ISETC2025

UNIVERSITI TEKNOLOGI MARA

ISETC2025

2 ND INTERNATIONAL SCIENCE, ENGINEERING AND TECHNOLOGY COLLOQUIUM



THE POWER OF SCIENTIFIC INNOVATION

INTELLIGENT SOLUTIONS FOR A SUSTAINABLE WORLD

ORGANIZED BY:
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA
PERAK BRANCH, TAPAH CAMPUS
MALAYSIA

CO-ORGANIZED BY:

三重大学
MIE UNIVERSITY

2nd International Science, Engineering and Technology Colloquium

(ISETC 2025)

Faculty of Applied Sciences,
Universiti Teknologi MARA,
Perak Branch, Tapah Campus,
35400 Tapah Road, Perak, Malaysia.

Colloquium date: 9th July 2025
Publication date: 9th September 2025

Proceedings of Extended Abstracts

EDITORS

Dr. Emi Norzehan Mohamad Mahbob
Dr. Saiyidah Nafisah Hashim
Ms. Lili Widarti Zainuddin
Ms. Nurul Nazwa Mohammad
Ms. Rozaina Saleh

e-ISBN: 978-629-97630-5-5

Copyright © 2025 ISETC
Published by Faculty of Applied Sciences, Universiti Teknologi MARA,
Perak Branch, Tapah Campus, 35400 Tapah Road, Perak, Malaysia.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the Faculty of Applied Sciences, Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400 Tapah Road, Perak, Malaysia.

PREFACE

Welcome to the 2nd International Science, Engineering and Technology Colloquium 2025 (ISETC 2025)!

It is with great pleasure that we present this year's colloquium, a distinguished gathering of scholars, researchers, and professionals dedicated to the advancement of applied sciences. Held virtually on 9th July 2025, ISETC 2025 serves as a platform to highlight cutting-edge research, foster meaningful networking, encourage collaborations, and explore innovative solutions to global challenges.

This year's theme, "The Power of Scientific Innovation: Intelligent Solutions for a Sustainable World" highlights our shared goal to solve global challenges through applied science. It celebrates innovation as a key to building a more sustainable and resilient future. We're proud to feature keynote speakers and presenters who bring fresh insights, bold ideas, and breakthroughs shaping tomorrow's world.

We would like to extend our heartfelt appreciation to the Faculty of Applied Sciences, Universiti Teknologi MARA, Perak Branch, Tapah Campus, for their outstanding support and assistance throughout the planning and execution of the event. Their dedication has been instrumental to the success of this colloquium. We would like to sincerely thank all participants and researchers for their valuable contributions. We also appreciate the reviewers for their careful evaluations and helpful feedback. Your hard work and support mean a lot to us.

As editors, we are proud to present this collection of proceedings. It is an honour to bring together the interesting and meaningful work of our speakers and authors. We hope the ideas shared will lead to new discoveries, encourage more research, and help solve global challenges through science and innovation.

Warm regards,

Dr. Emi Norzehan Mohamad Mahbob
Dr. Saiyidah Nafisah Hashim
Ms. Lili Widarti Zainuddin
Ms. Nurul Nazwa Mohammad
Ms. Rozaina Saleh

ISETC 2025 Proceedings Editors

OPTIMIZING PHENOLIC RECOVERY FROM CURRY LEAVES USING MICROWAVE-ASSISTED EXTRACTION WITH VARYING SOLVENT POLARITY

Nur Natasha Najwa Zamri, Sitinoor Adeib Idris*

Faculty of Chemical Engineering, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

**Corresponding author: adeib@uitm.edu.my*

Abstract: Curry leaves (*Murraya koenigii* L. Spreng) are widely valued for their culinary and medicinal uses, primarily due to their high content of phenolic compounds known for antioxidant and antibacterial properties. However, conventional extraction methods such as maceration and Soxhlet extraction often rely on toxic organic solvents, require prolonged extraction times, and may degrade thermolabile compounds—making these methods inefficient and environmentally unfriendly. This study aims to evaluate the effectiveness of Microwave-Assisted Extraction (MAE) as a green, rapid, and efficient alternative for recovering bioactive phenolics from *M. koenigii* leaves. MAE was conducted using three solvent systems: 100% water, 50% methanol-water, and 100% methanol, with plant material ground to 200 µm and extraction times ranging from 10 to 90 seconds. The total phenolic content (TPC) was quantitatively determined using the Folin-Ciocalteu method and UV spectrophotometry. Preliminary results indicate that MAE significantly reduced extraction time while maintaining high phenolic yields, with solvent polarity playing a crucial role in extraction efficiency. In conclusion, MAE proves to be a promising green technology for the rapid extraction of heat-sensitive phytochemicals, offering advantages in both sustainability and performance over traditional methods.

