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ENGINEERING AND TECHNOLOGY
COLLOQUIUM



THE POWER OF SCIENTIFIC INNOVATION

INTELLIGENT SOLUTIONS FOR A
SUSTAINABLE WORLD

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(ISETC 2025)**

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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

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ISETC 2025 Proceedings Editors

TAXONOMIC DESCRIPTIONS AND MORPHOLOGICAL CHARACTERISTICS OF FIVE ORNAMENTAL PLANTS SPECIES FROM UiTM TAPAH CAMPUS GROUND

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Abstract: Plants significantly contribute to campus environments by providing habitat diversity, regulating microclimates, and enhancing landscape aesthetics. However, awareness and understanding of plant identification, ecological roles, and scientific values among campus communities—including students, lecturers, and visitors remain notably low. This study aimed to enhance botanical literacy through the morphological taxonomic identification of five selected ornamental plant species at Universiti Teknologi MARA (UiTM), Perak Branch, Tapah Campus. Identification was based on observable morphological traits such as leaf shape and arrangement, flower form, stem characteristics, and growth habit. Morphological data were systematically collected and compared with authoritative sources, including guidebooks, dichotomous keys, and plant databases, to ensure accurate species identification. Findings revealed that many students were unfamiliar with the scientific names and ecological functions of commonly encountered plants. Challenges were noted particularly in differentiating species with morphological similarities and hybrid varieties, exemplified by the *Bougainvillea* hybrid. Despite these challenges, the study demonstrated that field-based morphological taxonomy is an effective educational tool for diploma-level students, reinforcing observational skills and ecological comprehension. Recommendations include the installation of educational signage with QR codes linking to digital resources to promote interactive learning and sustained awareness of campus biodiversity. This small-scale initiative offers potential for broader application, serving as a foundation for future biodiversity education projects and strengthening plant science teaching within campus environments.

Keywords: *Taxonomic identification, campus flora, plant morphology, biodiversity education, species classification*

INTRODUCTION

Plants are essential elements of ecosystems, playing significant roles in maintaining biodiversity, regulating local microclimates, and enhancing landscape aesthetics (Wäldchen et al., 2022; Oliveira et al., 2025; Arif et al., 2025). Within the Universiti Teknologi MARA (UiTM) Perak Branch, Tapah Campus, various ornamental and native plant species have been intentionally incorporated into campus landscaping. These plants not only contribute to ecological functions but also add significant visual appeal to the campus environment. Nonetheless, many students, lecturers, and visitors remain unaware of the scientific identities, distinct morphological characteristics, and ecological significance of these plants. This lack of botanical awareness and accessible identification resources can limit informal learning opportunities and diminish appreciation for campus biodiversity (Sarkar et al., 2024; Stagg & Dillon, 2023).

Taxonomic identification, the scientific classification and naming of plants based on observable morphological characteristics such as leaf morphology, venation patterns, flower structures, stem types, and growth habits, is critical for biodiversity documentation (Singh et al., 2021; Judd et al., 2022). Morphological taxonomy remains the most accessible and practical method for biodiversity studies, especially at the diploma and undergraduate levels, without necessitating expensive genetic testing (Wäldchen et al., 2022; McManus et al., 2024). Field-based taxonomy enhances ecological literacy by engaging students directly with nature, fostering observational skills, and deepening their understanding of plants and their ecological roles (Gill & Beardall, 2022).

However, plant identification can be challenging due to factors such as hybridization, phenotypic plasticity, and environmental influences that can alter typical plant morphology (McManus et al., 2024; Cronk & Forest, 2023). To mitigate these challenges, educational tools such as QR-coded signage have been recommended to facilitate interactive

learning and raise conservation awareness among students and campus visitors (Sarkar et al., 2024; Stagg & Dillon, 2023; Rahman et al., 2023).

This study aims to address the current gaps by identifying and describing five selected ornamental plant species found on the UiTM Tapah Campus. Morphological characteristics were systematically examined to classify and document each species scientifically. This initiative is intended not only to enhance botanical literacy among students but also to serve as a foundational effort towards improving biodiversity education, supporting environmental stewardship, and potentially guiding future educational outreach through signage development and digital platforms.

