

Comparison of DNA extraction efficiencies using various methods for the detection of genetically modified organisms (GMOs)

Abstract

The ability to detect the presence of transgenes in crop-derived foods depends on the quantity and quality of DNA obtained from a product to be analyzed. The efficiency of DNA extraction protocols differs due to the nature of each food product. In this paper, we described two main DNA extraction protocols and their modifications that have been applied and evaluated for DNA extraction from raw and processed food as well as animal feed. The yield and quality for five categories of food and feed samples namely, raw soybean, raw maize, animal feed, smooth tofu and soymilk are discussed. The statistical interaction analyses showed that the cetyltrimethyl ammonium bromide (CTAB) method was proven to be the best method to extract DNA from raw soybean, maize and animal feed samples which not only obtained high DNA yield of 32.7, 28.4 and 33.4 ng DNA/mg sample respectively, but also produced high quality DNA with the absorbance A260/A280 ratio of 1.9, 1.9 and 2.0, respectively. These DNA were suitable for PCR amplification which produced a 164 bp DNA fragment of the lectin gene from soybean, and a 277 bp DNA fragment of the zein gene from maize. In the processed food category, the Wizard isolation method was found to be the best for the extraction of DNA from smooth tofu and soymilk with the yield of 13.2 and 3.4 ng DNA/mg sample, and the quality of the DNA at the absorbance A260/A280 ratio ranged from 1.9 to 1.7. These DNA were successfully amplified using primers specific to the lectin gene of soybean. © All Right Reserved.