

Lam Chan Tai¹, Nguyen Thi Ngoc Lan¹, Tran Thanh Truc², Mai Huynh Cang³, Nguyen Hong Khoi Nguyen^{1*}

¹ Department of Food Technology, Institute of Applied Technology and Sustainable Development, Nguyen Tat Thanh University, Vietnam

² College of Agriculture, Can Tho University, Can Tho City, Vietnam

³ Department of Chemical Technology, Nong Lam University, Ho Chi Minh City, Viet Nam

* Correspondence: Nguyen Hong Khoi Nguyen- nhknguyen@ntt.edu.vn

Code: Pxxxxmmyyy

ABSTRACT

Morus nigra L. (Black mulberry) is a nutritious fruit that contains many bioactive compounds such as anthocyanins, polyphenol and antioxidant activity. The microwave-assisted extraction method (MAE) is an advanced method with due to its advantages of short extraction time and lower solvent consumption. The objective of this research is to find the appropriate conditions to extract the highest contents of anthocyanin, polyphenol and antioxidant activity in black mulberry by MAE method. The pH-differential method is used to determine the anthocyanin content, the polyphenol content is determined by the Folin-Ciocalteu method and the antioxidant activity is determined by the DPPH method. The highest contents of these compounds were obtained as follows anthocyanin contents 128.07 mg/L, polyphenol contents 4305.38 mg/L and antioxidant activity 2715.68 $\mu\text{mol/L}$ when extracted under conditions of concentration of ethanol 60o, solid to solvent ratio 1:30, microwave power 600W, microwave-assisted extraction time 2 minutes.