***Keywords*:** *Green extraction, curry leaves, phenolics, bioactive, polarity*

INTRODUCTION

Curry leaves (*Murraya koenigii*) are known for their culinary and medicinal uses, attributed to their rich phenolic content with antioxidant and antibacterial properties (Al Arif et al., 2024; Patil et al., 2021; Saini et al., 2023). Conventional extraction methods such as Soxhlet and maceration often involve prolonged extraction times and the use of harmful solvents (Asman S., 2023; Osorio-Tobón, 2020). This study explores microwave-assisted extraction (MAE) as a rapid and green technique to enhance the yield of phenolic compounds while minimizing solvent use and degradation of heat-sensitive bioactives. The research investigates the effect of solvent polarity (100% water, 50:50 methanol-water, and 100% methanol) and extraction time on the yield and quality of phenolics extracted from *M. koenigii*.

MATERIALS AND METHODS

Materials and Sample Preparation

Fresh *M. koenigii* leaves were purchased from Shah Alam, washed, dried at 110 °C for 24 h, ground, and sieved (200 µm). Solvents used included 96% methanol, deionised water, and Folin–Ciocalteu reagent.

Microwave-Assisted Extraction (MAE)

4 g of leaf powder was mixed with 80 mL of solvent (100% water, 50% methanol-water, or 100% methanol). Extraction was performed using a microwave at 600W for 10 to 90 seconds. Samples were filtered, centrifuged (10,000 rpm, 20 min), and evaporated to concentrate extracts.

Total Phenolic Content (TPC) Determination

TPC was measured via the Folin–Ciocalteu method. A mixture of extract, Folin reagent, and sodium carbonate was incubated and read at 765 nm using UV-Vis spectrophotometry.

RESULTS AND DISCUSSION

Effect of Solvent Polarity on Yield

The highest extraction yield was observed with 100% water (87.31%), followed by 100% methanol (74.9%), and the lowest with 50:50 methanol-water (61.79%). Water's high polarity effectively extracted polar phenolic compounds, while methanol offered moderate solubility and microwave absorption (Kaczorová et al., 2021; Mohammed et al., 2022). The methanol-water mix exhibited lower efficiency, likely due to suboptimal polarity and energy absorption (Muhamad et al., 2014; Xiang et al., 2024).

Effect of Extraction Time

Yield from water-based extractions increased consistently up to 90 seconds, while methanol peaked around 50 seconds before declining, suggesting compound saturation and degradation. The methanol-water mix peaked earlier (40 seconds), followed by a yield drop, possibly due to limited solute-solvent compatibility over time (Akhtar et al., 2019).

Absorbance and TPC Trends

Absorbance values, reflective of TPC, correlated with extraction time and solvent type. Water showed a continuous rise (max: 4.2987 A.U. at 90s), confirming its superior ability to extract and stabilize phenolics (Lucas et al., 2022). Methanol and methanol-water exhibited earlier peaks followed by decline, supporting the idea of early saturation and compound degradation (López-Salazar et al., 2023).

Polarity Considerations

Water, with a polarity index of 10.2, demonstrated stronger hydrogen bonding with phenolics, enhancing mass transfer and extraction efficiency. Methanol, being semi-polar (index ~5.2), was less effective for highly polar phenolics but could extract some moderately polar compounds (Organometallics.it, 2022). The results affirm that "like dissolves like" and that solvent polarity is critical in optimizing phenolic recovery.

CONCLUSIONS

Microwave-assisted extraction (MAE) is a promising, green technology for extracting phenolic compounds from curry leaves. Water, as the most polar solvent, provided the highest extraction yield and TPC under prolonged microwave exposure. Methanol showed moderate effectiveness, while the methanol-water mix underperformed. These findings underline the importance of solvent polarity and extraction time in optimizing MAE for bioactive recovery, paving the way for more sustainable phytochemical extraction methods.

REFERENCES

Akhtar, I., Javad, S., Yousaf, Z., Iqbal, S., & Jabeen, K. (2019). Microwave assisted extraction of phytochemicals: An efficient and modern approach for botanicals and pharmaceuticals. *Pakistan Journal of Pharmaceutical Sciences, 32(*1).

Al Arif, M. A., Warsito, S. H., Lamid, M., Lokapirnasari, W. P., Khairullah, A. R., Ayuti, S. R., Sugito, Hermawan, I. P., Widodo, O. S., & Gangil, R. (2024). Phytochemical analysis of curry leaf extract (Murraya koenigii L.) as a potential animal feed and medicinal ingredient. *Pharmacognosy Journal, 16*(2), 471–477. https://doi.org/10.5530/pj.2024.16.75

Asman, S. (2023). Extraction of Phytochemical from Murraya Koenigii (L.) Spreng Leaves using Maceration Method. *Scientific Research Journal, 20*(2), 147–160. https://doi.org/10.24191/srj.v20i2.23459

