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Predictive models for biomass and carbon stock estimation in *Psidium guajava* on bouldery riverbed lands in North-Western Himalayas, India

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Abstract *Psidium guajava* Linnaeus., popularly known as 'Apple of Tropics' is one of the major fruit crops undertaken on the bouldery riverbed lands of North-Western Himalayan region. Different predictive models were fitted to establish a functional relationship between biomass and collar diameter (CD) of the tree. Out of seven different models attempted viz, Monomolecular, Logistic, Gompetz, Allometric, Rechards, Chapman and Linear, Allometric model ($Y = a X^b$ where Y = total biomass, X = collar diameter, a and b = parameter estimates) fulfills the validation criteria to the best possible extent and is considered as best performing. Allometric model has been fitted to find the relationship between biomass of different tree components and collar diameter. All the equations indicated high correlation between biomass and collar diameter and the R^2 values for the fitted functions varied from 0.89 to 0.99. The calculated t-statistic values for all the components found to be non-significant ($p > 0.05$) which clearly reveals the validity and reliability of the model. The developed allometric models were used to estimate the biomass and carbon stocks of *P. guajava* plantations of the study site. The estimated total biomass varied from 1.43 Mg ha^{-1} in 4 year to 40.54 Mg ha^{-1} in 14 year old plantation. Mitigated carbon varied from 0.26 in 4 year to 7.75 Mg ha^{-1} in 14 year of plantation. The total biomass carbon stocks varied from 0.48 Mg ha^{-1} (4 year) to 13.66 Mg ha^{-1} (14 year) guava plantation.

Keywords Allometric · Biomass · Carbon · Degraded lands · *Psidium guajava* · Predictive models

Introduction

Global warming is one of the most burning issues that require immediate attention to save our mother earth from continuous rise in anthropogenic GHGs emission (Canadell et al. 2007; Raupach et al. 2007). Carbon