



UNIVERSITI
TEKNOLOGI
MARA

ISETC2025

2ND 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:



**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

SYNERGISTIC EFFECT OF *Euphorbia hirta* L. AND *Peperomia pellucida* AGAINST HUMAN PATHOGENS

Nurhazimah Nordin, Nur Amirah Athilah Erwan, Rashidah Iberahim *

*School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Cawangan Negeri Sembilan,
Kampus Kuala Pilah, Negeri Sembilan, Kuala Pilah, 72000, Malaysia*

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

Abstract: *Euphorbia hirta* is widely referred to as asthma-weed is a medicinal plant, which contains a potentially high number of bioactive substances like flavonoids, tannins, saponins as well as phenolic acids, and is a plant with antimicrobial impact. *Peperomia pellucida*, a herbaceous plant that is common in tropical areas, also has antibacterial and antioxidant properties because there is a great abundance of flavonoid, alkaloids and terpenoid compounds. The current research study examines the synergistic antibacterial activity between *E. hirta* and *P. pellucida* extracts against human pathogens. The aim of this research is to determine the bioactive compounds present in both plants that are related to the antibacterial activity and to identify the synergistic effect of the combination of these two plants. Secondary metabolites were screened by carrying out phytochemical screening and the Kirby Bauer Disc Diffusion technique and Minimum Inhibitory Concentration (MIC) tests were employed to determine the antibacterial activities as well as the synergy. *E. hirta* exhibited inhibition zones of 6-26 mm and *P. pellucida* did not exhibit any inhibition. The combination however demonstrated a moderate inhibition zone at dilute concentrations (7-8 mm at 500 mg/mL) and greater activity in the positive control with an inhibition zone of 26 mm (*E. coli*, *S. aureus*), 27 mm (*B. cereus*, *P. aeruginosa*). The results obtained using MIC showed that *E. hirta* had very high antibacterial activity with the minimum concentration of 15.625 mg/mL while the *P. pellucida* had moderate antibacterial activity between 31.25 mg/mL and 125 mg/mL. The combination plant needed up to 125 mg/mL in some cases. These findings enable the synergistic potential of both plants as natural antibacterial agents.

Keywords: *Synergistic antibacterial, human pathogen, E. hirta, P. pellucida*

INTRODUCTION

The increasing issue of resistant pathogen presents a significant crisis to global public health, requiring immediate research of new antimicrobial treatments. Medicinal plants have previously been studied to offer their medicinal potential and remain viable prospects in developing new antibacterial medicine (Ali et al., 2023). *E. hirta* is often used to treat respiratory and gastrointestinal diseases, and *P. pellucida*, which is common in tropical regions, has known due to its medicinal, antioxidant properties (Tablang et al., 2020). Recently, the research has focused on the importance of synergistic studies, as a combination of natural plant extracts can elevate antibacterial performance and introduce new solutions to drug-resistant infections (Prananda et al., 2024). The pathogenic bacteria such as *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Escherichia coli*, and *Staphylococcus aureus* are increasingly difficult to control with conventional antibiotics (Petrosillo et al., 2019). This study looks at the synergistic activity of *E. hirta* and *P. pellucida* against bacteria.

MATERIALS AND METHODS

Both plants, *E. hirta* and *P. pellucida* were collected, weighed, washed, dry in the oven and was grind to turn it into powder before was used for extraction preparation using a methanol (Basyal et al., 2021). After the extraction process, the phytochemical screening test will be used to detect the presence of specific classes of phytochemicals in plant extracts (Rao et al., 2023). This includes the bioactive compounds like alkaloid, saponin, tannin, flavonoid and steroids. Antibacterial susceptibility test was performed by using the Kirby-Bauer Disc Diffusion Test on Mueller-Hinton Agar (MHA) medium (Punamalai et al., 2021). The Minimum Inhibitory Concentration (MIC) test will be conducted using the broth microdilution method in a 96-well microplate.

RESULTS AND DISCUSSION

Phytochemical Screening

For both plant *E. hirta* and *P. pellucida*, it showed that both plants have a secondary metabolite of alkaloids and saponins while flavonoids and steroids were just presence in the *P. pellucida*. The presence of the secondary metabolites shows that the plant extract can be used to isolate the bioactive compounds and is known to be biologically active (Sharma, 2019).

Antibacterial Activity

Table 1. Results of the Kirby-Bauer Disc Diffusion Test

Plant extract	Concentration, mg/mL	Inhibition zone, mm			
		<i>Escherichia coli</i>	<i>Staphylococcus aureus</i>	<i>Bacillus cereus</i>	<i>Pseudomonas aeruginosa</i>
<i>E. hirta</i>	+ve control	26	26	26	26
	-ve control	NI	NI	NI	NI
	500	8	10	10.5	9.5
	250	6.5	9	9	8
	125	6	6.5	7.5	6
	62.5	NI	6	6	NI
<i>P. pellucida</i>	+ve control	26	26	27	26
	-ve control	NI	NI	NI	NI
	500	NI	NI	NI	NI
	250	NI	NI	NI	NI
	125	NI	NI	NI	NI
	62.5	NI	NI	NI	NI
<i>E. hirta</i> + <i>P. pellucida</i>	+ve control	26	26	27	27
	-ve control	NI	NI	NI	NI
	500	7.5	8	8	8
	250	7	7.5	7	6.5
	125	6	NI	NI	6.0
	62.5	NI	NI	NI	NI

Key: NI – No inhibition

E. hirta indicated the inhibition zone between 6 mm to 10.5 mm with the maximal antibacterial activity against *B. cereus* at the concentration of 500 mg/mL, whereas *P. pellucida* showed limited antibacterial activity and had no diameter of the inhibition zone against bacteria. This suggests that methanol cannot be used in extraction of active antibacterial compounds of *P. pellucida*. The synergistic effect of the two plants with each other showed enhanced antibacterial activity with inhibition zones of 7 to 8 mm at higher concentration (500 mg/mL) suggesting the possibility of the synergistic effect between the two plants.

