Transgenes monitoring in an industrial soybean oil processing by conventional and real-time polymerase chain reaction

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In recent years a great effort has been devoted to the development of new methods for the qualitative and quantitative detection of transgenic sequences in food. The EU has elaborated legislation for genetically modified organisms (GMO) in food control, which establishes both the legal basis for the approval procedure of GMO and the post market traceability and labelling requirements for GMO and GMO-derived food and feeds (Regulations (EC) No. 1829/2003, 1830/2003). Most of the developed analytical methods for GMO detection are DNA-based, since protein-based assays are not suitable for processed food. For that purpose, polimerase chain reaction (PCR) and real-time quantitative PCR have been successfully applied.

Since the approval of Roundup Ready (RR) soybean in Europe, the production of soybean oil using GM seeds has been increasing. Although several reports show the possibility of DNA detection in crude vegetable oils, due to the chemical treatments and high temperatures along refining, that detection is difficult to accomplish after refining[1].

The aim of the present work was to detect soybean DNA along the industrial processing of soybean oil extraction and refining. Four DNA extraction protocols were tested based on previous reports[2], namely, CTAB, Wizard, Nucleospin® food kit and Wizard® Magnetic DNA purification system for food.

The Nucleospin food kit evidenced the best results for DNA amplification from crude to refined soybean oils. The detection of lectin gene by conventional PCR was succeeded in all steps of refining process (crude, neutralized, washed, bleached and deodorised oil). The amplification by real-time PCR using TaqMan probes confirmed the presence of soybean DNA in all the stages along the oil refining. The detection of RR soybean was observed in all the steps along the industrial oil extraction, until the crude oil, confirming the use of GM seeds. That was also obtained in the final refined oil, but not after washing and bleaching, which was consistent with the low DNA yields in those extracts, probably due to instability of those samples. These findings were never reported and represent a great achievement when considering the detection GMO in vegetable oils.

Keywords: GMO; soybean oil; PCR.

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