Kaczorová, D., Karalija, E., Dahija, S., Bešta-Gajević, R., Parić, A., & Ćavar Zeljković, S. (2021). Influence of extraction solvent on the phenolic profile and bioactivity of two achillea species. *Molecules, 26*(6). https://doi.org/10.3390/molecules26061601

López-Salazar, H., Camacho-Díaz, B. H., Arenas Ocampo, M. L., & Jiménez-Aparicio, A. R. (2023). Microwave-assisted Extraction of Functional Compounds from Plants: A Review. *BioResources, 18*(3), 6614–6638. https://doi.org/10.15376/biores.18.3.Lopez-Salazar

Lucas, B. N., Dalla Nora, F. M., Boeira, C. P., Verruck, S., & Da Rosa, C. S. (2022). Determination of total phenolic compounds in plant extracts via Folin-Ciocalteu's method adapted to the usage of digital images. *Food Science and Technology (Brazil), 42*. https://doi.org/10.1590/fst.35122

Mohammed, E. A., Abdalla, I. G., Alfawaz, M. A., Mohammed, M. A., Al Maiman, S. A., Osman, M. A., Yagoub, A. E. G. A., & Hassan, A. B. (2022). Effects of Extraction Solvents on the Total Phenolic Content, Total Flavonoid Content, and Antioxidant Activity in the Aerial Part of Root Vegetables. *Agriculture (Switzerland), 12*(11). https://doi.org/10.3390/agriculture12111820

Muhamad, N., Muhmed, S. A., Yusoff, M. M., & Gimbun, J. (2014). Influence of Solvent Polarity and Conditions on Extraction of Antioxidant, Flavonoids and Phenolic Content from Averrhoa bilimbi. *Journal of Food Science and Engineering, 4*, 255–260. https://doi.org/10.17265/2159-5828/2014.05.006

Organometallics.it. (2022). *Solvent miscibility and polarity chart* [PDF]. https://www.organometallics.it/wp-content/uploads/2022/01/Solvent-Miscibility-and-Polarity-Chart.pdf

Osorio-Tobón, J. F. (2020). Recent advances and comparisons of conventional and alternative extraction techniques of phenolic compounds. In Journal of Food Science and Technology (Vol. 57, Issue 12, pp. 4299–4315). Springer. https://doi.org/10.1007/s13197-020-04433-2

Patil, S. S., Deshannavar, U. B., Ramasamy, M., Emani, S., Khalilpoor, N., & Issakhov, A. (2021). Study of Extraction Kinetics of Total Polyphenols from Curry Leaves. *International Journal of Chemical Engineering*, 2021. https://doi.org/10.1155/2021/9988684

Saini, S. C., & Reddy, G. (2023). Assessment of Quality of Curry Leaves (Murraya koenigii). In International Journal of Pharmaceutical Science Invention ISSN. Online. www.ijpsi.org

Xiang, Z., Liu, L., Xu, Z., Kong, Q., Feng, S., Chen, T., Zhou, L., Yang, H., Xiao, Y., & Ding, C. (2024). Solvent Effects on the Phenolic Compounds and Antioxidant Activity Associated with Camellia polyodonta Flower Extracts. *ACS Omega, 9*(25), 27192–27203. https://doi.org/10.1021/acsomega.4c01321

Pejabat Perpustakaan
Library Office

Universiti Teknologi MARA
Cawangan Perak
Kampus Seri Iskandar
32610 Bandar Baru Seri Iskandar,
Perak Darul Ridzuan, MALAYSIA
Tel: (+605) 374 2093/2453 Faks: (+605) 374 2299

UNIVERSITI TEKNOLOGI MARA

Surat kami : 700-KPK (PRP.UP.1/20/1)
Tarikh : 20 Januari 2023



Prof. Madya Dr. Nur Hisham Ibrahim
Rektor
Universiti Teknologi MARA
Cawangan Perak

Tuan,

PERMOHONAN KELULUSAN MEMUAT NAIK PENERBITAN UiTM CAWANGAN PERAK MELALUI REPOSITORI INSTITUSI UiTM (IR)

Perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pihak kami ingin memohon kelulusan tuan untuk mengimbas (*digitize*) dan memuat naik semua jenis penerbitan di bawah UiTM Cawangan Perak melalui Repositori Institusi UiTM, PTAR.

3. Tujuan permohonan ini adalah bagi membolehkan akses yang lebih meluas oleh pengguna perpustakaan terhadap semua maklumat yang terkandung di dalam penerbitan melalui laman Web PTAR UiTM Cawangan Perak.

Kelulusan daripada pihak tuan dalam perkara ini amat dihargai.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Setuju.

27.1.2023

PROF. MADYA DR. NUR HISHAM IBRAHIM
REKTOR
UNIVERSITI TEKNOLOGI MARA
CAWANGAN PERAK
KAMPUS SERI ISKANDAR

Saya yang menjalankan amanah,

SITI BASRIYAH SHAIK BAHARUDIN
Timbalan Ketua Pustakawan

nar

Powered by CamScanner