On Hyperbolic Gompertz Growth Model (HGGM)

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Abstract : We proposed a Hyperbolic Gompertz Growth Model (HGGM), which was developed by introducing a stabilizing parameter called θ using hyperbolic sine function into the classical gompertz growth equation. The resulting integral solution obtained deterministically was reprogrammed into a statistical model and used in modeling the height and diameter of Pines (Pinus caribaea). Its ability in model prediction was compared with the classical gompertz growth model, an approach which mimicked the natural variability of height/diameter increment with respect to age and therefore provides a more realistic height/diameter predictions using goodness of fit tests and model selection criteria. The Kolmogorov-Smirnov test and Shapiro-Wilk test was also used to test the compliance of the error term to normality assumptions while using testing the independence of the error term using the runs test. The mean function of top height/Dbh over age using the two models under study predicted closely the observed values of top height/Dbh in the hyperbolic gompertz growth models better than the source model (classical gompertz growth model) while the results of R2, Adj. R2, MSE, and AIC confirmed the predictive power of the Hyperbolic Monomolecular growth models over its source model.

Keywords : height, Dbh, forest, Pinus caribaea, hyperbolic, gompertz

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