ABUNDANCE PATTERN OF LAND SNAIL IN KNUCKLES FOREST

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Introduction

Species diversity measures can be divided into three main categories namely species richness indices, indices based on the proportional abundances of species, and species abundance models which describe the distribution of species abundances (Magurran, 1988). Abundance distribution utilizes all the information gathered in a community, and it is the most complete mathematical description of the data.

A diversity index is an attempt to give a one- dimensional description of this structure. Hill (1973) has defined a family of functions of the species relative abundances which contains the Simpson and information diversity index, and the total species count as special cases.

Diversity measures are based on the (Kempton, 1979) pattern of abundance of those species with medium abundance which give undue emphasis to neither very common nor rare species are found to be most consistent. Different diversity indices may give inconsistent orderings of a group of communities. Adopting a parametric distribution to describe the species frequencies allows efficient standardization for differences in sample sizes. It is suggested that the separation of diversity into two components representing species richness and evenness is seldom justified on available data.

The objective of this research is to find out the abundance pattern of land snails in knuckles forest region.

Data Collection

For this purpose, secondary data collected by the third author was used. Data had been collected from several areas covering both natural and cultivated areas. Specially, the gradient of the floor is the main factor considered in selecting the sampling areas. Montane forest (MF), submontane forest (SMF), montane zone cardamom (MZC), submontane zone cardamom (SMZC), submontane zone grassland (SMZG), intermediate zone forest (IZF), intermediate zone home gardens (IZHG) are the selected zones. The variables in the data set are the number of snails in a plot of size $100\text{m} \times 2\text{m} \times 1\text{m}$ (length $\times$ breadth $\times$ depth) type of species, family to which observed individual belongs and some other factors namely elevation, slop of the ground, Ph value of soil, canopy height, canopy density, leaflitter, open, rockface, number of rocks, grass, ferns, strobe, logs, and dead trees in the plot.

Methodology

Species abundance data will frequently described by one or more family of probability distributions. However the diversity is examined in relation to four main models called the log normal distribution, the geometric series, the logarithmic series and MacArthur's broken stick model (Magurran,1988). The geometric series can be applied to represent the progression ranging when few species are dominant with the remainder fairly uncommon. The log normal distribution and log series well represent the species where intermediate abundance become more common, and broken stick model is suitable to represent the pattern of the species in which species are as equally abundant as is ever observed in the real world. The hypothetical shapes of the each series are given in Fig. 1.

Four models geometric (Geo), log series (L.S), truncated log normal (T.L.N.) and broken stick (B.S) were fitted for data in each zone and then suitability of the fitted models were tested with the observed patterns. The most suitable model was selected based on four criterions Chi square statistics, correlation between expected and observed frequencies, AIC and BIC. If the test statistic is greater than the corresponding table value, null hypothesis is rejected.

When correlation test is used, p-value should be less than the significance level to reject the null hypothesis. Further, model that give the minimum value of AIC and BIC is the most suitable model for the data representation.

Results and Discussion

Goodness of fit of all models was tested using following two hypotheses.

H_0:Data follows the required model.

Vs

H_1:Data doesn't follow the required model.

Required hypothesis for correlation test is

H_0: No correlation exits between fitted values and observed values.

Vs

H_1: Correlation exits between fitted values and observed values.

Results in Table 1 are for the montane forest. According to the Chi- square test, test values of geometric and truncated lognormal distributions are less than the corresponding table values, while test statistics values of other models are greater than the table values. The null hypothesis for geometric and truncated log normal is not rejected, and therefore it can be concluded that geometric and truncated log normal distribution fit well with data in montane forest area and other models do not fit well.

According to the results of correlation test, it can be seen that p- value of geometric series is less than the significance level 5% and p-values of other models are greater than the significance level. Also Geometric model shows the minimum AIC and BIC. Hence the most suitable model for the data in montane forest is geometric series.

Similarly the respective models were fitted for the data in other zones separately. The suitability of each model in representing data in each zone is given in Table 2. Zonewise proportion of suitability of models is in the last row of this table. Results show that geometric series well fit data in every zone. Other models do not represent the data in all zones with compared to geometric series. Log series and log normal models represent the data in only few zones.

Broken stick model shows a large deviation. Therefore the most suitable model that represents data well is the geometric. That means few species of snails are dominant with the remainder fairly uncommon

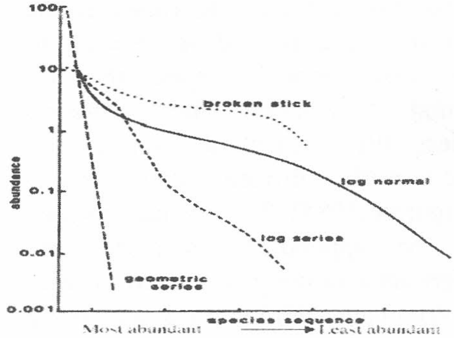

Fig. 1. Hypothetical shapes of series.

Table 1. Results of model fitting for data in montane forest

Model	Chi-square test			Correlation test			Other	
	Test statistic	Table value	Conclusion	r - value	P- value	Conclusion	AIC	BIC
Geo:	2.73	30.14	**Accepted**	0.964	**0.00**	**Accepted**	220.45	222.01
L.S.:	20.11	11.07	Rejected	0.635	0.09	Rejected	402.73	405.84
T.L.N:	11.11	15.50	**Accepted**	0.022	0.95	Rejected	247.87	250.98
B.S.:	39.91	14.06	Rejected	0.172	0.68	Rejected	330.96	330.96

Table 2. Suitability of the models

Zone	Models			
	Geo.	L.S.	T.L.N.	B. S.
MF	**ok**	no	**ok**	no
SMF	**ok**	**ok**	no	no
MZC	**ok**	**ok**	**ok**	**ok**
SMZC	**ok**	**ok**	**ok**	no
SMZG	**ok**	**ok**	**ok**	no
IZF	**ok**	no	no	no
IZHG	**ok**	no	**ok**	no
Proport.	**7/7**	**4/7**	**5/7**	**1/7**

References

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