MATERIALS AND METHODS

Plant Sampling

Plant sampling was conducted in landscaped and accessible areas within the UiTM Tapah Campus grounds. Selection of species was based on the frequency of occurrence, visual prominence, and accessibility for morphological observation. Based on these criteria, five ornamental plant species were identified and chosen for detailed morphological analysis: *Alternanthera brasiliana* (Purple Joyweed), *Bougainvillea* hybrid (Bougainvillea), *Lagerstroemia indica* (Crape Myrtle), *Ixora coccinea* (Jungle Flame), and *Podocarpus macrophyllus* (Buddhist Pine).

Morphological Observations

Systematic recordings of morphological traits were performed, emphasizing key features. Observations were conducted on leaf characteristics such as shape, arrangement, margin, apex, base, and venation patterns. Flower features, including color, inflorescence type, petal and sepal arrangements, and the presence and appearance of bracts, were documented. Additionally, evaluations of stem and bark determined whether the plants were woody or herbaceous and included descriptions of texture and surface features. Measurements of leaf dimensions—length, width, and petiole length—were carried out using standard rulers or measuring tapes. Multiple photographic records were also captured for each species to support and validate morphological descriptions.

Taxonomic Identification

Species identification was conducted by comparing the observed morphological traits with scientific descriptions found in dichotomous keys, reputable plant databases such as Plants of the World Online, botanical textbooks, and relevant floras. This comparative method ensured accurate confirmation and classification at the species level.

RESULTS AND DISCUSSION

Each of the five species was identified and documented based on distinct morphological traits. The following table summarizes the key diagnostic features:

Table 1. Plant Species Identification and Key Traits

Scientific Name	Common Name	Key Distinguishing Features
<i>Alternanthera brasiliana</i>	Purple Joyweed	Reddish-purple, decussate leaves, non-flowering, herbaceous, smooth bark
<i>Bougainvillea</i> hybrid	Bougainvillea	Brightly colored bracts (purple, pink, white), thorny woody climbing stems, elliptic alternate leaves
<i>Lagerstroemia indica</i>	Crape Myrtle	Exfoliating bark, large 6-petaled flowers, elliptic alternate leaves with arcuate-reticulate venation
<i>Ixora coccinea</i>	Jungle Flame / Ixora	Dense red flower clusters, glossy verticillate leaves, 4-petaled symmetrical flowers, corymb or dichasial cymes
<i>Podocarpus macrophyllus</i>	Buddhist Pine	Needle-like spiral leaves, gymnosperm (non-flowering), woody stems with fissured bark

This project successfully identified and described five selected plant species using morphological observations. However, the findings indicate that many students on campus were unable to recognize plants encountered daily, highlighting low botanical literacy. This observation aligns with Arif et al. (2025), who emphasize the critical role of plant identification in fostering environmental awareness. The study confirmed that vegetative characteristics, such as leaf venation and stem structure, reliably facilitate species differentiation, particularly in instances where floral structures were not present (Wäldchen et al., 2022).

Several challenges emerged during the identification process, notably with the *Bougainvillea* hybrid, where morphological variability due to hybridization complicated accurate classification. Similar difficulties arose from environmental influences affecting plant morphology, corroborating findings by McManus et al. (2024). Despite these challenges, the results reinforced the effectiveness of field-based taxonomy for diploma-level educational purposes, enhancing students' observational skills and ecological comprehension (Bacon, 2023).

Moreover, the selected species provide valuable ecological services within the campus environment. For instance, *Lagerstroemia indica* significantly contributes to shading and microclimate moderation, *Alternanthera brasiliana* offers beneficial ground cover, and *Podocarpus macrophyllus* enriches gymnosperm diversity, presenting opportunities for comparative studies between gymnosperms and angiosperms.

