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Estimating the Biomass and Carbon Stocks in Dominant Tree Species in Wet Zone Homegardens of Sri Lanka

Marambe Y.H.B.[1*], Ranasinghe D.M.H.S.K.[1], Wahala W.A.S.B.[2]

[1]Department of Forestry and Environmental Science, Faculty of Applied Science, University of Sri Jayewardenepura, Nugegoda, Sri Lanka
[2]Department of Tourism Management, Faculty of Management, University of Sabaragamuwa, Belihul Oya, Sri Lanka
**myoshan@yahoo.com*

Abstract

Homegardens in Sri Lanka are a dynamic food production system and continues to be a major land use practice in the island evolving from one generation to another. Generally maintained as a family property, homegardens account for around 13% of the total land use in the country. Homegardens in general offer several ecosystem services including climate regulation, enhance biodiversity, as well as improve land productivity and increase crop diversity. Due to its rich tree diversity and density, smallholder homegardens in Sri Lanka can be considered as a system capable of contributing to the storage of atmospheric carbon at a significant level. The aim of the present study was to estimate the mean carbon stock of each dominant tree species in the homegardens of low, mid and up country wet zone. The specific districts selected for the study were Kalutara, Kandy and Nuwara Eliya representing low, mid and up country wet zone. Three homegardens were selected from each district based on their visually observed diversity. These homegardens ranged from 0.5 acres to 3.0 acres and the entire homegarden was taken for assessment. The diameter at breast height (dbh) and Total height (up to the tip of the crown) were taken in all the trees and using Importance Value Index (IVI) equation; Important Value Index (IVI)=Relative Density+Relative Basal Area+Relative frequency the dominant trees in the homegarden which contribute significantly to the carbon stock were identified. The results indicated that the dominant trees in the low country wet zone were *Cocos nucifera, Hevea brasiliensis, Mangifera indica, Swietenia macrophylla, Dillenia retusa, Artocarpus heterophyllus, Alstonia macrophylla, Areca catechu.* The dominant tree species in the mid country wet zone homegardens were *C. nucifera, A. heterophyllus, M. indica, S. macrophylla, Syzigium aromaticum, Durio zibethinus.* The dominant tree species in the up country wet zone homegardens were *A. macrophylla, A. heterophyllus, C. nucifera, M. indica, S. macrophylla, S. aromaticam.* The aboveground biomass of each tree was estimated using an allometric equation which incorporated the wood density, dbh and tree height, where the wood density of each species was taken from literature. As the study did not use destructive sampling, the root shoot ratio was taken as 6:1. Finally the total biomass (sum of both the aboveground and below ground biomass) and the total carbon stock was calculated for each tree using the equation; W_C=W*0.5 where, W_C is the amount of carbon produced and W is the amount of total biomass produced.

Keywords: Homegarden, Biomass, Carbon stock, Wet zone. Climate regulation