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Variation of Chlorophyll Content of Selected Mangroves from Diverse Salinity Environments on the East Coast of Sri Lanka

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Abstract

Mangroves are unique coastal plants subjected to salinity stress. Seasonal changes in water availability can affect leaf pigments such as chlorophyll and thereby influence physiological functions. Determining the response of chlorophyll content is crucial to assess the adaptability of mangroves to changing environments. The objective of the study was to investigate the response of chlorophyll content of three common mangrove species (*Avicennia marina*, *Excoecaria agallocha*, and *Lumnitzera racemosa)* from diverse salinity sites during wet (WS) and dry seasons (DS) in the Eastern Coast of Sri Lanka. The sites were Sathurukondan (water salinity - WS: 0.6±0.55 ppm; DS: 6.1±0.79 ppm), Thampalagamam (water salinity - WS: 2.9±0.15 ppm; DS: 15.2±0.84 ppm), and Panama (water salinity - WS: 9.6±0.55 ppm; DS: 32.8±0.84 ppm). Field measurements of chlorophyll content (SPAD-502plus) were taken on three plants per species, with fifteen leaves per plant (air temperature: WS 25°C-32°C and DS 32°C-37°C). Data analysis was performed using one-way ANOVA (MINITAB 18). Results revealed that chlorophyll content of *E. agallocha* was significantly higher *($p<0.05$)* compared to other species during both seasons. *A. marina* exhibited significantly lower values at Sathurukondan and Thampalagamam during DS while *L. racemosa* showed the same trend during WS. During the WS, *A. marina* showed a significantly higher value (47.1) at the lowest salinity site while the other species showed similar values across all sites. In the DS, *L. racemosa* and *E. agallocha* showed significantly lower values (44.9 and 48.3) at the high salinity site while *A. marina* showed a similar value across the diverse salinity sites. Only *L. racemosa* showed a significantly higher chlorophyll content in DS than WS across all sites. Overall, *E. agallocha* showed the highest chlorophyll content amongst the species irrespective of season and showed a limited response to salinity variation amongst sites during the wet season. During the dry season it was more responsive while *A. marina* showed a limited response. Thus, the selected species showed distinct chlorophyll responses to salinity across different sites during the wet and dry seasons. This variability underpins the importance of species selection for restoration efforts as their physiological traits may influence their survival and productivity in response to stressors such as salinity. Further, it suggests that species level chlorophyll variability and responses should be considered when using spectral reflectance-based methods such as remote sensing to monitor mangrove health and productivity.

Keywords: *Chlorophyll, Mangroves, Salinity, Season, Physiology*