MATERIALS AND METHODS

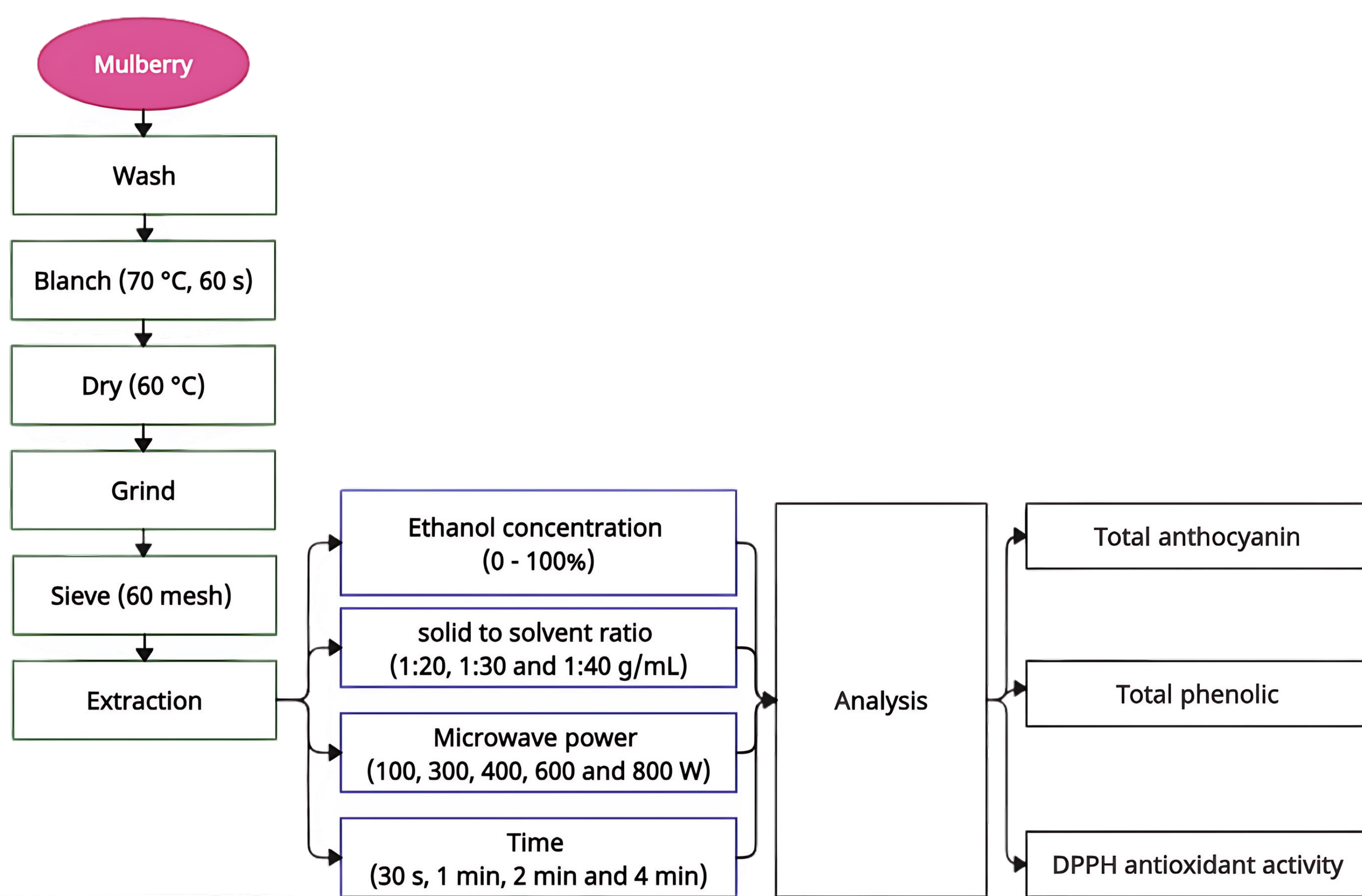


Fig 3. Sample processing and research diagram

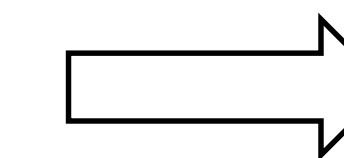
CONCLUSIONS

In this study, we have found the optimal conditions for maximal recovery of polyphenols and anthocyanins from the black mulberry material. Parameters consisted of ethanol concentration of 60o, solid to solvent ratio of 1:30, microwave power of 600W and microwave-assisted extraction time of 2 minutes. Thereby, it is also proved that the microwave-assisted extraction method is a method that requires a short time, less effort, is suitable for the extraction of heat-unstable compounds and also provides better extraction efficiency than the conventional extraction methods. This result may act as a precursor for natural colorant production studies that utilize black mulberry.

INTRODUCTION



Fig 1. Black mulberry



ANTHOCYANIN PIGMENT



Fig 2. Microwave oven

Shorter extraction time

Improve extraction efficiency and yield

Reduce solvent usage and energy consumption

RESULTS AND DISCUSSION

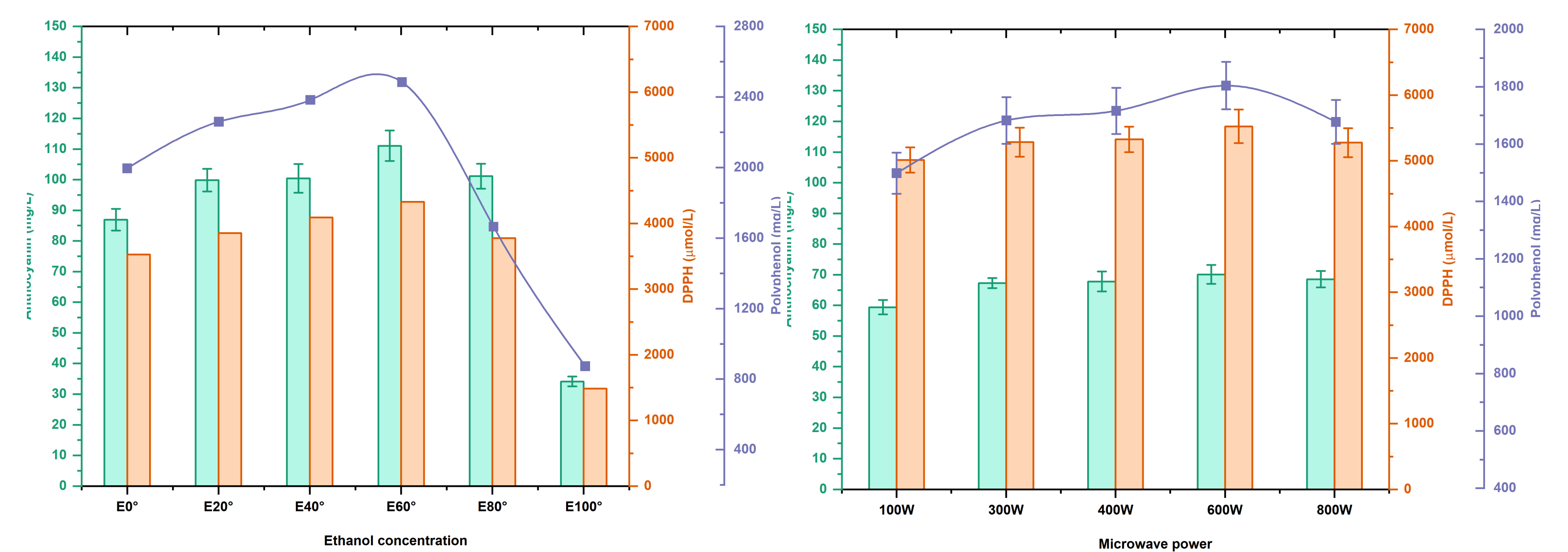


Fig 4. Effect of ethanol concentration on anthocyanin, polyphenol and DPPH contents in red cabbage extract

Fig 6. Effect of microwave power on anthocyanin, polyphenol and DPPH contents in red cabbage extract

