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Evaluation of DNA extraction methods for PCR analysis of maize and sunflower oils

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Abstract: Vegetable oils are an important source of energy and are often used in human nutrition. The modern food industry has a big challenge dealing with adulteration of different types of plant oils. Reliable authentication of oils is essential for food quality and safety assessment, correct labeling, sustainable food production, and health protection. DNA-based polymerase chain reaction (PCR) techniques are recognized as the most efficient means of reliable food analysis. Preparation of DNA samples of appropriate quality and in sufficient quantities from oils remains the major drawback for successful PCR detection. This study examines several approaches to DNA enrichment and extraction. Four DNA extraction methods were used, such as two types of our modified CTAB methods, the NucleoSpin Food Mini Kit, and the Olive Oil DNA Isolation Kit. Various cold-pressed and refined oils of corn and sunflower were tested. DNAs were evaluated by spectrophotometer and PCR analysis. DNA amplification was performed with eukaryote, plant, and species-specific PCR systems. PCR products were evaluated by agarose gel electrophoresis. The results showed that centrifugation of the oils at 18,000 g, at 4 ºC was the best method for DNA enrichment from the oils. The modified CTAB method was found to be the best DNA extraction method for PCR analysis of sunflower and maize oils. In addition, a PCR system specific for the 18S-302 amplicon of the 18S ribosomal RNA gene was identified as the best method for DNA traceability in oils.

Keywords: Vegetable oil, genomic DNA extraction, PCR analysis

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