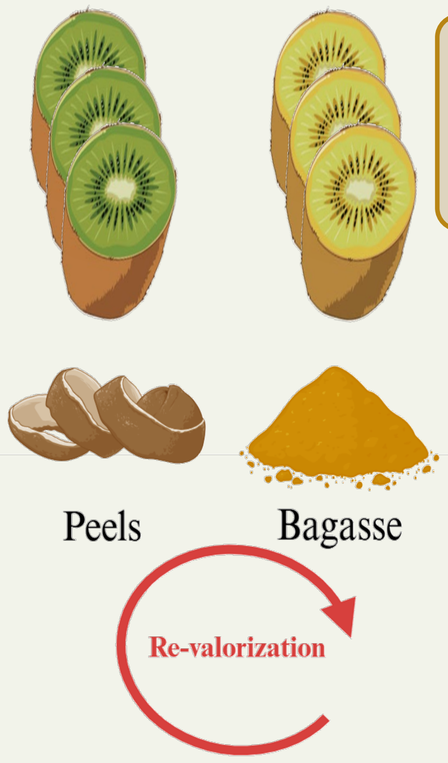
Sustainable Antioxidant Recovery: Optimizing the Extraction of Bioactive Compounds from the Peels and Bagasse of *Actinidia deliciosa* and *Actinidia chinenesis*

Franklin Chamorro[1]; Rafael Nogueira-Marques[1]; Maria Carpena[1]; A. Perez-Vasquez[1]; Ezgi Nur Yuksek[1]; Javier Echave[1]; M. A. Prieto [1,*]

[1] Instituto de Agroecoloxía e Alimentación (IAA), Universidade de Vigo, Nutrition and Food Group (NuFoG), Campus Auga, 32004 Ourense, España.

INTRODUCTION

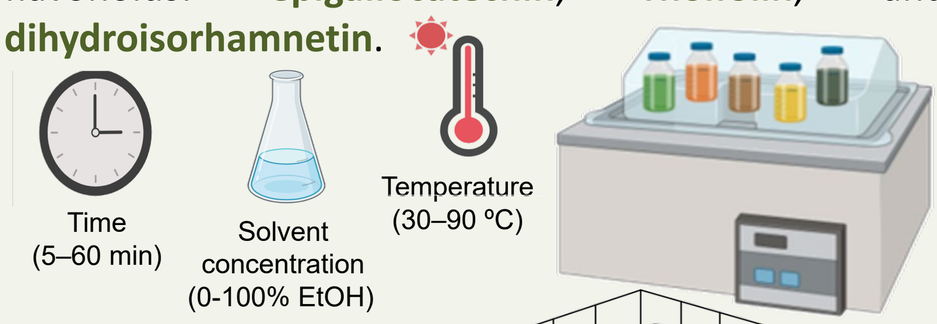
Currently, the utilization of agro-industrial by-products has gained popularity due to the presence of bioactive compounds such as **polyphenols**. In this context, processing by-products from **green kiwi** (*Actinidia deliciosa*) and **yellow kiwi** (*Actinidia chinensis*), including **peels** and **bagasse**, represent an underutilized source of **bioactive compounds**, especially **flavonoids** with proven **antioxidant** and **anti-inflammatory** properties. To obtain these compounds, the optimization of the parameters involved in the extraction process, such as **temperature**, **time**, and **solvent concentration**, plays a crucial role in identifying the best conditions and potential interactions to maximize the desired results. This is key to the circular economy and food innovation.



OBJECTIVE, MATERIALS AND METHODS

Optimize the recovery of flavonoids by the heat-assisted extraction (HAE) technique

To **optimize flavonoid** recovery using heat-assisted extraction (**HAE**), considering time (5–60 min), temperature (30–90 ºC), and solvent concentration (0–100% ethanol) as variables to be optimized. In four kiwifruit by-products: green kiwifruit peel (**GKP**), green kiwifruit bagasse (**GKB**), yellow kiwifruit peel (**YKP**), and yellow kiwifruit bagasse (**YKB**), using the Response Surface Methodology (**RSM**). **HPLC-ESI-QqQ-MS/MS** was used to identify and quantify three main flavonoids: **epigallocatechin**, **rhoifolin**, and **dihydroisorhamnetin**.



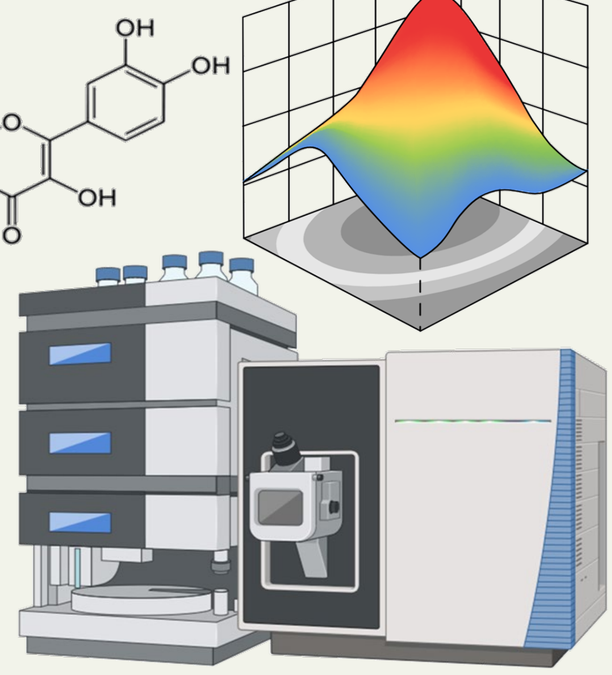


Figure 1. Workflow of Heat-Assisted Extraction and RSM Optimization for Flavonoid Recovery