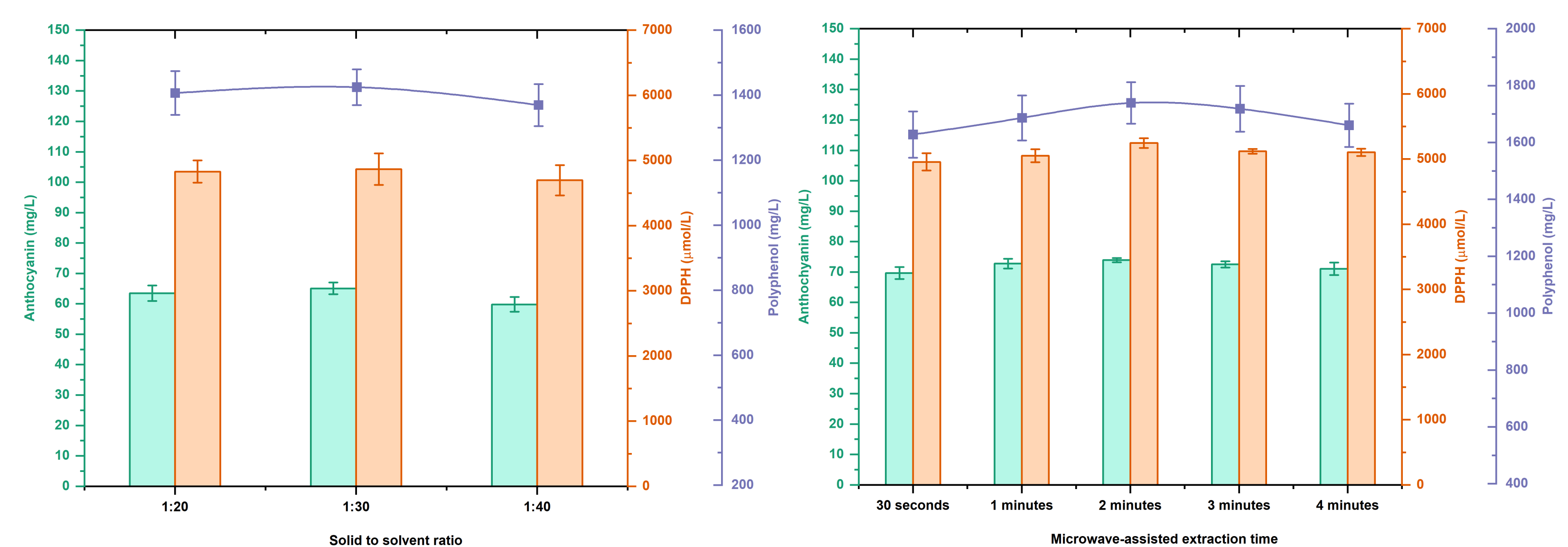


Fig 5. Effect of solid to solvent on anthocyanin, polyphenol and DPPH contents in red cabbage extract

Fig 7. Effect of microwave power on anthocyanin, polyphenol and DPPH contents in red cabbage extract

REFERENCES

- TP Dao, DC Nguyen, DT Nguyen, TH Tran, PTN Nguyen, NTH Le, XT Le, DH Nguyen, DVN Vo, LG Bach (2019) Extraction Process of Essential Oil from Plectranthus amboinicus Using Microwave-Assisted Hydrodistillation and Evaluation of Its Antibacterial Activity, Asian Journal of Chemistry, 31: 977-981.
- NB Hoang, TT Nguyen, TS Nguyen, TPQ Bui, LG Bach (2019) The application of expanded graphite fabricated by microwave method to eliminate organic dyes in aqueous solution, Cogent Engineering, 6: 1584939.
- K Kaderides, L Papaikononou, M Serafim, AM Goula (2019) "Microwaveassisted extraction of phenolics from pomegranate peels: Optimization, kinetics, and comparison with ultrasounds extraction," Chem. Eng. Process. Intensif., 137: 1-11.
- V Farzaneh, IS Carvalho (2017) "Modelling of microwave assisted extraction (MAE) of anthocyanins (TMA)," J. Appl. Res. Med. Aromat. Plants, 6: 92- 100.
- PV Thinh, ND Trinh, NT Thuong, VTT Ho, BTP Quynh, LG Bach (2018) Influence Factors of Exfoliation Synthesis Exfoliated Graphite from Vietnamese Natural Graphite Flakes Using Microwave Irradiation, Solid State Phenomena, 279: 230-234.

CONTACT

Nguyen Hong Khoi Nguyen

Department of Food Technology, Institute of Applied Technology and Sustainable Development, Nguyen Tat Thanh University, Vietnam

Website:

- <https://ntt.edu.vn>

- <https://kttpmt.ntt.edu.vn>

Phone: (+84) 19002039 - ext. 409

Email: nhknguyen@ntt.edu.vn