(60)

Prediction of Diameter and Height of Rubber from Tree Age

Fernando P.D.H.[1*], Subasinghe S.M.C.U.P.[1], Lokupitiya R.S.[2]

[1]Centre for Forestry and Environment, Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Nugegoda, Sri Lanka
[2]Department of Statistics, University of Sri Jayewardenepura, Nugegoda, Sri Lanka
**pdhfernandez@gmail.com*

Abstract

Hevea brasiliensis (rubber) is one of the main economic crops in Sri Lanka which is cultivated primarily for latex production. Rubber tree is also a valuable source of fuel and timber used in wood-based industries such as medium density fiberboard manufacturing. Due to high economic value of rubber latex and wood, it is important for the plantation managers to have a reliable mechanism to monitor the growth of those trees in the plantations. Therefore, this study aimed at building mathematical models to predict the tree diameter at breast height (dbh) and total height of rubber with the tree age from the plantation establishment to the uprooting stage. Data collection was done at Halpe and Salawa rubber estates located in the low country wet zone. Dbh and total height measurements were collected from six age classes from 4 to 31 years, at each estate. Twenty trees were measured from each age class totaling to 240 tree measurements. After observing the distribution of both dbh and total height with tree age, two forms of non-linear models, viz., Michaelis-Menten and power-law, were selected for model construction. First, data collected from Halpe and Salawa estates were separately fitted to the selected two model forms and residuals were statistically compared. Since there were no significant differences of the residual values in the two sites for both dbh and height, the data were pooled and re-fitted to the selected models. The quality of the models were determined using both qualitative tests by standard residual distribution and quantitative tests by coefficient of determination, average model bias, mean absolute difference and modelling efficiency. Validation of the finally selected models was done using data reserved at the beginning which were not used for model construction. Finally, Michaelis-Menten models for dbh and height prediction of rubber were selected based on its higher performance than the power-law model.

Keywords: *Hevea brasiliensis*, Michaelis-Menten, Allometric model, Modelling efficiency, Residuals

Acknowledgement: Authors acknowledge the assistance of Pussellawa Plantations Limited