In the MIC test, *E. hirta* significantly demonstrated good antibacterial effects against all the bacteria species than *P. pellucida*. The combination activity of the two plants did not reduce the MIC values when compared with *E. hirta* alone. The combination of plants may need higher concentration to prevent bacterial development. Therefore, the Kirby-Bauer test showed a synergistic effect stronger than MIC test, which demonstrated that the combination did not enhance the long-term inhibition of bacterial growth.

CONCLUSIONS

This research identifies the antibacterial effect of *E. hirta* and *P. pellucida* on typical human pathogens. *E. hirta* showed a good active antibacterial effect with large inhibition zone and acceptable MIC value, which may indicate that *E. hirta* is a good prospective natural antibacterial agent. Conversely, *P. pellucida* exhibited minimal activity in methanolic extraction and thus it might not be suitable to use methanol to extract its bioactive compounds. However, early research was conducted by using ethanolic extract and it revealed that *P. pellucida* have the inhibition zones therefore confirming to the fact that ethanol is the best solvent to extract the bioactive compounds. There was a potential synergistic effect shown in the Kirby-Bauer test to the two plants combined with each other, as shown by the larger zones of inhibitions but this was not strongly represented in the MIC test. Generally, the results denote that *E. hirta* has greater potential as an antibacterial agent, whereas the combination of the plants can offer additional benefits at higher concentration, particularly in the early phase of bacterial inhibition.

REFERENCES

- Ali, N. A., Pulh, Z. A., Sajid, A., Kumar, S., Naqvi, N. S. H. A., & Sahar, N. U. (2023). Antibacterial Potential and Phytochemical Investigation of Medicinal Plant (*Euphorbia hirta* Linn). *Pakistan Journal of Biotechnology*, 20(01), 83–92. <https://doi.org/10.34016/pjbt.2023.20.01.761>
- Basyal, D., Neupane, A., Pandey, D. P., & Pandeya, S. (2021). Phytochemical Screening and In Vitro Antioxidant and Anti-inflammatory Activities of Aerial Parts of *Euphorbia hirta* L. *Journal of Nepal Chemical Society*, 42(1), 115– 124. <https://doi.org/10.3126/jncs.v42i1.35362>
- Petrosillo, N., Taglietti, F., & Granata, G. (2019). Treatment Options for Colistin Resistant *Klebsiella pneumoniae*: Present and Future. *Journal of Clinical Medicine*, 8(7), 934. <https://doi.org/10.3390/jcm8070934>
- Prananda, A. T., Prayugo, B., Dewi, F., Syahputra, R. A., Velaro, A. J., Harahap, M. a. Y., Taslim, N. A., Tjandrawinata, R. R., & Nurkolis, F. (2024). Unveiling the functional food properties of *Peperomia pellucida*: Phytochemical profiling, antioxidative potential, and their nanoemulsion fraction in wound healing efficacy. *Journal of Agriculture and Food Research*, 16, 101156. <https://doi.org/10.1016/j.jafr.2024.101156>
- Punamalai, G., Muniyandi, K., Sachidhanatham, P., & Kumaresan, V. (2021). Antibacterial activity of *Euphorbia hirta* leaf extracts against some human bacterial pathogens. *International Journal of Botany Studies*, 6(1), 453–456. <https://www.botanyjournals.com/archives/2021/vol6/issue1/6-1-38>
- Rao, A., Kumari, S., Laura, J. S., & Dhania, G. (2023). Qualitative Phytochemical Screening of Medicinal Plants Using Different Solvent Extracts. *Oriental Journal of Chemistry*, 39(3), 621–626. <https://doi.org/10.13005/ojc/390312>
- Sharma, K. R. (2019). Phytotoxic, Antioxidant, Antibacterial, and Antileishmanial Activities of *Euphorbia hirta* from Chitwan District Nepal. *Asian Journal of Pharmaceutical and Clinical Research*, 146–149. <https://doi.org/10.22159/ajpcr.2020.v13i2.36469>
- Tablang, J. O., Campos, R. P. C., & Jacob, J. K. S. (2020). Phytochemical Screening and Antibacterial Properties of Silverbush (*Peperomia pellucida*) Against Selected Cultured Bacteria. *Global Journal of Medicinal Plant Research*, 8(1), 1–4. <https://doi.org/10.22587/gjmplr.2020.8.1.1>



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"

Saya yang menjalankan amanah,

Setuju.

27.1.2023

SITI BASRIYAH SHAIK BAHARUDIN
Timbalan Ketua Pustakawan

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

nar