Microwave-assisted extraction: a green approach for triterpenic acids extraction

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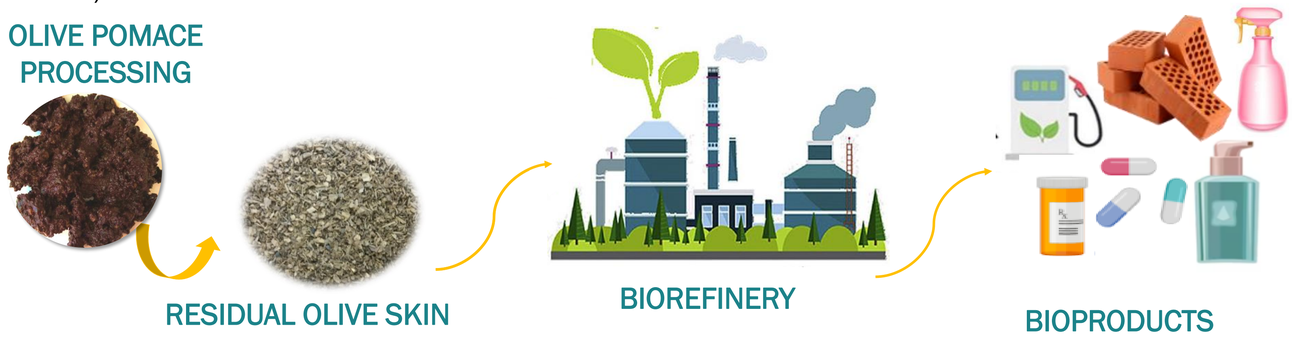
Introduction

Microwave-assisted extraction (MAE) uses microwave energy to facilitate the extraction process and offers numerous advantages over conventional extraction techniques, such as shorter extraction time, lower solvent and energy consumption, and higher extraction efficiency (Gómez-Cruz et al., 2022). In addition, MAE has emerged as a promising green technology for the extraction of bioactive compounds from bioresources such as **triterpenic acids** (Usman et al., 2023). These compounds are present in the olive fruit and pass into the olive pomace during olive oil production. Recent studies also suggest that triterpenic acids are concentrated on the **residual olive skin (ROS)**, a waste generated when olive pits are recovered from olive pomace (Romero et al., 2017). Therefore, this biomass, which is generated in large quantities each year, has a great potential to extract these biocompounds that present a wide range of applications in the food, health and industrial biotechnology sectors (Thimmappa et al., 2014).

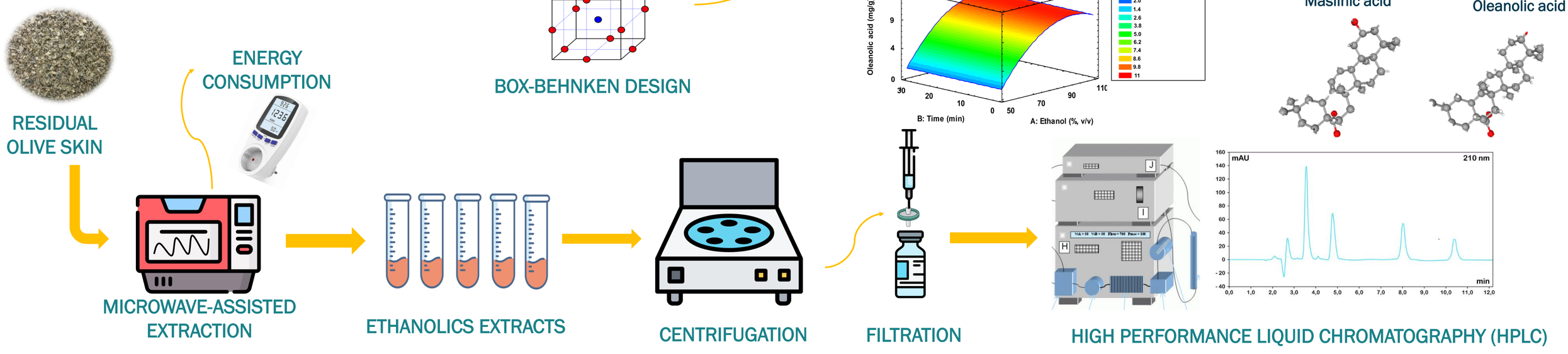


Objectives

1. To extract triterpenic acids by MAE from residual olive skin
2. To compare the content of triterpenic acids with other by-products of the olive industry (olive pomace and exhausted olive pomace)

Keywords: green extraction, maslinic acid, microwave-assisted extraction, oleanolic acid, residual olive skin.

