

Title: **Determination of almond adulterations with hazelnut and peanut by HPLC-UV and HPLC-FL fingerprinting, and multivariate calibration methods.**

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Nowadays, society is worried more than ever about the quality of the food that they consume. Recent incidents regarding food frauds, like the melamine case in dairy products, may have acted as a trigger point for the arousal of concerns about consumer product safety. One of the most common food frauds is the adulteration of a product by replacing an expensive component with other cheaper and/or lower health beneficial components. Nuts are sometimes the target of this kind of practices, usually in bakery products where manufacturers adulterate almond flours with peanut, hazelnut or other cheaper nuts, which does not only imply an economic fraud, but also a health issue, as the unspecified ingredient may cause allergies in the consumer.

In this work, HPLC-UV chromatographic fingerprints were recorded, following a previously developed method in the research group used for polyphenol analysis, in order to achieve identification and quantification of adulteration levels in almond and almond custard cream samples adulterated with peanut or hazelnut, using chemometric methods such as principal component analysis (PCA) and partial least squares (PLS). Moreover, HPLC-FL fingerprinting was also evaluated to see if fluorescence detection could offer better chemical descriptors to achieve sample classification and authentication according to the different nut types than the one obtained by ultraviolet-visible detection, as well as a better quantification of adulteration levels in the same adulterated almond and almond custard cream samples.

In the end, HPLC-FL fingerprinting combined with chemometrics was proposed as the best option and as a suitable strategy to address nut product classification, as well as identification and quantification of nut frauds by means of adulteration.

Keywords: High Performance Liquid Chromatography, Fingerprinting, Chemometrics, Principal Component Analysis, Partial Least Squares, Food Fraud, Nuts.