Comparative Analysis of Antioxidant Activity in Yerba Mate (Ilex paraguariensis A.St.-Hil.) Using Different Solvents and Extration Methods

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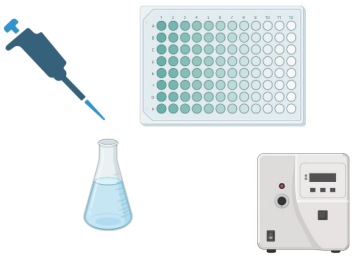
Introduction

Yerba mate (*Ilex paraguariensis* A.St.-Hil) is known for its antioxidant and anti-inflammatory properties, attributed to its abundant bioactive compounds, such as polyphenols [1]. The present study aimed to test different solvents (water vs. hydroethanolic solution) and extraction methods to evaluate their efficiency in extracting polyphenols in view of selecting the best one for future optimization of the extraction.

Ilex paraguariensis A.St.-Hil

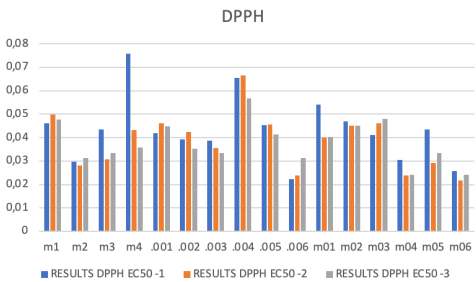
Methodology

For that purpose, maceration at 40°C and room temperature for 1h with re-extraction after one additional hour, ultrasound-assisted extraction (UAE) for 15 min at 125, 250 and 375W and microwave-assisted extraction (MAE) for 15 min at 250, 500 and 750W were employed. The extracts were freeze-dried and subsequently analyzed for total phenols (TP) content and antioxidant activity. *In vitro* assays were employed to determine antioxidant efficacy through 2,2-Diphenyl-1-Picrylhydrazyl (DPPH) free radical scavenging, Thiobarbituric Acid Reactive Substances (TBARS) and Reducing Power (RP) assays, and TP were measured spectrophotometrically.



Results

Regarding the DPPH assay, it was observed that hydroethanolic extracts obtained higher EC50 values across the different extraction techniques, with UAE at 2375W for 15 minutes yielding an EC50 of 23±3 µg/mL, followed by MAE at 750W for 15 minutes, with an EC50 of 24±2 µg/mL. For reducing power, the EC50 values ranged from 94 to 127 µg/mL. MAE with H2O at 750W exhibited the best performance in the TBARS assay (88 µg/mL), followed by maceration with water at 40oC. MAE and UAE achieved the highest phenolic contents in hydroethanolic extracts, expressed in GAE/mL, ranging from 105 to 135 mg GAE/mL.



Conclusion

These preliminary findings underscore UAE and MAE, particularly with 80% ethanol, as efficient methods for extracting antioxidants from yerba mate, highlighting potential applications in functional foods and supplements. Future research will focus on optimizing extraction protocols using advanced experimental designs to maximize bioactive compound benefits.

References
[1] Heck, C. I., & De Mejia, E. G. (2007). Yerba mate tea (Ilex paraguariensis): A comprehensive review on chemistry, health implications, and technological considerations. Journal of Food Science, 72(9), R138-R151.

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This work offers sustainable solutions for bio-waste, leveraging innovative Technologies to promote a circular economy and enhance food safety. It aligns with the 2030 Agenda goals by reusing agri-food waste, developing new products, and reducing waste generation (goals 12.5; 12.a). It also supports the vegetable industry in reducing industrial waste through innovation and research (goals 9.4; 9.5).

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