Experimental procedure



Results and discussion

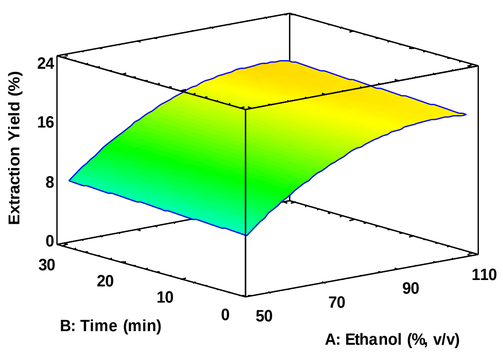
OPTIMAL EXTRACTION CONDITIONS → Multiple response

100% (v/v) ethanol

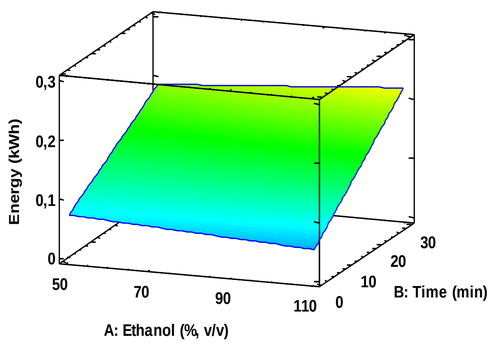
4 min

99 ºC

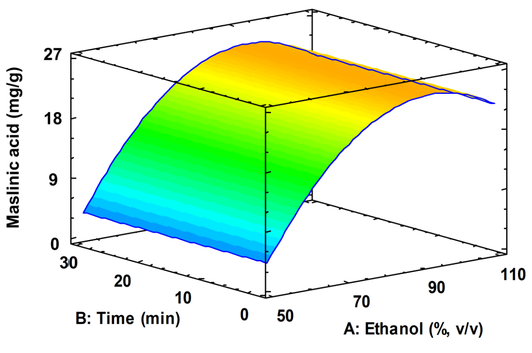
Extraction yield (%)



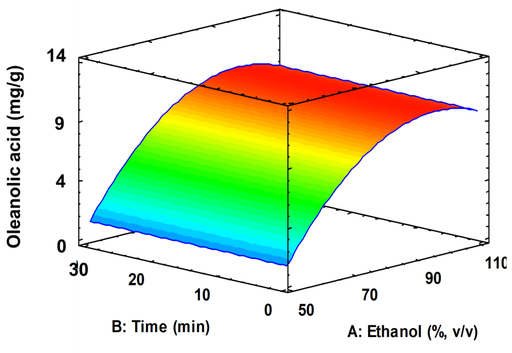
Energy consumption (kW h)



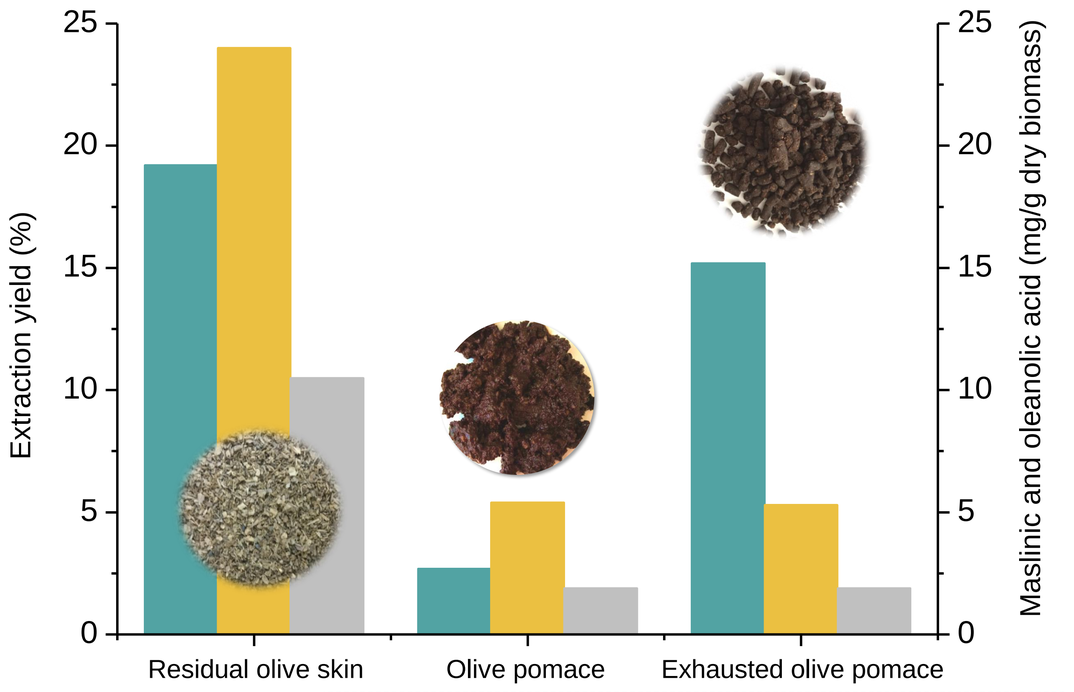
Maslinic acid concentration (mg/g dry biomass)



Oleanolic acid concentration (mg/g dry biomass)



COMPARISON WITH OTHER BY-PRODUCTS OF THE OLIVE OIL INDUSTRY



Triterpenic acids content in ROS is ~80% higher than in olive pomace and exhausted olive pomace at 100% ethanol for 4 min and 99ºC

Conclusions

- MAE is an efficient technique for the extraction of triterpenics acids from residual olive skin.
- Considering electricity consumption as a response, the best conditions for extracting triterpenic acids were: 100 % (v/v) ethanol, 4 min and 99 ºC.
- Residual olive skin is a rich source of triterpenic acids, which can be extracted under a biorefinery scheme to maximize the valorization of this bioresource that would contribute to the circular bioeconomy of the olive oil industry.

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