Impact of Salinity on Organic Carbon Sequestration of Mangrove Soils: A Case Study of Kadolkele Mangrove Ecosystem, Negombo, Sri Lanka

R.P.D.V. Rajapaksha, W. de Silva*
Department of Plant and Molecular Biology, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka
*wasanadesi@kln.ac.lk

Mangrove ecosystems are efficient carbon sinks and provide significant contribution to climate change mitigation by capturing and storing atmospheric carbon. Yet, there need to be more knowledge on the variation of soil organic carbon content and their differential preservation with water-land environmental gradients. As such, the current study was initiated to determine the impact of soil NaCl salinity affects mangrove soils' organic carbon sequestration capacity in the Kadolkele mangrove ecosystem, Negombo estuary. Ten-meter-wide belt transects were laid perpendicular to the shoreline across the water-land environmental gradient in the study area. Each transect was divided into 10 m x 10 m subplots. Soil samples were collected with a split core sampler from a 10 m distance along transects. Samples of mangrove soils were taken from three depths, 0–10 cm, 10–20 cm and 20–30 cm. The total organic carbon content and NaCl salinity were determined using the Walkley Black and Mohr methods. Moreover, we have determined Oxidation and Reduction Potential (ORP) and soil electrical conductivity with Hanna, HI98194 multiparameter. Our result indicated that soil organic carbon varied from 0.055 g/g to 0.009 g/g, and surface soils (0–10 cm depth) contained significantly high amounts of organic carbon content and gradually decreased with increasing depth. The highest soil organic carbon (0.051 ± 0.004 g/g) and NaCl (32.91 ± 3.25 ppt) contents were found in the surface soils on the landward zone of the vegetation. Furthermore, our study revealed that NaCl salinity ($P < 0.001$, $r = 0.92$), ORP ($P < 0.001$, $r = 0.36$), and soil electrical conductivity ($P < 0.01$, $r = 0.75$) had shown a significant positive impact on soil organic carbon content. As such, salinity is important in shaping carbon dynamics in mangrove ecosystems.

Keywords: *Soil NaCl salinity, Organic carbon content, Mangrove soils, Oxidation and Reduction Potential, Kadolkele*