

Endophytic Fungi of the Mangrove Plant *Avicennia marina* in the Batticaloa Lagoon of Sri Lanka: Diversity and Their Bioactivities

K. Thushanthan^{1, 2}, T. Mathiventhan¹, H. I. U. Caldera², N. N. Wijayawardene³,
K. G. S. U. Ariyawansa²

¹*Department of Botany, Faculty of Science, Eastern University, Sri Lanka*

²*Department of Plant Sciences, Faculty of Science, University of Colombo, Sri Lanka*

³*Center for Yunnan Plateau Biological Resources Protection and Utilization, Qujing Normal University, China*

Mangroves provide essential ecosystem services such as fisheries, coastal protection, carbon sequestration, decomposition, and bioremediation. These distinct ecosystems support diverse fungal communities and help them survive in these unusual environments. This study aimed to assess the richness, composition, and bioactivities of endophytic fungal communities in the mangrove plant, *Avicennia marina*, from the Batticaloa District of Sri Lanka. The Sathurukondan area in the Batticaloa District (7°44'25.1"N 81°39'47.6"E) was selected for initial sampling. A total of 750 leaf segments, 288 stem segments, and 390 root segments from five *A. marina* plants were surface sterilized using 2% NaOCl, and 70% ethanol and placed on PDA media for fungal endophyte recovery. All tissue types yielded 1140 isolates belonging to 40 distinct morphotypes. Endophyte colonization rates for leaf, stem, and root samples were 87.2%, 95.13%, and 62.05%, respectively. The highest Shannon Weiner diversity index ($H' = 2.523$) was observed in plant 5, while the lowest diversity ($H' = 1.6837$) was observed in plant 1. Among the putative endophytic fungal isolates, three demonstrated high salt tolerance (NaCl at 65 ppm), while 27 isolates showed phosphate solubilization ability, which could be useful in agricultural applications where phosphate availability is limited for plant growth. Seven isolates showed promising laccase activity. Laccases can degrade a variety of environmental pollutants, including synthetic dyes, polycyclic aromatic hydrocarbons (PAHs), and endocrine-disrupting chemicals. Moreover, four isolates showed anticancer activity (L-asparaginase test), whereas isolate 37 exhibited a promising level of IAA production (110.18 ppm) under in vitro conditions. These studies have revealed a diverse endophytic fungal community in *A. marina* plants in the sampled region, as well as interesting bioactivities with potential industrial applications.

Keywords: *A. marina*, Endophytic Fungi, Phosphate Solubilization, Morphotype, Bioactivity