Valorization of Discarded Kiwiberries Through Ultrasound-Assisted Extraction of Phenolic Compounds

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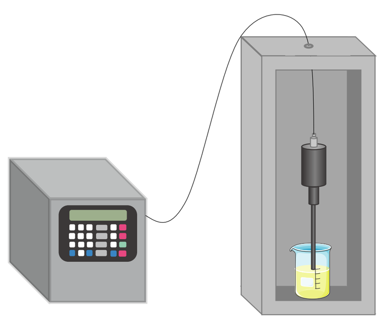
INTRODUCTION & AIM

- Bioactive molecules play a pivotal role in combating oxidative stress and inflammation associated with several chronic diseases[1-3].
- A significant portion of fruit production is discarded as waste mainly due to imperfections or suboptimal sizes[4].
- Using food waste as sources of bioactive compounds promotes eco-friendly products and supports the sustainability of the agri-food chain, aligning with the Sustainable Development Goals and the European Green Deal.

Kiwiberry

- Rich in polyphenols and vitamins[5]
- Anti-cancer, antioxidant and anti-inflammatory activities[6]
- Nutraceutical, cosmeceutical and pharmaceutical potential[7]



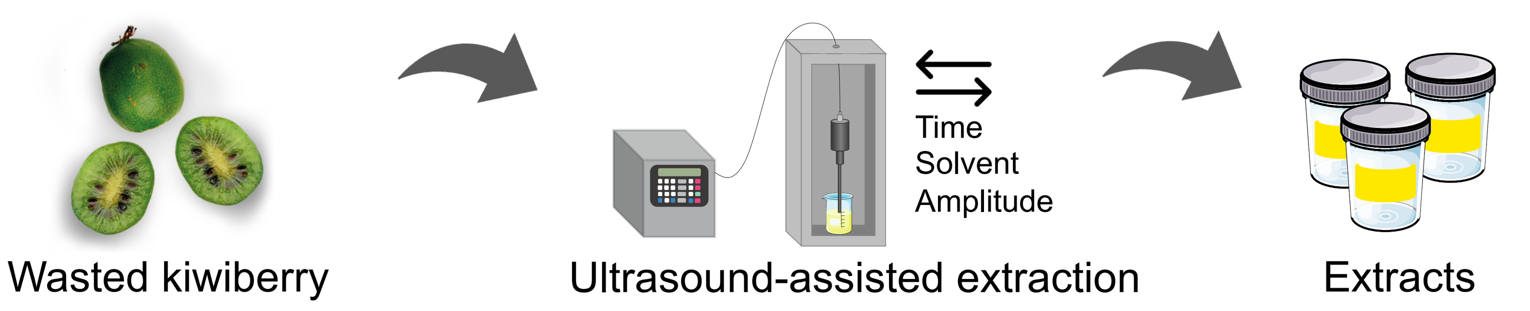
Ultrasound-assisted extraction (UAE)

- Allows high extraction yields[8]
- Maintain the quality of the extracted compounds[8]
- Stands out from other green extraction techniques for requiring less time and energy[8]

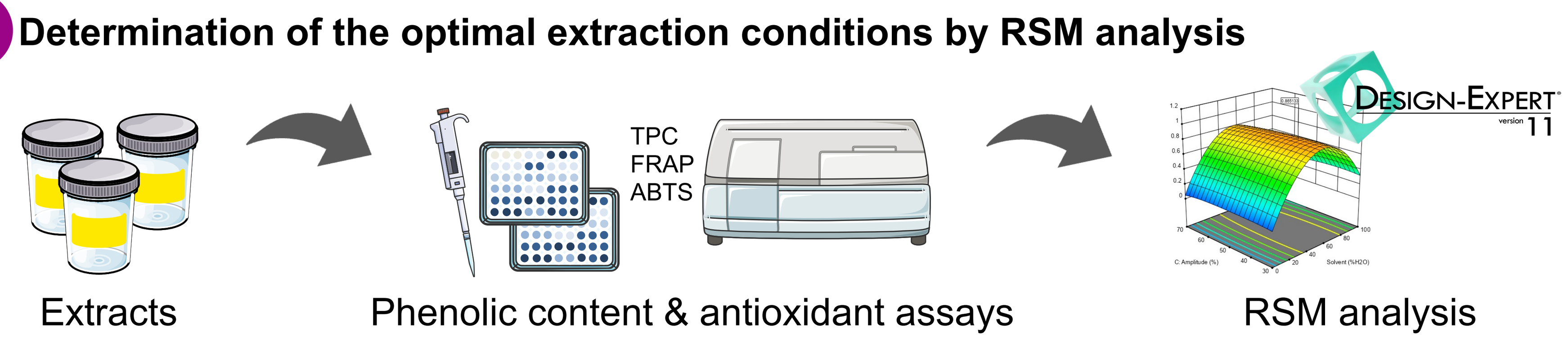
AIM: Optimize the extraction conditions of kiwiberry by ultrasound-assisted extraction, using Response Surface Methodology (RSM), to achieve an extract with high antioxidant/antiradical activities and phenolic content.

