

*Title:* **Characterization of nuts by HPLC-UV fingerprinting and chemometrics.**

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The authenticity of food is one of the more important facts in the food industry. Nowadays, society is worried about the products that they consume. There is a fraudulent practice derived from food product adulteration by substitution of the most valued components for others of lower commercial value and/or lower health beneficial properties. This is not only an economic fraud; in the case of nuts it can also cause a health problem due to the allergies that may cause to some people.

In this work, HPLC-UV fingerprinting profiles were evaluated as chemical descriptors to achieve nut samples characterization and classification using chemometric methods such as principal component analysis (PCA) and partial least squares-discriminant analysis (PLS-DA). The extraction of bioactive substances from the analyzed nut samples was carried out by employing a simple liquid-solid extraction with water and different pure organic solvents (methanol, acetonitrile, ethanol, and acetone) as well as mixtures of organic solvent:water at different ratios: 50:50, 70:30 and 80:20 (v/v). The optimum solvent which can extract more quantity of bioactive compounds was acetone:water 70:30 (v/v).

The reversed-phase high performance liquid chromatography (HPLC) method used in this work to achieve the separation of bioactive compounds was previously developed in the research group for the analysis of polyphenols. Briefly, separation was performed using a C18 reversed-phase column under gradient elution with 0.1% (v/v) formic acid aqueous solution (solvent A) and methanol (solvent B) as mobile phase components. HPLC-UV chromatography fingerprinting profiles obtained in combination with methods chemometrics (PCA and PLS-DA) showed to be useful to achieve the classification of the samples based on the nut variety and the thermal processing method employed (toasted or fried).

Therefore, the HPLC-UV fingerprinting profiles obtained with the proposed method are good chemical descriptors to address nut product authentication for the prevention of food frauds.

**Keywords:** Nuts, High performance liquid chromatography (HPLC), Fingerprinting, Principal component analysis (PCA), Partial least square-discriminant analysis (PLS-DA).