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Development of new molecular tools to assess argan oil authenticity: detection of olive oil as a potential adulterant

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Argan oil is a traditional product obtained from the argan tree (*Arganiaspinosa* L.),whichis endemic only to Morocco[1].Both cosmetic and food grade argan oil are commercialized worldwide, attaining very high prices in the international market.For that reason, argan oil is very prone to be adulterated, in particular with cheaper vegetable oils. Therefore, it is important to develop methodologies that can be used in control and inspection programs in order to guarantee argan oil authenticity and quality. In particular, there is the need for methodologies that allow the accurate identification of vegetable oils illegally added to argan oil. The present work aims at developing novel approaches based on DNA markers to detect the presence of adulterants, using olive oil as case study.

In silico analysis was performed for the design of *Oleaeuropea* L. and *A. spinosa* L. specific primers targeting the chloroplastidial*mat*Kgeneand the ITS2 region, respectively. Samples of authentic argan oil were acquired from a producing cooperativein Morocco, while olive oil samples were obtained from local stores in Portugal. Cross-reactivity was assayed using DNA extracts from other edible and oil producing plant species (*n*=17). Binary model mixtures were prepared with the addition of known amounts of olive oil in argan oil in the proportions of 50, 25, 5, 1% (w/w), followed by a pre-concentration by centrifugation. DNA was extracted using the Nucleospin Plant kit, protocol B. according to the manufacturer instructions. Specificity and sensitivity of the designed primers were assessed by qualitative PCR. Species-specific PCR assays were successfully developed, producing amplicons of 109 and 117 bp for olive and argan, respectively, down to 0.01 pg of DNA for both species. The application of the olive-specific PCR assay to DNA extracts of binary mixtures enabled the clear detection of 1%. Subsequently, a real-time PCR assay with EvaGreen dye was developed for quantitative analysis using the normalised ΔCq method. The assay confirmed the limit of detection of 1% of olive oil, in a dynamic range of 1-50%, with acceptable correlation coefficient and PCR efficiency (81.1%), considering the type of food matrix. Both, qualitative and quantitative PCR assays can provide simple, fast and high-throughput tools to detect the presence of adulterant oils in argan oil.

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Mots clés: Argan oil, argan oil authenticity, the Nucleospin Plant kit, qualitative PCR, Species-specific PCR, quantitative PCR