METHOD

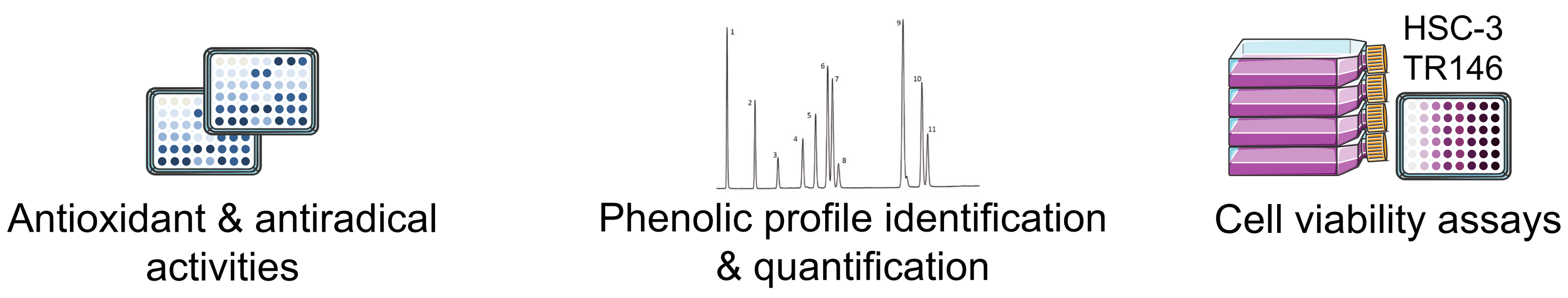
1 Extraction of phenolic compounds from kiwiberry by UAE



2 Determination of the optimal extraction conditions by RSM analysis



3 Characterization of the optimal extract



CONCLUSION

Taken together, these findings highlight the potential of kiwiberry as a sustainable source of bioactive compounds, with the extract demonstrating significant antioxidant properties while showing no significant toxicity to oral cells. This study presents a novel approach to valorize kiwiberry by-products, promoting environmental sustainability and resource efficiency in food production.

RESULTS & DISCUSSION

1 Determination of the optimal extraction conditions by RSM analysis

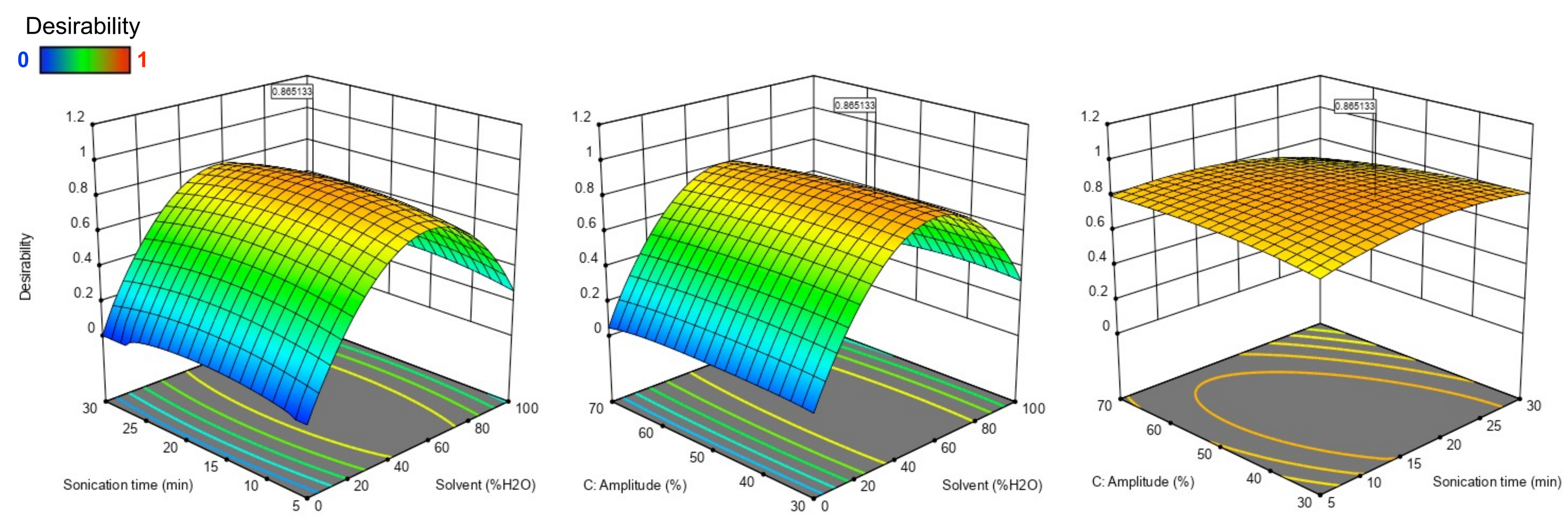


Figure 1. Desirability plots for the response variables (TPC, FRAP and ABTS), showing the simultaneous optimization of factors. Desirability ranges from 0 to 1, with 1 indicating the ideal conditions for maximizing the objective.

