



TREE ALLOMETRY: CROWN DIMENSIONS VERSUS TRUNK DIAMETER IN FOUR HARDWOOD- AGROFORESTRY SPECIES OF KUMAUN FOOTHILLS

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ABSTRACT: Trees demonstrate considerable variations and flexibility in their crown dimensions viz. crown length, crown diameter, crown height, crown projection area, crown percent and crown spread ratio etc. along with height and trunk diameters. These crown characteristics vary over time and are closely associated with photosynthetic capacity of a tree. Allometry can be applied to investigate relationships between crown dimensions and trunk diameter. In this article, the above relations were evaluated in four hardwood- agroforestry species viz. *Dalbergia sissoo*, *Tectona grandis*, *Azadirachta indica* and *Emblica officinalis* growing at village Semal Khaliya (Ramnagar Block) which is situated in Bhabhar belt of Kumaun Himalaya. A 4- parametric Richard's function was applied to link trunk diameter with crown dimensions. Results confirmed strong correlations between trunk diameter and crown characteristics ($R^2_{adj.}$ ranging from 0.694 – 0.998) in all the four species. However, $R^2_{adj.}$ varied drastically when crown height was regressed against trunk diameter. Least value (0.694) was observed in *Tectona grandis* and highest value (0.923) was observed in *Dalbergia sissoo*. Residual analysis displayed no outliers and the data was found to be normally distributed. Model parameters were statistically significant.

Keywords: Allometry, crown dimensions, Kumaun Himalaya, Richard's function, trunk diameter

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INTRODUCTION

A tree crown is often considered as a part of tree bearing green foliage and live branches (Helms, 1998). Photosynthesis occurs in leaves and the end product i.e., photosynthate translocate through the crown branches from the leaves to the remaining part of a tree. In return, water and

mineral nutrients absorbed by the roots are transferred through the trunk to branches and leaves. A tree crown therefore represents the aboveground spatial requirements needed for a tree to grow, survive and reproduce (Kärner and Kozłowski, 1979). Crown dimensions have two main components: crown shape and size. Crown shape is influenced by genetic and physical