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Valorization of the banana peels by extraction of rutin using acidic aqueous solutions

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PURPOSE OF THE ABSTRACT

Banana peels are a food waste with no commercial value, rich in value-added compounds with relevant biological activities such as rutin. In this work, organic acids and their aqueous solutions were applied as alternative solvents to extract rutin from banana peels. First, COSMO-RS, a quantum chemistry-based thermodynamic model, was applied in this work to screen the best organic acids for the extraction of rutin present in banana peels. Solid-liquid extractions were then performed with these solvents to identify the best one and its composition. The rutin content was maximized using ripe banana peels and an aqueous mixture of acetic acid of 65 wt.%, resulting in 200 mg of rutin / 100g dw of biomass. After, a response surface methodology was carried out to optimize extraction conditions (extraction time, solid?liquid (biomass?solvent) ratio and temperature), leading to a maximum extraction yield 239 mg of rutin /100 g dw of biomass at 25 °C, 80 minutes of extraction and a solid-liquid ratio of 0.06. The solvent was shown to be reusable in three successive extraction cycles, with no significant losses in the extraction efficiency of rutin. The results obtained show the potential of aqueous solutions of organic acids to substitute the conventional organic solvents in the extraction of biocompounds from natural sources, thus contributing to the development of more efficient and sustainable extraction processes.

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FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Waste food | Rutin | Process optimization | Alternative solvents

BIBLIOGRAPHY