

Faunistic Analysis of Ground Beetle Assemblages of District Sialkot, Punjab, Pakistan

Mubashar Hussain, Somia Liaqat
Department of Zoology, University of Gujrat, Pakistan
*E-mail: somialiaqat.123@gmail.com

ABSTRACT

This study was designed to document the diversity of ground beetle fauna of district Sialkot. The study reported 15 species belonging to four subfamilies, six tribes, and eight genera.

Keywords: Barcoding, Biodiversity, Carabidae, Ecosystem, Morphological

INTRODUCTION

Biodiversity plays a significant role in maintaining all ecosystems (Colwell). The demographic increase in human population and overexploitation of natural resources have led to significant biodiversity losses (Liempd and Busch). The consequences of these losses are evident from increased rate of species extinction, population fragmentation and reduction in genetic diversity (Rimmel and Jonall). Therefore, the collection of fine grain data at local and regional level along with the use of novel technologies to measure variations at genetic level is required to understand, track and mitigate biodiversity losses (Magurran; VanderBank et al.).

Objectives

The research objectives were:

- To explore the diversity of ground beetles from district Sialkot.
- Phylogenetic analysis of ground beetles by using Cytochrome c oxidase I gene.

METHODOLOGY

Sampling was done fortnightly during August 2020 to July 2021 from three Tehsils of district Sialkot i.e. Sialkot, Sambrial, and Pasrur. Data were collected by placing three 500m long transects each separated by 150m. At each habitat in the sampling location, nine pitfall traps were placed which were separated by ~150m. Sampling was conducted by handpicking (Mishkatullah) and placing pitfall traps (Greenslade). Species were identified using taxonomic keys (Choate; Abdullah and Azmir; Ribera et al.; Ghannem et al.). DNA barcoding of selected species was done by following the general procedure of total DNA extraction, amplification of Cytochrome c oxidase I (COI) gene by PCR, and sequencing of the amplified gene (Linard et al.; Monaghan et al.). Diversity indices were calculated to record species richness and evenness at different locations. Similarities Percentage (SIMPER) was also performed using PAST Software to note the dissimilarity patterns and percentage contributions of species in dissimilarity.

CONCLUSION/RESULTS

Our study reported 15 species belonging to four subfamilies, six tribes, and eight genera.

Calosoma inquisitor (15.18%), *Pheropsophus verticalis* (12.37%), and *Pheropsophus darwini* (11.54%) were the most abundant species in district Sialkot. The values of diversity indices calculated for different sites show high species diversity and evenness in Sambrial ($D = 0.09$, $e^{-H/S} = 0.94$) followed by Pasrur

($D = 0.08$, $e^{\wedge}H/S = 0.93$) and Sialkot ($D = 0.11$, $e^{\wedge}H/S = 0.84$). Species richness was highest in Pasrur ($H = 2.49$) followed by Sambrial ($H = 2.42$) and Sialkot ($H = 2.22$). The month-wise diversity indices indicate highest carabid diversity, richness and evenness in July ($D = 0.09$, $H = 2.51$, $e^{\wedge}H/S = 2.88$) while lowest during December ($D = 0.56$, $H = 0.89$, $e^{\wedge}H/S = 0.49$). DNA barcoding was also performed for six species i.e. *Pheropsophus hilaris hilaris*, *Pheropsophus hilaris sobrinus*, *Pheropsophus lissoderus*, *Scarites subterraneus*, *Poecilus versicolor*, and *Dioryche subrecta*. Phylogenetic analysis confirmed morphological identification. The study emphasized that ground beetles are one of the key components of insect diversity, which need to be explored extensively with respect to habitat modification and habitat types.

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