



Revalorization of cinnamon leaves by phenolic compounds extraction process: an optimization by Box-Behnken design

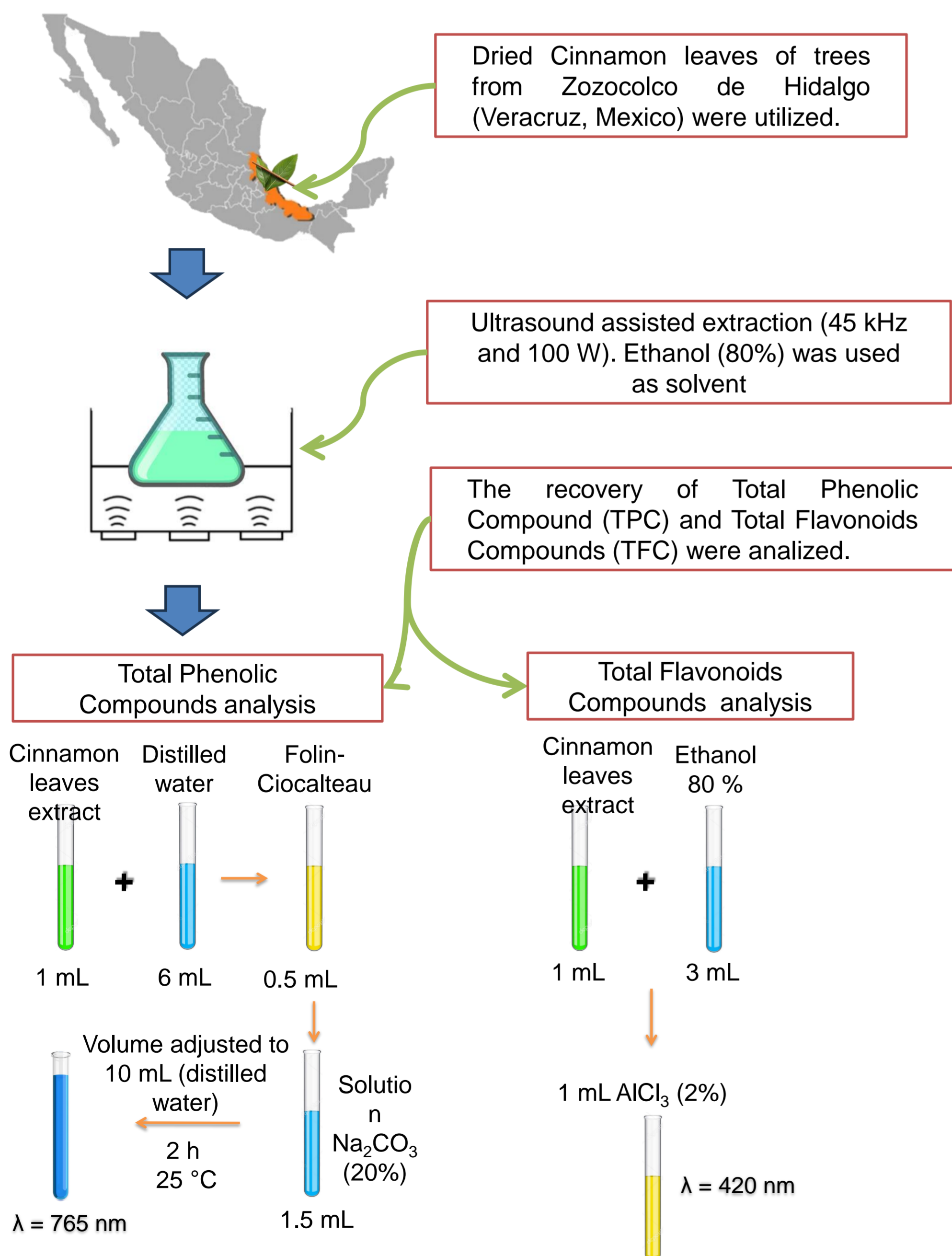
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INTRODUCTION & AIM

The cultivation of **cinnamon** (*Cinnamomum zeylanicum*) is one of the most important worldwide. In **Mexico**, states such as Veracruz and Puebla are the main producers. The bark is the main product due to its culinary properties, however, it contains bioactive compounds of interest in different industries. The cinnamon leaves contain polyphenolic compounds with antimicrobial, antioxidant, and insecticidal properties [1]. This **study aimed** to optimize the ultrasound-assisted extraction process conditions for phenolic compounds from cinnamon leaves.

