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RESEARCH PAPER

Diameter-age growth curve modelling for different multipurpose tree species in dryland of North Karnataka

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Abstract : Among 12 multipurpose tree species tested for predicting diameter at breast height (DBH) and age relationship under agroforestry systems of northern dry zone of Karnataka, Gomptertz model showed best fit for 9 species *viz.*, *Acacia nilotica*, (R^2 = 0.9938), *Bahunia purpurea* (R^2 = 0.9950), *Dalbergia sissoo* (R^2 = 0.9944), *Eucalyptus citriodara* (R^2 = 0.9983), *Eucalyptus hybrid* (R^2 = 0.9988), *Hardwickia binata* (R^2 = 0.9969), *Inga dulce* (R^2 = 0.9931), *Syzygium cumini* (R^2 = 0.9976) and *Tamarindus indica* (R^2 = 0.9953), where as, Exponential model for 2 species and only one species showed its fitness to Weibull model. Hence, Gompertz model can be best adopted while predicting diameter and age growth of native species grown under dry land situation.

Key Words : DBH, Age, Model, Species, Growth

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INTRODUCTION

Tree height and diameter relationship is an important component in yield estimation, stand description, and damage appraisals (Parresol, 1992). Many height and diameter equations have been developed for various tree species (Curtis, 1967; Wykoff *et al.*, 1982; Huang *et al.*, 1992). Among the variety of mathematical equations, sigmoidal or non-linear growth functions are widely used in developing tree height and diameter equations. Foresters often use height-diameter models to predict total tree height (c-I>) based on observed diameter at breast height (DBH) for estimating tree or stand volume and site quality. Therefore, estimations of tree or stand volume and site quality rely heavily on accurate height-diameter functions. The general diameter/age relationship is represented by the cumulative growth curve (CGC) which is sigmoidal for biological systems.

Growth models assist forest researchers and managers in many ways. Some important uses include the ability to predict future yields and to explore silvicultural options. Models provide an efficient way to prepare resource forecasts, but a more important role may be their ability to explore management options and silvicultural alternatives. For example, foresters may wish to know the long-term effect on both the forest and on future harvests of a particular silvicultural decision, such as changing the cutting limits for harvesting. With a growth model, they can examine the likely outcomes, both with the intended and alternative cutting limits, and can make their decision objectively. The process of developing a growth model may also offer interesting and new insights into the forestry. Growth models may also have a broader role in forest management and in the formulation of forest policy. The same could be used as an advantage and in conjunction with other resource and environmental data, to make prediction, formulate prescriptions and guide forest policy decisions into stand dynamics. Hence, looking to the importance of growth models in forestry, the present study was carried out to develop growth models for different multipurpose trees under dry land conditions of north Karnataka.

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