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Detection of soybean oil as a potential adulterant of argan oil based on a novel DNA approach

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Introduction:
Argan oil is a non-refined vegetable oil obtained from the fruits of the argan tree (*Argania spinosa* L.) and produced almost exclusively in the southwestern Morocco, where the argan forest is found. Different grades of argan oil are available, namely edible/food and cosmetic grades, depending on the use of roasted or raw kernels, respectively. Argan oil is considered one of the most prized oils in the world, with its demand growing worldwide mainly due to its success as an ingredient in cosmetic products. In Europe, the price of the edible grade oil is also very high as it is perceived as a luxury product [1]. Being a premium product, argan oil is highly prone to adulteration by admixing with cheaper vegetable oils or even its total substitution. Therefore, it is important to develop methodologies that can be used in the control of the authenticity of pure argan oil. Considering that several factors can affect the chemical composition of the oil, in this work novel approaches based on DNA markers are proposed to detect the presence of soybean oil as adulterant of argan oil.

Materials and Methods:
Samples of authentic argan oil were acquired from cooperatives in Morocco, while soybean oil was purchased from local stores in Portugal. *In silico* analysis was performed for the design of *A. spinosa* L. specific primers, while previously reported primers were used for the specific identification of soybean [1]. Binary model mixtures were prepared with the addition of known amounts of soybean oil in argan oil in the proportions of 40, 25, 5, 1% (w/w), followed by concentration by centrifugation. DNA was extracted using the Nucleospin Plant kit, protocol B (Macherey-Nagel), according to the manufacturer instructions. Specificity and sensitivity of the designed primers for argan were assessed by qualitative PCR, followed by the development of a real-time PCR assay with EvaGreen dye to quantify soybean using the normalised ΔCq method.

Results and Discussion:
Species-specific PCR assays was successfully developed, allowing the specific detection down to 0.01 pg of *A. spinosa* DNA. The application of the soybean-specific PCR assay to DNA extracts of binary mixtures enabled the clear detection of 2%. Subsequently, a real-time PCR assay was developed to estimate soybean addition in argan oil, which confirmed the limit of detection of 2% of soybean oil, with a dynamic range of 2-25%. The correlation coefficient (0.965) and PCR efficiency (73.5%), although being low, can be considered acceptable for this type of food matrix.

Conclusion:

This work evidenced the possibility of using DNA-based approaches as a simple, fast and high-throughput tools to detect the presence of adulterant oils in argan oil.

References:

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