METHOD



RESULTS & DISCUSSION

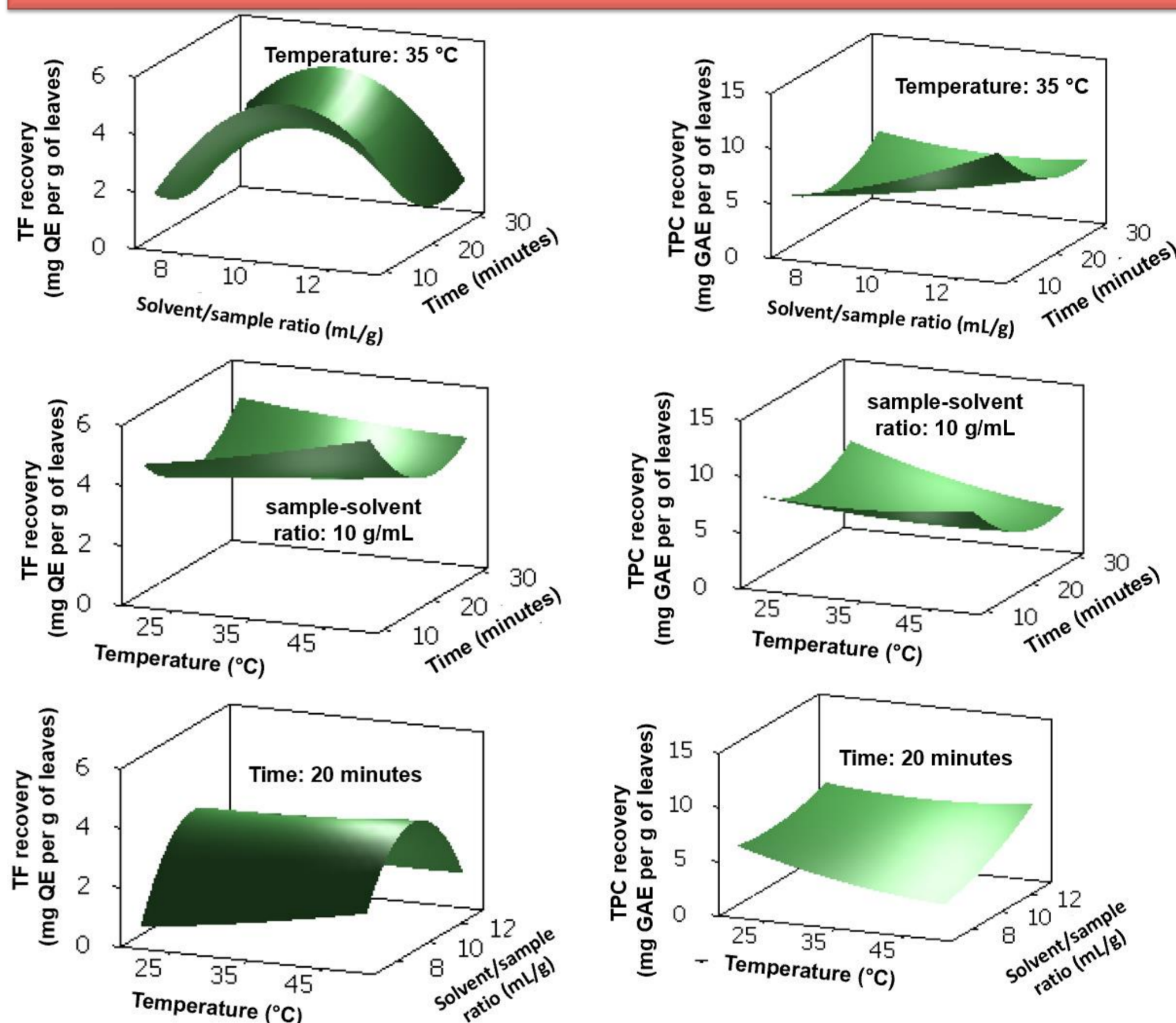


Fig 1. Effect of ultrasound extraction process variables on the recovery of TF from cinnamon leaves.

Fig 2. Effect of ultrasound extraction process variables on the recovery of TPC from cinnamon leaves.

The maximum recovery of bioactive compounds was 11.86 mg GAE/g for TPC and 4.90 mg QE/g for TFC. Similar findings have been reported by various authors [1,2]. For TFC recovery (Fig. 1) the terms solvent-sample ratio, time and its interactions, were statistical significance ($p < 0.05$). For TPC recovery (Fig. 2), only the quadratic term of solvent- sample ratio was significant ($p < 0.05$). The solvent-sample ratio is crucial in extraction. Excessive solvent causes waste, while too little leads to incomplete separation. Increasing process time initially boosts yield but then reduces it, similar to temperature effects. For flavonoid extraction in various plant matrices, no significant degradation was observed within the 10 to 70 °C range [1,2,3].

CONCLUSION

The study highlights the potential use of *C. zeylanicum* leaf extracts as a rich source of polyphenols through ultrasound-assisted maceration. The optimal conditions determined by the Box-Behnken Design are 50 °C, 12.66 mL/g, and 10 minutes.

FUTURE WORK / REFERENCES

Furthermore, antibacterial, and antifungal activities of the extracted fractions must be evaluated.

- [1] Yang, C.-H.; Li, R.-X.; Chuang, L.-Y. (2012). Antioxidant Activity of Various Parts of *Cinnamomum cassia* Extracted with Different Extraction Methods. *Molecules*, 17, 7294-7304. <https://doi.org/10.3390/molecules17067294>. [2] Liu, Z., Kong, L., Lu, S., & Zou, Z. (2019). Application of a combined homogenate and ultrasonic cavitation system for the efficient extraction of flavonoids from *Cinnamomum camphora* leaves and evaluation of their antioxidant activity in vitro. *Journal of Analytical Methods in Chemistry*. [3] Yarena-Prieto, B.J.; Gonzalez-Gonzalez, M.; Vázquez-Espinosa, M.; González-de-Peredo, A.V.; García-Alvarado, M.A.; Palma, M.; Rodríguez-Jimenes, G.d.C.; Barbero, G.F. (2022). Optimization of an Ultrasound-Assisted Extraction Method Applied to the Extraction of Flavonoids from Moringa Leaves (*Moringa oleifera* Lam.). *Agronomy*, 12, 261. <https://doi.org/10.3390/agronomy12020261>.

$$y_j = \beta_{0j} + \beta_{1j}T + \beta_{2j}R + \beta_{3j}t + \beta_{11j}T^2 + \beta_{22j}R^2 + \beta_{33j}t^2 + \beta_{12j}TR + \beta_{13j}Tt + \beta_{23j}Rt$$

- A Box-Behnken design was used to determine the effect of:
- ✓ sample-solvent ratio: 7-13 mL/g
 - ✓ Temperature: 20-50 °C
 - ✓ Time: 10-30 minutes