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Development of Best Fit Models Based on Allometric Equations to Predict the Clear Bole Height Stem Carbon Content of *Rhizophora mucronata* in Kadolkele and Rekawa Mangrove Forests

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Abstract

Mangrove forests can play an important role in carbon removal as they are considered as one of the most carbon-dense ecosystems in the world. The objective of the present study was to develop allometric equations to estimate the stem carbon content of *Rhizophora mucronata* in Negombo and Rekawa mangrove forests. Kadolkele mangrove forest is a planted mangrove forest located in the wet zone and Rekawa mangrove forest is a natural mangrove forest located in the intermediate zone. Fortyfive trees of *R. mucronata* were selected from each mangrove forest. Stem core samples were obtained from each tree and their dry weights were measured. The organic carbon content of stem core samples was determined using loss on ignition method. This study used stem Diameter at Breast Height (DBH), Clear Bole Height of the stem (CBH), Crown Height (CH), Total Height (TH), Leaf Area (LA) of *R. mucronata* to develop allometric equations to estimate clear bole height stem carbon content. For each site, 75% of data were used for model construction and 25% were used in model validation. Stepwise regression model with backward elimination was used to develop the best fit model to predict the clear bole height stem carbon content. MINITAB 14 statistical software was used in statistical analysis. Results showed that clear bole height stem carbon content of *R. mucronata* can be determined using DBH. The best fit allometric equation of stem carbon content for *R. mucronata* in Rekawa was lnc=-1.686+1.997 ln DBH with a reliability of 80.60%. In Negombo, the best fit model was ln c=-3.125+2.522 ln DBH with a reliability of 77.9%. The common best fit model for *R. mucronata* (after the combination of two forests data sets) was ln c=-2.403+2.247 ln DBH with a reliability of 76.17%.

Keywords: Allometric equations, Mangroves, Stem carbon, Sri Lanka