

Abstract

# Targeted HPLC-UV-FLD Polyphenolics to Assess Paprika Geographical Origin <sup>†</sup>

Xavi Collado <sup>1</sup>, Guillem Campmajó <sup>1,2</sup> , Sònia Sentellas <sup>1</sup> , Javier Saurina <sup>1,2</sup>  and Oscar Núñez <sup>1,2,\*</sup> 

<sup>1</sup> Department of Chemical Engineering and Analytical Chemistry, University of Barcelona, Martí i Franquès 1-11, E08028 Barcelona, Spain; xavi.collado08@gmail.com (X.C.); gcampmajó@ub.edu (G.C.); sonia.sentellas@ub.edu (S.S.); xavi.saurina@ub.edu (J.S.)

<sup>2</sup> Research Institute in Food Nutrition and Food Safety, University of Barcelona, Av. Prat de la Riba 171, Edifici Recerca (Gaudi), E08921 Santa Coloma de Gramenet, Spain

\* Correspondence: oscar.nunez@ub.edu

<sup>†</sup> Presented at the 2nd International Electronic Conference on Foods—“Future Foods and Food Technologies for a Sustainable World”, 15–30 October 2021. Available online: <https://foods2021.sciforum.net/>.

**Abstract:** Paprika is a red powder seasoning with a characteristic flavour obtained from the drying and grinding of red pepper fruits of the genus *Capsicum* (Solanaceae family). In Europe, seven paprika products are distinguished with the protected designation of origin (PDO) label, which ensures a high-quality product through strict requirements, leading to higher retail prices than unlabelled paprika and making them susceptible to fraudulent practices. Contents of polyphenol and phenolic compounds depend on several factors, such as the environmental conditions of the production area. Thus, in the present study, a simple and feasible high-performance liquid chromatography with ultraviolet and fluorescent detection (HPLC-UV-FLD) method was developed to determine 17 polyphenols in paprika samples, aiming to authenticate them through chemometrics. Reversed-phase chromatographic separation was optimised, using a C18 column and 0.1% formic acid aqueous solution and acetonitrile as the mobile phase components. The proposed methodology exhibited limits of detection below 0.9 mg L<sup>-1</sup>, as well as good linearity ( $R^2 \geq 0.984$ ), precision (RSD day-to-day values below 24%), and trueness (relative errors below 14%). Moreover, compound confirmation was carried out via high-performance liquid chromatography coupled to mass spectrometry (HPLC-MS). The proposed methodology was applied to 109 paprika samples, including samples from Spain (La Vera PDO, Murcia PDO, and Mallorca PDO), Hungary, and the Czech Republic. The obtained HPLC-UV-FLD polyphenolic profiles were employed as sample chemical descriptors to authenticate paprika geographical origin using a classification decision tree constructed via partial least squares regression–discriminant analysis (PLS-DA) models. As a result, a sample classification rate of 87.8% was reached after external validation. Moreover, two different paprika geographical origin blend scenarios (La Vera vs. Murcia and the Czech Republic vs. Murcia) were evaluated through partial least squares (PLS) regression, allowing blend percentage prediction with errors below 10.8% after external validation.

**Keywords:** paprika; HPLC; polyphenols; food authentication; chemometrics



**Citation:** Collado, X.; Campmajó, G.; Sentellas, S.; Saurina, J.; Núñez, O. Targeted HPLC-UV-FLD Polyphenolics to Assess Paprika Geographical Origin. *Biol. Life Sci. Forum* **2021**, *6*, 5. <https://doi.org/10.3390/Foods2021-10923>

Academic Editors: Christopher J. Smit and Alessandra Durazzo

Published: 13 October 2021

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

**Supplementary Materials:** The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/Foods2021-10923/s1>, Poster: Targeted HPLC-UV-FLD Polyphenolics to Assess Paprika Geographical Origin.

**Author Contributions:** Conceptualization, S.S., J.S. and O.N.; methodology, X.C. and G.C.; validation, X.C. and G.C.; investigation, X.C. and G.C.; resources, S.S., J.S. and O.N.; supervision, S.S., J.S. and O.N.; writing–original draft preparation, G.C. and O.N.; writing–review and editing, G.C., S.S., J.S. and O.N.; funding acquisition, S.S., J.S. and O.N. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by the PID2020-114401RB-C22 of the Spanish Ministry of Science and Innovation and by the Catalan Government (reference 2017-SGR-312), Spain.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Data is available upon request to the authors.

**Acknowledgments:** G. Campmajó thanks the University of Barcelona for the PhD APIF fellowship.

**Conflicts of Interest:** The authors declare no conflict of interest.