effective tool worldwide to meet this demand[1]. Accordingly, labeling regulations for food products have been implemented in most countries and are constantly updated to ensure consumers know what they will be consuming when they choose to buy a product[2]. Many countries have implemented labeling requirements for foods, such as listing whether any of the ingredients are genetically modified (GM) and/or food allergens[3-5]. Consequently, a reliable method for identifying and quantifying these ingredients in food products is indispensable to ensure that the food quality is consistent with the food labeling information. For this type of monitoring, extracted and purified deoxyribonucleic acids (DNAs) are useful in qualitatively and/or quantitatively detecting food ingredients with high sensitivity and specificity using real-time polymerase chain reaction (PCR), especially for processed food products[6, 7].

For the real-time polymerase chain reaction (PCR) detection, DNA sequences in endogenous genes specific to each food ingredient are targeted. A high-copy endogenous gene is targeted to qualitatively detect the corresponding ingredient with high sensitivity, while a single-copy endogenous gene in

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