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5th FOODINTEGRITY CONFERENCE

Nantes, France

14-15 November 2018

Assuring the integrity of the food chain:
Delivering real world solutions



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A NOVEL DNA-BASED APPROACH FOR ARGAN OIL AUTHENTICATION: DETECTION OF OLIVE OIL AS A POTENTIAL ADULTERANT

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Argan oil is a non-refined vegetable oil produced from the argan tree (*Argania spinosa* L.), a species endemic only in the South-western Morocco. Argan oil has been used in this country for centuries, either as food or for cosmetic/medicinal purposes. Depending on the use of roasted or raw argan kernels, food or cosmetic grade oil is obtained [1]. The use of roasted kernels affords edible oil with a nutty and roasty flavour that for long years has been prepared exclusively by Berber women according to an ancestral laborious process. Currently, as a consequence of its high cost and increasing demand, this traditional product from Morocco is highly prone to illegal practices to increase profits, such as adulteration by the addition of cheaper vegetable oils. Therefore, considering the economic, social and cultural importance of argan oil in Morocco, 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.

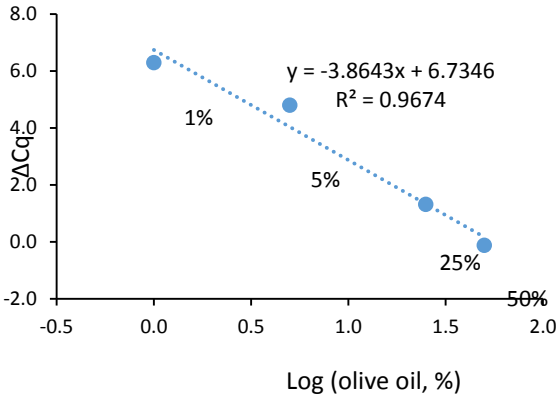

Fig. 1. Normalised calibration curve of real-time PCR with EvaGreen dye targeting the *mat*K gene of olive, using binary mixtures of olive oil in argan oil (50, 25, 5, 1%, w/w).

In silico analysis was performed for the design of *Olea europea* L. and *A. spinosa* L. specific primers targeting the chloroplastidial *mat*K gene and the ITS2 region,

respectively. Samples of authentic argan oil were acquired from producers in Morocco, while olive oil samples were obtained from local stores in Portugal. Other edible and oil producing plant species were also used for assay specificity testing (*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 concentration by centrifugation. DNA was extracted using the Nucleospin Plant kit, protocol B (Macherey-Nagel, Düren, Germany) according to the manufacturer instructions. The concentration and purity of the DNA extracts were measured by UV spectrophotometry in a micro-volume plate accessory. 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 (Fig. 1). 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 a simple, fast and high-throughput tool to detect the presence of adulterant oils in argan oil.

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