Title Detection of the adulteration of olive oil with other plant oils using a polymerase chain reaction approach

Author Stelios Spaniolas, Christos Bazakos, Murad Awad, Claire Zoghby and Panagiotis Kalaitzis

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Abstract

The EU is the largest producer, exporter and consumer of olive oil. The development of cost-efficient, DNA-based analytical assays to detect adulteration of olive oil with oils from other plant species will provide to the olive producing, bottling and trading industry the means to protect their products against fraud and misdescription. This fraud referred to mixtures of olive oil with oils of other plant species, most of which may cause additional concerns due to allergenic potential and the presence of GMOs. Moreover, the cosmetics industry uses also oils derived from other plant species other than olive such as almond, avocado and walnut, which are also potential targets for adulteration. As a consequence, there is a need for a reliable, cost-efficient and sensitive analytical method to detect the plant species from which the oils and/or oil mixtures were originated. Several studies on the molecular evolution and plant DNA barcoding have indicated regions of the plastid genome that potentially could serve as analyte DNA molecules, able to detect the plant species oil originates from. These polymorphisms such as a) Insertions/Deletions (indels) and b) single nucleotide polymorphisms (SNPs) have been used in the past for food authentication and can be exploited for plant species differentiation. The analytical assays and detection methods underlying these polymorphisms cover a wide range of chemistries and detection platforms, thus, making the olive oil adulteration analysis accessible to any biotechnology laboratory. The aim of the present study is to test a PCR assay targeting in one of such plastid genome regions, namely trnL, and to apply it in a range of several plant oils. The results were detected with standard agarose gel and capillary electrophoresis and several analytical performances and ongoing work are discussed.