Model for Tree Volume Estimation and Determination of Root-Shoot Relationship and Biomass Production of *Annona Glabra* in Thalangama Tank, Sri Lanka

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Abstract

Tree volume is one of the most important and difficult variable in an ecosystem. It has to be predicted using a reliable method since all the management decisions are taken on the volume production of the tree. *Annona glabra* is a widely spread invasive species which can significantly impact native communities and ecosystems in Sri Lanka by widely reducing biodiversity. The objectives of the study were to (a) construct a volume predication model, (b) determination of the root and shoot ratio, (c) measure biomass of *A. glabra*, and root: (d) determine shoot variation with DBH, tree height and tree volume of *A. glabra* for making suitable management decisions. Random sampling was used in 0.01ha sample plots on Thalangama tank to collect the data of 60 individual trees stratified by age into two age classes of 7 years (2009-2016) and 12 years (2004–2016). All the reliable tree measurements of each tree were measured by using standard methods. Using these measurements, log volume was estimated by Newton's formula and the volume of final section was calculated by assuming as a cone. The tree volume was then calculated by adding all the section volumes together. Total biomass was estimated using fresh weight and dry weight of destructive tree samples. Estimated mean total tree biomass for 7 years and 12 years old *A. glabra* were 6.98 kg per tree ($\pm$0.42) and 7.59 kg per tree ($\pm$0.40) respectively. Estimated root: shoot ratio for 7 years and 12 years *A. glabra* in Thalangama tank area were 1: 2.6 and 1: 2.4 respectively. Model for tree age prediction was built as a function of tree height while tree volume prediction model was built as a function of tree height and basal area using SPSS. The best models were selected based on R^2 value and distribution of the standardized residual. Accordingly, selected models for tree age and tree volume with the R^2 values were 94% and 92% respectively. Finally, it is recommended that the volume prediction model of *A. glabra* able to use as management decision tool in Sri Lankan wetlands.

Keywords: *Annona glabra*, Biomass, DBH, Invasive species, Tree volume prediction
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