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Variation of Foliage Chlorophyll Content with Maturity of Three Mangrove Species: *Rhizophora mucronata, Bruguiera gymnorhiza,* and *Sonneratia caseolaris.*

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Abstract

Mangroves are highly productive coastal ecosystems whose primary productivity is governed by leaf-level photosynthetic activity, closely linked to chlorophyll concentration. Leaf chlorophyll is strongly associated with nitrogen allocation and serves as a reliable indicator of plant physiological status and stress. Accurate assessment of chlorophyll content is therefore essential for evaluating mangrove health and monitoring ecosystem degradation under changing environmental conditions. This study aimed to assess maturity-related variation in leaf chlorophyll content in dominant mangrove species. The study was conducted in the Malgasowitadeniya Mangrove Conservation Forest Reserve, Kalutara District, Sri Lanka, where *Rhizophora mucronata* (RM), *Sonneratia caseolaris* (SC), and *Bruguiera gymnorhiza* (BG) are the most abundant species. Three trees per species were selected across three circular plots. Leaf sampling and tagging were carried out during the rainy season in August 2024. Leaves within each whorl were labelled sequentially from the most mature (L1) to the youngest. Leaf morphological characteristics were recorded, and leaf colour was measured using a 'Lovibond' handheld spectrocolorimeter. Leaf chlorophyll content was quantified using a 'CCM-2000 Plus' portable chlorophyll meter and expressed in chlorophyll content index (CCI) units. Younger leaves exhibited higher chlorophyll concentrations compared to older, senescent leaves. Higher chlorophyll concentrations were recorded in the youngest leaves of BG (45.35±5.87 CCI), RM (33.36±8.93 CCI), and SC (32.57±2.32 CCI). In contrast, senescent leaves showed comparatively reduced chlorophyll levels, with values of 25.91±9.36 CCI in BG, 30.35±8.31 CCI in RM, and 28.85±3.73 CCI in SC. These findings demonstrate clear age-related patterns in leaf chlorophyll dynamics among mangrove species. The study provides valuable insights into mangrove physiological responses to environmental variability and contributes to the development of effective monitoring frameworks for assessing mangrove forest productivity and resilience under climate change.

Keywords: *Productivity, Young, Senescent, Monitoring, Stress, Physiology*