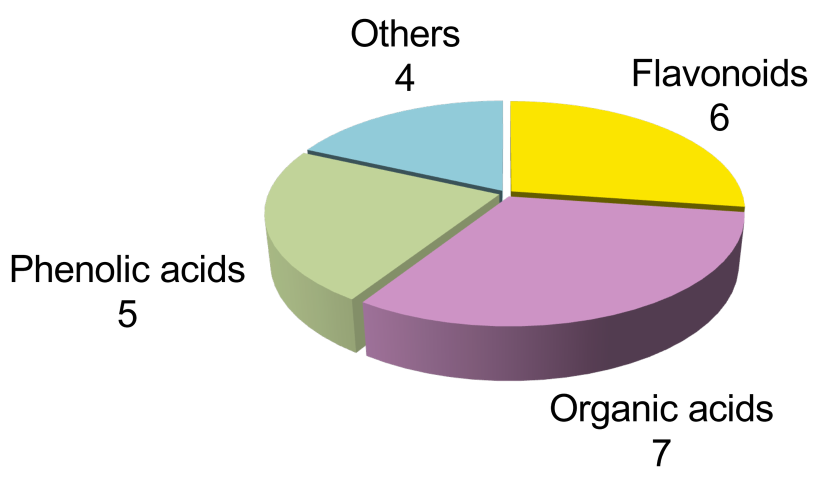
Optimal extraction conditions: 50% H_2O, 17.5 min, 50% amplitude (R^2 = 0.865133)

2 *In-vitro* antioxidant/antiradical activities

Table 1. Total phenolic content (TPC) and antioxidant/antiradical activities of the optimal extract. GAE, gallic acid equivalents; FSE, ferrous sulfate equivalents; AAE, ascorbic acid equivalents; TE, Trolox equivalents; IC_{50}, inhibition percentage (%).

TPC	FRAP	ABTS	ROS $O_2^{\bullet-}$	ROS HOCl	ROS $ROO^{\bullet}$
18.705 mg GAE/g dw	186.876 µmol FSE/g dw	16.334 mg AAE/g dw	IC_{50} = 829.384 µg/mL	IC_{50} = 16.895 µg/mL	0.18 µg TE/mg dw

3 Phenolic profile identification & quantification



- **Chlorogenic acid** 0.217 µg/mg dw
- **Catechin** 0.0060 µg/mg dw
- **Neochlorogenic acid** 0.0528 µg/mg dw
- **Epicatechin** 0.0024 µg/mg dw

4 Cell viability assays

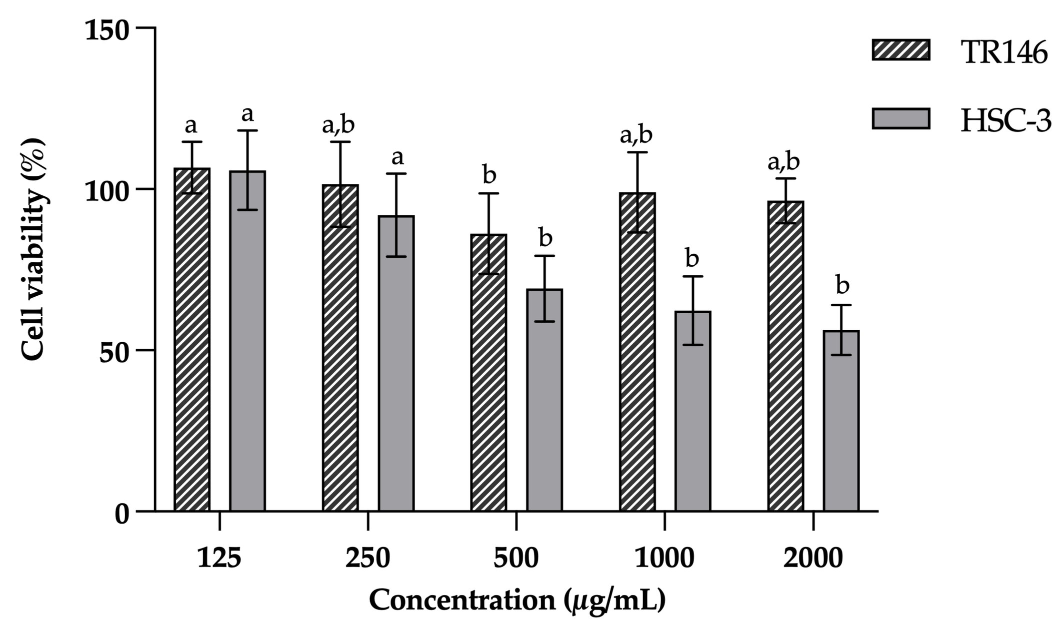


Figure 2. Effects of optimal extract exposure on the viability of TR146 and HSC-3 cells at different concentrations. Values are expressed as mean ± standard deviation (n = 3). Different letters represent significant differences (p≤0.05).

REFERENCES/AKNOWLEDGEMENTS

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