Note

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Wheat DNA fragmentation of commercial processed foods

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Abstract

Recent advances in plant biotechnology have established transgenic wheat lines, which are almost ready to be cultivated for commercial production in the field. Wheat flours are used as ingredients in many food products. Here, in order to detect genetically modified wheat in processed foods, the yield and fragmentation of genomic DNA prepared from processed foods were investigated. Qualitative PCR using primer sets that gave 96-755 bp PCR products at ca. 100 bp intervals showed that in fermenting processes by yeast and baking processes for breads and buns, including steaming and frying, DNA fragmentation of less than 430 bp did not occur. Amplicons longer than 755 bp were found in all noodles, but roasting and retort processes to produce stews caused severe degradation of genomic DNA leading to fragmentation and reduced yields. A Japanese traditional sweet, kuzumochi, which is processed by *Lactobacillus* fermentation with kneaded flours for a year, gave amplicons shorter than 323 bp. These results indicated that PCR detection methods for transgenes in wheat processed foods should be established using primer pairs that target DNA sequences shorter than 200 bp.

Keywords : DNA fragmentation, wheat flour, wheat processed food, qualitative PCR

I Introduction

Many genetically modified (GM) crops have been developed over the years worldwide. Novel traits can be introduced by transgenes into major GM crops, among these are herbicide tolerance, insect and virus resistance. Furthermore, the genetic alteration of nutrient composition, addition of new nutrients, and enhancement of environmental stresses such as drought resistance have also been developed recently[1-3]. A mandatory safety assessment of GM crops used for foods should be undertaken in each country, and unauthorized GM crops and foods produced with GM crops prohibited from entering commercialized markets before a safety assessment. In order to prevent importation and circulation of unauthorized GM crops and foods in markets, detection methods should be established internationally. In Japan, the zero-tolerance for unauthorized GM crops and foods is obligated through qualitative regulation by the Food Sanitation Act, and quantitative regulation for authorized GM crops and materials for processed foods should mandate labeling by Food Labeling Law in the case of unintended contamination over 5% of total weight[4]. Therefore, the establishment of qualitative and quantitative detection methods for GM crops and foods have been required. Generally, the detection methods are by PCR analysis and specific PCR primers designed to amplify target genomic DNA sequence shorter than 200 bp in length for real-time PCR and microarray analysis[5-8]. The raw materials of GM crops are cooked by physical, chemical, and biological treatments to produce processed foods. These treatments are known to denature, degrade, and fragment genomic DNA. The different degrees of the treatments, from shallow to deep processing, result in different levels of genomic DNA degradation and fragmentation. Genomic DNA of crop ingredients such as soybean, corn, and tomato are lightly

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