Construction of Allometric Relationships to Predict Growth Parameters, Stem Biomass and Carbon of *Eucalyptus grandis* Growing in Sri Lanka

S.M.C.U.P. Subasinghe[*]

Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Sri Lanka

Date Received: 04-06-2015 Date Accepted: 26-10-2015

Abstract

Enhancement of carbon storage through the establishment of man-made forests has been considered as a mitigation option to reduce increasing atmospheric CO_2 levels. Therefore the present study was carried out to estimate the biomass and carbon storages of the main stem of *Eucalyptus grandis* using allometric relationships using the plantations of Nuwara Eliya and Badulla districts in Sri Lanka. Tree diameter and total height were measured for the samples trees and stem volume was estimated using a previously built individual model for the same species. Stem biomass was estimated using core samples and carbon was determined using Walkley-Black method. Finally the biomass values were converted separately to the carbon values. Non-liner regression analysis was employed for the construction of models which had age as the explanatory variable. Linear regression was used in order to build the models to predict the above ground and stem biomass and carbon using volume as the explanatory variable. For both linear and non-linear types, the model quality was tested using R^2 and fitted line plots. According to the results, stem biomass and carbon values at the 7^{th} year were 110.8 kg and 68.7 kg respectively. Stem biomass and carbon values at the 40^{th} year were 1,095.8 kg and 679.4 kg respectively. Carbon content at the age 20 was 62.0% from the stem biomass. Exponential models were proven to be better than the logistic models to predict the diameter, height, stem volume, biomass and carbon with age. R^2 values and the fitted line plots indicated that the selected models are of high quality. Linear models built to predict the stem biomass and carbon using stem volume also showed the high accuracy of these models which had R^2 values above 97.9%.

Key words: Eucalyptus grandis, forest biomass, forest carbon, allometric equations