Isopod-Driven Microhabitat Engineering on Mangrove Prop Root

E.M.A.N. Ekanayake*, M.P. Kumara
Department of Fisheries and Marine Science, Ocean University of Sri Lanka, Mahawela Road, Tangalle, Sri Lanka
*ekanayakeamandhi@gmail.com

The wood-boring *Sphaeroma terebrans* is well adapted for constructing cylindrical burrows in mangrove prop roots, which are usually oriented perpendicular to the grain of the wood surface. While habitat modification by epibiotic has been widely documented in mangrove, the role of boring isopods as active ecosystem engineers in prop roots of *Rhizophora* spp remains unclear. This study aimed to investigate how burrowing by invasive isopods modifies the physical structure of mangrove prop roots and creates microhabitat mosaics that influence the composition of associated communities, focusing on three mangrove sites in Chilaw Lagoon, Sri Lanka. Burrow length (L), width (W), and isopod data were collected. The burrowing isopod abundance was significantly influenced by combined (burrowing length, burrowing width, and sub-root diameter) prop-root characteristics ($p < 0.05$), where burrowing width was identified as the only significant predictor ($p < 0.01$). Isopod abundance per cm² differed significantly between fringe and riverine mangroves ($p < 0.001$), likely due to the extensive presence of *Saccostrea* sp. in the riverine system, which physically covered large portions of the prop roots and limited available surfaces for isopod colonization. Burrow's presence was restricted to the lowest root zone ($p < 0.05$), where tissues are younger, softer, and exposed for longer durations. In some instances, isopod burrows extended across the full diameter of the prop root, indicating intense bioerosion and deep penetration into host tissues. These burrows facilitated secondary colonization by Asian date mussels, demonstrating a clear sequence of biogenic habitat modification. Infestation intensity is high on prop roots with mean diameters ranging between 2.0 and 2.5 cm. Thus, isopods functioned as ecosystem engineers that physically restructuring the root surface and creating spatially heterogeneous settlement niches for *Arcuatula senhousia.* This biogenic habitat modification altered the availability of microhabitats for colonizing organisms, thereby reorganizing patterns of recruitment, persistence, and community assembly on prop roots. Overall, this study presents the first integrated evidence of microhabitat mosaic formation driven by isopod invasion in mangroves in the world.

Keywords: *Invasive isopods, Ecosystem engineers, Mangrove prop roots, Microhabitat*