

Extended Abstract

# Phenolic Profile of Fruit Industry Byproducts Determined by LC–DAD–MS/MS

Letícia Barbosa-Pereira <sup>1,\*</sup>, Mariana A. Andrade <sup>2</sup>, Cássia H. Barbosa <sup>2</sup>, Fernanda Vilarinho <sup>2</sup>, Ana Sanches-Silva <sup>3,4</sup>, Ana Rodriguez-Bernaldo de Quirós <sup>1</sup> and Raquel Sendón <sup>1</sup>

<sup>1</sup> Department of Analytical Chemistry, Nutrition and Food Science, Faculty of Pharmacy, University of Santiago de Compostela, 15782 Santiago de Compostela, Spain; ana.rodriguez.bernaldo@usc.es (A.R.-B.d.Q.); raquel.sendon@usc.es (R.S.)

<sup>2</sup> Department of Food and Nutrition, National Institute of Health Dr Ricardo Jorge (INSA), 1649-016 Lisbon, Portugal; mariana.andrade@insa.min-saude.pt (M.A.A.); cassia.barbosa@insa.min-saude.pt (C.H.B.); fernanda.vilarinho@insa.min-saude.pt (F.V.)

<sup>3</sup> National Institute for Agricultural and Veterinary Research (INIAV), 4485-655 Vairão, Portugal; ana.silva@iniav.pt

<sup>4</sup> Center for Study in Animal Science (CECA), ICETA, University of Oporto, 4051-501 Oporto, Portugal

\* Correspondence: letricia.barbosa.pereira@usc.es

† Presented at the 1st International Electronic Conference on Food Science and Functional Foods, 10–25 November 2020; Available online: [https://foods\\_2020.sciforum.net/](https://foods_2020.sciforum.net/).

**Keywords:** fruit by-products; polyphenols; food additives/ingredients; LC-DAD; LC-MS/MS

The bioconversion of fruit by-products into new functional and clean label ingredients/additives represents a sustainable approach with great potential for application in the food sector. The aim of this work was the exhaustive characterization of the different extracts yielded from by-products of orange and lemon juice extraction (mix of peel, pomace and seeds) by the identification and quantification of the polyphenols recognized by their antioxidant properties and thus their potential health benefits. Ethanolic extracts were characterized by liquid chromatography coupled to mass spectrometry (LC–MS/MS). Separation was performed on a Kinetex<sup>®</sup> EVO C18 100 Å (150 × 3 mm, 5 µm) column using water and methanol acidified with 0.1% formic acid as a mobile phase. Liquid chromatography with diode array detector (LC–DAD) was used for the quantification of the main polyphenols. Orange by-product was that with a high number of polyphenols, while lemon extract was that with high concentrations. The main compounds present in orange by-product were Naringenin-7-O-rutinoside, Hesperetin-7-O-rutinoside, and Iso-sakuranetin-7-O-rutinoside. Lemon extract was characterized by the presence of Apigenin-6,8-di-C-glucoside, Eriodyctiol-O-rutinoside, and Hesperetin-7-O-rutinoside. The polyphenolic profiles of the by-products were similar to those described by other authors for the respective fruit juices, but the concentrations could be up to 10-fold higher according to the variety of the fruit [1,2]. The results highlight that the origin of the extract affects its composition and therefore its chemical characterization is mandatory for food application. These fruit by-products may be a low-cost source of polyphenols that could be used as food ingredients/additives minimizing their environmental impact.

**Citation:** Barbosa-Pereira, L.; Andrade, M.A.; Barbosa, C.H.; Vilarinho, F.; Sanches-Silva, A.; de Quirós, A.R.-B.; Sendón, R. Phenolic Profile of Fruit Industry Byproducts Determined by LC–DAD–MS/MS. *Proceedings* **2021**, *70*, 31. [https://doi.org/10.3390/foods\\_2020-07821](https://doi.org/10.3390/foods_2020-07821)

Published: 10 November 2020

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



**Copyright:** © 2020 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 (<http://creativecommons.org/licenses/by/4.0/>).

**Supplementary Materials:** The following are available online at [www.mdpi.com/2504-3900/70/1/31/s1](http://www.mdpi.com/2504-3900/70/1/31/s1), poster presentation.

**Author Contributions:** Conceptualization, R.S. and L.B.-P.; Data curation, L.B.-P.; Formal analysis, C.H.B., M.A.A. and L.B.-P.; Funding acquisition, A.S.S. and R.S.; Investigation, L.B.-P., C.H.B., M.A.A., F.V. and L.B.-P.; Methodology, L.B.-P., M.A.A. and F.V.; Project administration, R.S. and A.S.S.; Resources, R.S. and A.R.-B.d.Q.; Supervision, R.S., A.S.S.; Validation, L.B.-P., M.A.A. and

R.S.; Writing—original draft, L.B.-P.; Writing—review & editing, A.S.S, R.S. All authors have read and agreed to the published version of the manuscript.

**Funding:** This work was financially supported by the VIPACFood project (grant agreement no. 618127) selected by ERA-NET ARIMNet2 call 2016 (Coordination of Agricultural Research in the Mediterranean) of the European Union through the 7th Framework Programme and funding by the Spanish National Institute for Agricultural and Food Research and Technology (INIA) ref. AP-CIN2016-00061-00-00, by the “Consellería de Cultura, Educación e Ordenación Universitaria, Xunta de Galicia”, Ref. No. GRC 2019/030, and by Foundation for Science and Technology (FCT, Portugal,) ARIMNET2/0003/2016. Cássia H. Barbosa is grateful for her research grant in the frame of the VIPACFood project (ARIMNET2/0003/2016). The work was also supported by UIDB/00211/2020 with funding from FCT/MCTES through national funds.

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

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Not applicable.

**Acknowledgments:** L. Barbosa-Pereira is grateful to the Spanish Ministry of Science, Innovation and Universities for her “Juan de la Cierva—Incorporación” Grant (Agreement No. IJCI-2017-31665).

## References

1. Khan, M.K.; Dangles, O. A comprehensive review on flavanones, the major citrus polyphenols. *J. Food Compos. Anal.* **2014**, *33*, 85–104.
2. Xi, W.; Lu, J.; Qun, J.; Jiao, B. Characterization of phenolic profile and antioxidant capacity of different fruit part from lemon (*Citrus limon* Burm.) cultivars. *J. Food Sci. Technol.* **2017**, *54*, 1108–1118.