Proceedings of the Seventeenth Sessions of the Sri Lanka Association for Fisheries and Aquatic Resources, 19th and 20th May, 2011. Auditorium of National Aquatic Resources Research and Development Agency, Colombo 15.

Contribution of mangrove above-ground roots for carbon sequestration function in mangrove ecosystems at Kadolkele in Meegamuwa estuary

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Contribution of mangrove aboveground roots for carbon sequestration function was studied at Kadolkele mangrove stand in Meegamuwa estuary (7°11' N and 79º50' E). The structure of mangrove vegetation was analyzed to determine the effect of structure of mangrove vegetation on carbon sequestration capacity of mangrove aerial roots. Structural parameters were obtained along the three belt transects (10 m x 50 m, 10 m x 70 m, 10 m x 80 m) laid perpendicular to the shoreline. Plant density, stem density, basal area, tree height, species diversity and species richness were analyzed to determine the structure of mangrove vegetation. Prop root, pneumatophores and knee roots are the aerial roots that observed to occur in Kadolkele mangrove stand. Prop roots can be divided into four types, i.e. primary, secondary, tertiary and quaternary roots, depending on their branching pattern and maturity. Organic carbon content in these aerial roots was analyzed using the Walkley-Black method.

When comparing the carbon content per unit dry weight in different types of prop roots, it was higher in primary roots (0.431 C g^{-1}) than that of secondary (0.411 C g^{-1}), tertiary (0.405 C g^{-1}) and quaternary roots (0.363 C g^{-1}). Carbon content per unit dry weight in these prop roots was higher to that of pneumatophores (0.318 C g^{-1}) and knee roots (0.227 C g^{-1}) and there was a significant difference ($p<0.05$) in carbon content among these roots. Results clearly indicate that prop roots highly contribute to carbon sequestration function than pneumatophores and knee roots. In Kadolkele mangrove area, contribution of knee roots for carbon sequestration (517.0 g m^{-2}) was higher than that of prop roots (226.3 g m^{-2}) and pneumatophores (456.2 g m^{-2}), as biomass of knee roots (1686.42 g m^{-2}) was higher than that of prop roots (585.14 g m^{-2}) and pneumatophores (1371.74 g m^{-2}) and showed no significant difference at 0.05 level. Present study reveals the structural changes of mangrove vegetation in three transects and along the gradient from shoreline to land affects the carbon sequestration capacity of aerial roots of mangroves in Kadolkele. Carbon storage capacity of aerial roots per unit area in transect 1 (1322.3 g m^{-2}) and transect 2 (1494.3 g m^{-2}) was higher than that of transect 3 (902.6 g m^{-2}) owing to higher importance value of knee root bearing *Lumnitzera racemosa* in transect 1 and 2. When comparing the carbon storage capacity of mangrove aerial roots per unit area along the gradient from shoreline to land, it was higher in stratum 3 (1398.1 g m^{-2}), the most landward zone than that of stratum 1 (1332.6 g m^{-2}) and stratum 2 (978.5 g m^{-2}).