To sustain and extend educational impacts, this study recommends the installation of informative signage boards equipped with QR codes for each identified species. Signage should clearly display common names, scientific names, morphological attributes, and ecological roles. QR codes would further enhance interactive learning by linking directly to online educational resources, effectively promoting ongoing plant education and cultivating long-term biodiversity awareness on campus (Sarkar et al., 2024).

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, this study effectively demonstrated the utility and practicality of morphological taxonomy for identifying ornamental plant species within the UiTM Tapah Campus. Despite challenges posed by morphological variability and environmental influences, the approach significantly enhanced botanical literacy among diploma-level students. The project underscored the importance of campus biodiversity in providing ecological services and educational opportunities. To maximize the educational impact and foster sustained biodiversity awareness, the integration of informative QR-coded signage is strongly recommended. Future studies should continue to broaden species coverage and explore combined morphological and genetic methods to further strengthen plant identification accuracy and ecological education.

REFERENCES

- Arif, W. P., Sari, M. S., & Lestari, S. R. (2025). Unveiling the roots of botanical literacy: A systematic literature review on its concepts and domains. *Eurasia Journal of Mathematics Science and Technology Education*, 21(4), 2612. <https://doi.org/10.29333/ejmste/16121>
- Bacon, K. L. (2023). Investigating student experiences of botanical field work using a semi-immersive virtual botanical fieldtrip. *Journal of Biological Education*, 58(5), 1551–1590. <https://doi.org/10.1080/00219266.2023.2192733>
- Gilbert, K. J., Armitage, D., Bauer, U., Fukushima, K., Gaume, L., Love, R., Lin, Q., Liu, S., Martin-Eberhardt, S., Millett, J., Renner, T., Scharmann, M., & Thorogood, C. (2025). Construction costs and trade-offs in carnivorous pitcher plant leaves: Towards a pitcher leaf economic spectrum. *Annals of Botany*. <https://doi.org/10.1093/aob/mcaf024>
- Nazreen, S., S, A., V, V., & S, A. (2018). Foliar features of *Alternanthera* (Forssk.) species of southern Western Ghats of Kerala. *International Journal of Advanced Research*, 6(7), 144–151. <https://doi.org/10.21474/ijar01/7346>
- Oliveira, A. P., Paramés, A., Bajanca, A., & Martinez-Perez, C. (2025). Higher education students' biodiversity knowledge. *Education Sciences*, 15(4), 499. <https://doi.org/10.3390/educsci15040499>

- Pany, P., Meier, F. D., Dünser, B., Yanagida, T., Kiehn, M., & Möller, A. (2022). Measuring students' plant awareness: A prerequisite for effective botany education. *Journal of Biological Education*, 58(5), 1103–1116. <https://doi.org/10.1080/00219266.2022.2159491>
- Plants of the World Online | Kew Science. (n.d.). *Plants of the World Online*. Retrieved from <https://powo.science.kew.org/>
- Sarkar, P., Gayki, K., Kapgate, H., Ambhore, R., & Dhande, A. P. N. M. (2024). A review on identification and information using QR code in ACE College campus plants. *International Journal of Research Publication and Reviews*, 5(11), 1858–1863. <https://doi.org/10.55248/gengpi.5.1124.3229>
- Stagg, B. C., & Dillon, J. (2023). Plants, education and sustainability: Rethinking the teaching of botany in school science. *Journal of Biological Education*, 57(5), 941–943. <https://doi.org/10.1080/00219266.2023.2264617>
- Turdaliyevich, B. E., Choriyevech, R. K., & Kizi, O. M. Y. (2023). Diseases and pests of *Lagerstroemia indica* L. *Inter-publishing.com*. <https://doi.org/10.51699/ijbea.v2i5.1882>
- Wäldchen, J., Wittich, H. C., Rzanny, M., Fritz, A., & Mäder, P. (2022). Towards more effective identification keys: A study of people identifying plant species characters. *People and Nature*, 4(6), 1603–1615. <https://doi.org/10.1002/pan3.10405>



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



Prof. Madya Dr. Nur Hisham Ibrahim
Rektor
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Tuan,

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Kelulusan daripada pihak tuan dalam perkara ini amat dihargai.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

Setuju.

27.1.2023

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