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Investigation of a best fitting mathematical model for the frequency of occurrence of *Trichoderma harzianum* in Hakgala Montane Forest in Sri Lanka

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Trichoderma is a genus commonly found in the soils of all climatic zones. All most all the species of *Trichoderma* can produce antimicrobial antibiotics and are good competitors of fungal pathogens, which promote plant growth, enhance stress resistance and induce disease resistance in plants. Interactions between plants and *Trichoderma* are ecologically important. Moreover, this genus is economically much important because *Trichoderma* has been used as a biofertilizer and bio pesticide. In the present study, the attention is given to *Trichoderma* species: *Trichoderma harzianum*. The aim of this study was to detect a proper mathematical model to investigate the frequency of occurrence of fungus; *Trichoderma harzianum* in Hakgala Montane Forest in Sri Lanka at any period of time. Data for the frequency of occurrence of *Trichoderma harzianum* were collected at once in three months intervals from the decomposing leaf litter of Hakgala Montane Forest in a previous study. Significance of the data was checked using the ANOVA test. Data were tested with five mathematical models (Exponential, Logistic, Gompertz, Brody, Von Bertalanffy) and parameters estimated using the nonlinear least square method in R Studio software. The models were tested for goodness of fit using the adjusted coefficient of determination (R^2), Akaike's information criterion (AIC) and Bayesian information criterion (BIC). The logistic model provided the best fit of the data due to the highest value of R^2, lower values of AIC and BIC than other models. The developed logistic model revealed 0.549% for the growth rate of *Trichoderma harzianum* in Hakgala Montane Forest. Since the Hakgala Montane Forest is an undisturbed natural ecosystem with its equilibrium stage this proposed model can be used to investigate the frequency of *Trichoderma harzianum* at any time period even for future predictions.

Keywords: ANOVA, Coefficient of determination, Frequency of occurrence, Logistic model, *Trichoderma harzianum*