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Paradox of inverse relationship between species richness and abundance in the population of Bihar hairy caterpillar, *Spilosoma spp.*of Saharsa, Bihar, India.

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Abstract: In the natural distribution of species population, there exist a paradoxial relationship between richness and abundance. The paradox has been investigated in terms of inverse relationship between the species richness & abundance in the population of Bihar hairy caterpillar, *Spilosoma spp*. surveyed & sampled from urban area of Saharsa district, Bihar. This peculiarity amounts to the logarithmic relationship in the statistical computation of species diversity as per Shannon Wiener equation[1].

Key words: Species richness, abundance, logarthmic inverse relationship, S.W index.

INTRODUCTION

Obeying the natural principle of inverse relationship between quality and quantity in the organization of the material world, the distribution & occurrence of various species of Bihar hairy caterpillar, *Spilosoma spp*. have been found to reflect a paradox. In a natural system, if the quality of some component is high, its quantity will be low and vice- versa. Very rarely, both the parameters are unidirectional, because of the fact that the driving energy force of the system always operate in terms of thermodynamic principle[1,2,3,]

It is hard to understand that the qualitative performance of a species is limited to few individuals of species and a huge number of individuals may not perform well as they exist like crowd thriving and exploiting the natural resources.

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In population biology and statistical computation of abundance and richness of any species, this peculiar phenomenon of paradox can be easily observed through application of standard indices of relative abundance and species diversity. As a matter of fact these two entities are indicators of quantity & quality of species which are inversely or logarithmically related to each other as envisaged by German scientist- Claud E. Shannon & Norbert Wiener in 1949. They proposed an extraordinary information theory and established an index to measure the abundance of individuals of a species as well as abundance of different species in an ecological system. Chronologically the place of Norbert Wiener has been taken over by Warren Waver in 1953 and hence Shannon Wiener index is also recognized as Shannon Weaver index[5,6,7].

MATERIAL & METHODS

In the present investigation, various species of *Spilosoma* has been surveyed and sampled from different pockets of agricultural fields of Saharsa district through quadrate sampling and random netting methods. The numerical count of the individuals in live condition during sampling and the qualitative species identification were done on the spot as far as possible. Barring few representative individuals which were brought in the lab, rest of the members in live condition were released back to the nature as per ethical rule. As per random sampling of various species of *Spilosoma*, the natural distribution of the eight species obtained during the sampling has been displayed in the Fig.1 of four zones of urban area of Saharsa district map. the same has also been furnished in the presence absence Table.1. Fig.2 displays the percentage occurence of *Spilosoma* spp. on their zone specific presence absence trend. The number of individuals counted in each quadrate sampling or netting and their species identity have been presented in the raw data table no. 1. Table no. 2 reflects the statistical computation of species wise relative abundance whereas Shannon Wiener diversity has been presented in the table no.3. The graphical representation of rank abundance curve has been furnished in the figure of the histogram.

Following statistical tools have been used for the purpose:

a) S.W. diversity index: -

H= “ pi log pi

Where,

H = species diversity,

Pi = mean of individual species procured by the formula n/N,

log pi is the log product of pi (mean of individual species).

b) Relative abundance = ni/N x 100

Where,

Ni = number of individuals of a species.

N = number of individuals of total number of species

All these statistical computation provide an important information that the higher number of species existing in a particular quadrnt eliminates the possibility of occurrence of more different species whereas contrary to this, occurrence of more number of species in the particular quadrnt does not allow the higher population build up of individuals of a particular species.

RESULT & DISCUSSION

Fig I: Zone-wise, distribution of *Spilosoma* spp. sampled from four zones of urban area of Saharsa district (map in the background).