RESULTS

Optimum conditions

5 min **30 C** **100%**

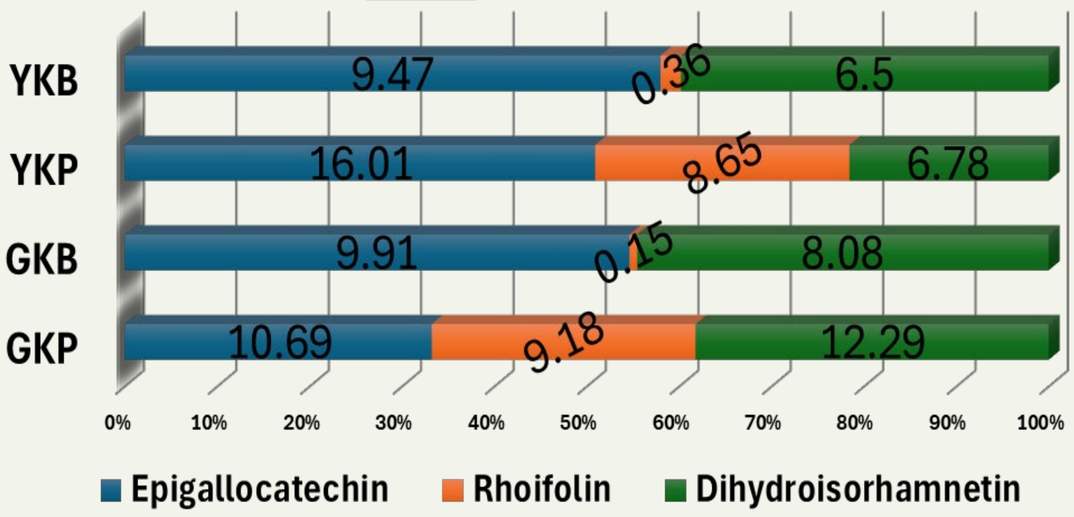
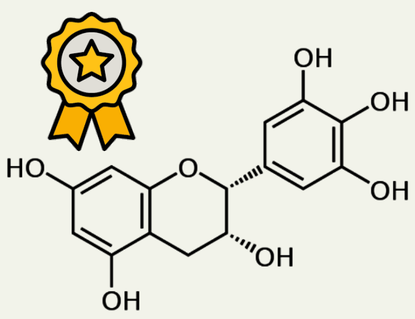


Figure 2. Quantification of Epigallocatechin, Rhoifolin, and Dihydroisorhamnetin in Kiwifruit Peels and Bagasse. Expressed in µg/ml of extract



Epigalocatequina

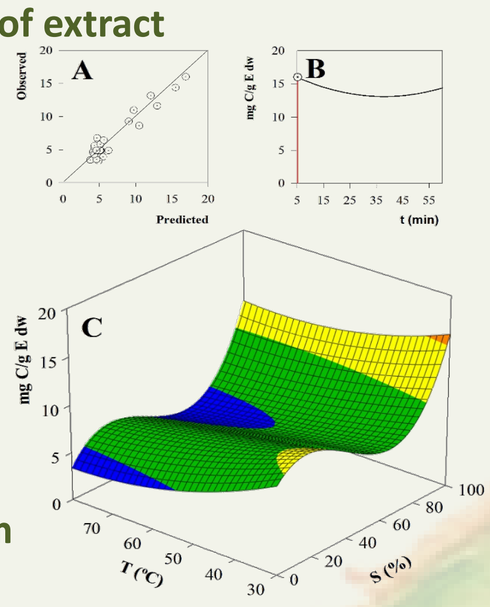


Figure 3. RSM for epigallocatechin extraction from YKP

Epigallocatechin is the main flavonoid, reaching a concentration of **16.01 µg/ml of extract**. This compound has a high **antioxidant capacity** and is associated with **cardioprotective**, **anti-inflammatory**, and **neuroprotective effects**.

CONCLUSIONS

These results represent an opportunity to enhance the value of **yellow kiwi peel** by incorporating it into **functional food**, **nutraceutical**, and even **cosmetic formulations**, in line with trends in **sustainability**, **waste reduction**, and the development of high-value **bioactive ingredients** with a **positive impact on health** and sustainability.

ACKNOWLEDGMENTS

The research leading to these results was funded by Knowledge Generation Projects 2023 (PID2023-148814OA-C22) that supported the contract of F. Chamorro and by MICIU/AEI/10.13039/501100011033 that supported the predoctoral industrial fellowship for A. Pérez-Vázquez (DIN2024-013416) in collaboration with Mercantia Desarrollos Alimentarios S.L. The authors gratefully acknowledge the national funding from FCT, Foundation for Science and Technology, through the individual research grants of J. Echave (2023.04987.BD) with the DOI https://doi.org/10.54499/2023.04987.BD