

## Comparison of some segmented taper equations for Brutian Pine

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**Abstract:** Brutian pine (*Pinus brutia* Ten.) forests are economically and ecologically one of the most important forests in Turkey, where they constitute large forest areas and occupy approximately 5.9 million ha, with a current standing volume of approximately 270 million cubic meters (GDF, 2012). In this context, knowing the state and limitations of growth and yield of Lebanon cedar forests in the Taurus Mountains is necessary for improving future management and planning strategies of timber resources. However, information regarding growth and yield is currently lacking in Turkey. Taper models are one of several necessary components in modern forest inventory and/or management planning systems, giving information on diameter at any point along the tree stem. This information can be used to estimate stem volume and to assort the structure of the tree. This study aimed to assess the performance of segmented taper equations for predicting tree diameter at a specific height, height to a specific diameter, merchantable volume and total tree volume for Brutian pine (*Pinus brutia* Ten.). Ten commonly used and well-known segmented taper functions were evaluated: Max and Burkhart (1976), Clark et al. (1991), and Fang et al. (2000) models. Appropriate statistical procedures were used in model fitting to account for the problems of autocorrelation and multicollinearity in the hierarchical data that are associated with the construction of taper models. The compatible segmented model of Clark et al. (1991) was superior to the other equations in describing the stem profile, estimating height to a specific diameter, and merchantable volume for Lebanon cedar when upper stem diameter measurements were available, while the taper equation of Fang et al. (2000) performed well when those measurements were unavailable. The equations developed in this study are fundamental tools for use in forestry practices and can be help forest managers in the area of study.

**Keywords:** Taper model, Segmented model, Volume systems, Brutian pine