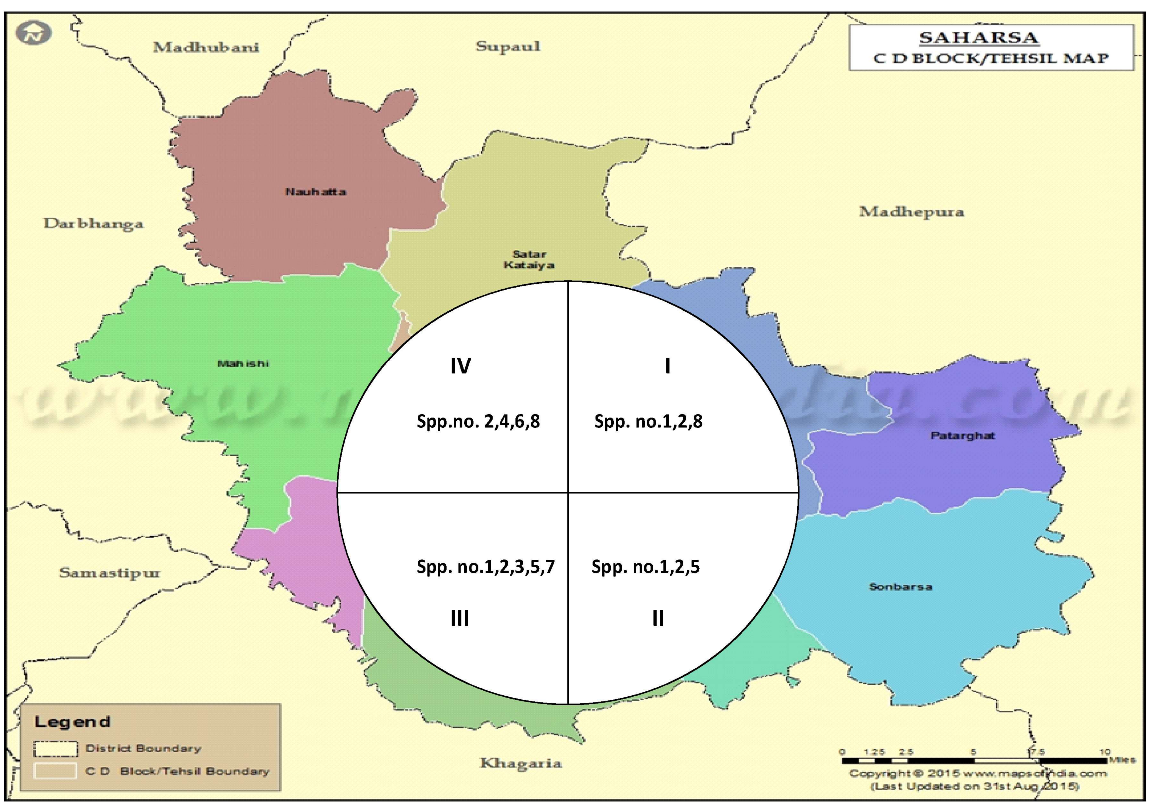

Table-1. Presence-absence table of *Spilosoma* sampled from four different zones of urban areas of Saharsa district with % of occurrence.

Serial no.	species	Zonewise presence & absence of species frequency				% occurrence
		Zone 1	Zone 2	Zone 3	Zone 4	
1	*Spilosoma congrua* (agreeable tiger moth), Walker	+	+	+	-	75
2	*Spilosoma fuscipennis,* Hampson	+	+	+	+	100
3	*Spilosoma virginica* (yellow bear), Fabricius	-	-	+	-	25
4	*Spilosoma erythrozona* (box tree moth), Kollar	-	-	-	+	25
5	*Spilosoma urticae* (water ermine),Esper	-	+	+	-	50
6	*Spilosoma lubricipeda* (white ermine),Linnaeus	-	-	-	+	25
7	*Spilosoma erythrophleps*,Hampson,	-	-	+	-	25
8	*Spilosoma obliqua* (jute hairy caterpillar), Walker	+	-	-	+	50

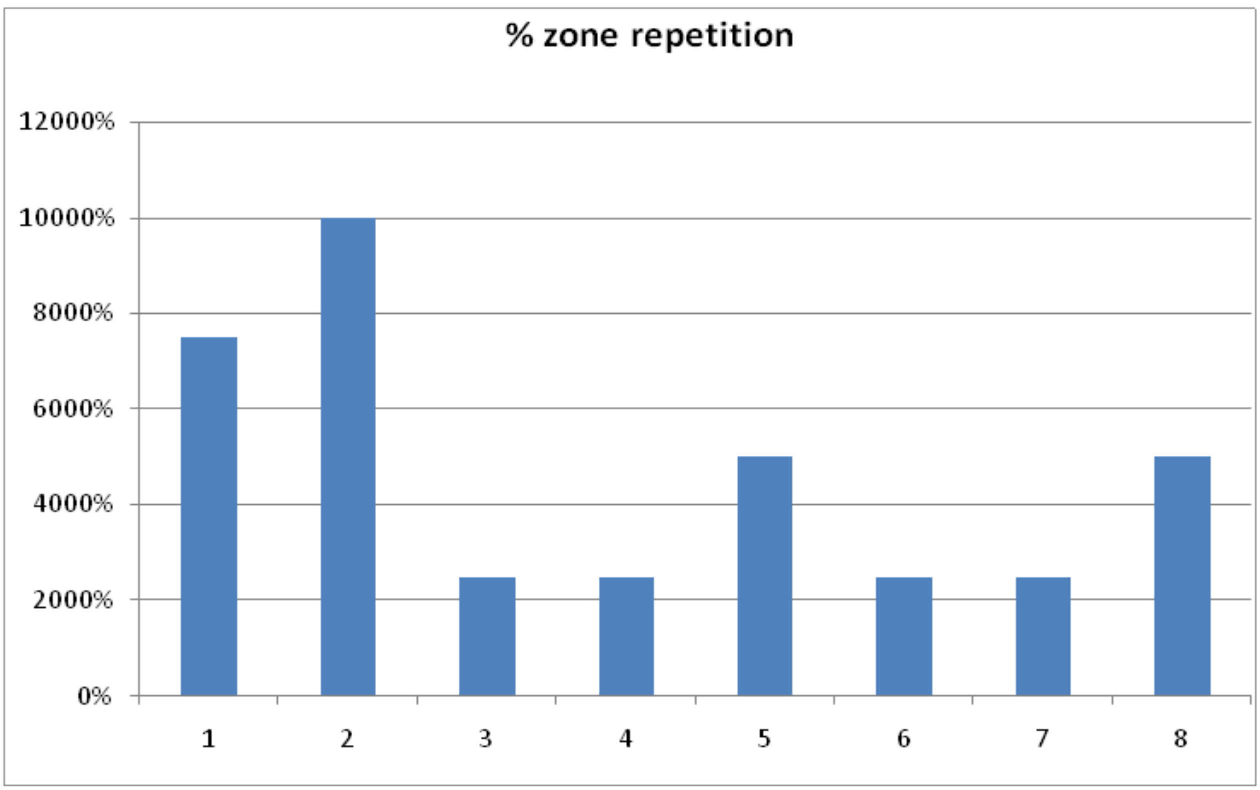

Fig.2. Histogram showing percentage occurrence of varieties of *Spilosoma* spp. on their zone specific presence-absence trend in the urban areas of Saharsa district.

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