

Modeling of leaf area of three Afromontane forest tree species through linear measurements

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ABSTRACT:

Leaf area is an important parameter for evaluating growth, development and competitive ability of forest trees. Destructive methods of leaf area determination often require substantial financial investment and technical knowledge, both of which are unavailable in some developing countries and most parts of others. The aim of this study was to develop linear regression models for the non-destructive determination of leaf area of three Afromontane forest tree species (*Cordia millenii* Bak., *Gmelina arborea* Roxb. and *Entandrophragma angolense* (Welw.) C.DC.). Leaf samples were collected from trees in the Tubah Upland Forest in the Bamenda Highlands of Cameroon. Leaf length (L), maximum leaf width (W), and leaf area (LA) were determined. Linear regression analysis was conducted between LA as dependent variable and L, W, LW, L², W², L²W, LW² as independent variable and F-test was used to test for significance of the model. Goodness-of-fit was evaluated from the coefficient of determination (r^2) and Root Mean Square Error (RMSE). Values of predicted leaf area were then plotted against those of the observed leaf area. The findings showed that the leaf area of *C. millenii*, *G. arborea* and *E. angolense* can be reliably determined from the models $LA = 471.59 + 0.10LW^2$ ($r^2 = 0.85$, RMSE = 170.91, $p = 0.00$), $LA = -972.63 + 110.90W$ ($r^2 = 0.92$, RMSE = 102.72, $p = 0.00$), and $LA = -31.81 + 2.88LW$ ($r^2 = 0.97$, RMSE = 66.00, $p = 0.00$), respectively. Further studies involving additional formulae derived from L and W are, however, encouraged.

Keywords:

Leaf size, Leaf dimensions, Montane forest, Linear regression.