

Grasshopper Species Composition in Mirpur Division of Azad Jammu and Kashmir, Pakistan

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Abstract.- The present study represents the grasshopper species composition, diversity, abundance and richness of Mirpur division of Azad Jammu and Kashmir, Pakistan. A total number of 25 species were collected and identified from the study site. Eighteen species were found in each of Mirpur and Bhimber district while 14 species were found in Kotli district. Species diversity was highest in Mirpur followed by Bhimber and Kotli while grasshopper abundance was higher in Bhimber followed by Mirpur and Kotli. On the basis of number of specimens collected, *Oxya hyla hyla* was found most abundant in Bhimber while *Spathosternum presiniferum presiniferum* was found most abundant both in Mirpur and Kotli. In relation to species distribution pattern 9 species were broadly, 7 intermediately and 9 narrowly distributed in the study area.

Key words: Mirpur division of Azad Kashmir, species diversity, species richness, species abundance.

INTRODUCTION

About the grasshoppers of Azad Jammu and Kashmir few records are available which are scattered throughout the literature beginning with 1985 (Perwin *et al.*, 1985; Mahmood and Yousuf, 1999; Mahmood and Yousuf, 2000 a,b,c; Mahmood *et al.*, 2002; Mahmood and Ullaha, 2002; Mahmood and Shah, 2003). The economic importance of grasshoppers in the study area is yet to be recognized. These insects usually cause a considerable loss to natural grasses, rice, maize and millet crops in some years depending on the environmental conditions. In the recent past a significant out break of *Hieroglyphus* spp. and crop loss was observed in different localities of study area (Personal communication). Despite the fact that grasshoppers can cause a significant loss to crops and natural grasses, no efforts have been made to know about the grasshopper's species composition that inhibit in this area.

In the present study, we report the grasshopper species composition, richness, abundance,

Study area is the Mirpur Division consists of 3 districts *viz.*, Kotli, Mirpur and Bhimber. The study site is situated between 73°-74° longitudes and 33°-34° latitude with hilly topography. The climate is of sub-tropical type and elevation from sea level ranges from 360m to 900m approximately. About 40% area is under cultivation and the main crops are maize, wheat and rice. Remaining 60% area consists of range lands and pine forests.

MATERIALS AND METHODS

The adult grasshoppers were collected from March to October, 2007-2008 with the help of sweep net (24 inch. diameter). Twelve collection sites, 4 for each district were selected those represent the maximum floristic composition of the study area (Table I). At each site during each collection trip, one hundred and fifty net sweeps were made along vegetation transect. The maximum collection was made during the months of July, August and September because during these months maximum grasshopper population is present in the study area. Many repetitive collection trips were conducted from collection sites to ensure maximum collection of the species. The collected specimens were identified up to species level in the laboratory of Entomology with the help of already published

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diversity and distributional pattern in the study area.

keys (Kirby, 1914; Bei-Benko and Mishchenko, 1951; Hollis, 1965, 1968; Mason, 1973; Jago, 1984; Richie, 1981, 1982; Wagan, 1990; Mahmood and Yousuf, 1999)

Table I.- Collection localities of Mirpur division.

Localities Distt. Mirpur	Altitude Ft.	Localities Distt. Bhimber	Altitude Ft.	Localities Distt. Kotli	Altitude Ft.
Dadyal	1250	Jattlan	1100	Sehnsa	2100
Siak	1250	Bindi	2050	Gullpur	2200
Chakswari	1300	Jandichontra	2800	Choch	2700
Bathar	1250	Samani	2050	Kurti	2200

Data analysis

The species richness was calculated as the total number of species present in the study site. Species abundance was calculated as total number of individuals/150 net sweeps while the diversity was calculated by using Shannon and Weaver index. Species distribution was determined as the proportion of occurrence of each species in the study site as narrowly distributed (present at $\leq 33\%$) intermediately distributed (present at >33 and $< 66\%$) and broadly distributed (present at $\geq 75\%$) in the collection sites. This methodology was taken from Maria *et al.* (2000).

RESULTS AND DISCUSSION

During this expedition a total number of 25 species belonging to 2 families, Acrididae and Pyrgomorphidae, were collected from three districts of Mirpur division. Five species were present only in Mirpur, 4 species were present only in Bhimber, 3 species were common only in Mirpur and Kotli 3 species were common in Kotli and Bhimber, 2 species were common in Mirpur and Bhimber while 9 species were common in 3 collection sites. The family Acrididae had the highest relative abundance in all districts (Table II). The subfamily Oxyinae was found as dominant in Bhimber while Hemiacridinae and Catantopinae were found dominant in Kotli and Mirpur respectively (Table II). The district Bhimber is mainly occupied by rice crop and it has been observed that *Oxya* spp. are

serious pest of rice in this area (personal communication). In the present study *Oxya* spp. were collected from rice crop in this area. The members of Oxyinae are reported as pest of rice crop in Pakistan and world wide (Sultana and Wagan, 2009; Riffat and Wagan, 2007 a) and it can be the reason for its abundance in this district. The highest abundance of grasshoppers was found in Bhimber followed by Mirpur and Kotli. In Bhimber *Oxya hyla hyla* Serville was most abundant accounting 27% followed by *Oxya fuscovitta* Marschall accounting 22.29% of the assemblage. In Mirpur, *Spathosternum presiniferum presiniferum* Walker was found most abundant with 17% presence followed by *Hieroglyphus nigrorepletus* with 15.85% presence. In Kotli, *Spathosternum presiniferum presiniferum* Walker was found most abundant with 40.32% presence followed by *Catantop innotabilis* Walker and *Hieroglyphus nigrorepletus* with 9.67% presence of the assemblage from the district.

Table II.- Relative average abundance, express in percent, of grasshopper families and subfamilies record in each district.

Family	District Mirpur	District Kotli	District Bhimber
Acrididae	24.54	21.14	49.82
Catantopinae	06.14±0.53	05.46±0.72	04.09±2.25
Hemiacridinae	04.77±0.60	08.53±0.58	06.82±1.74
Euprepocnemidinae	03.75±0.68	01.02±1.67	05.46±1.95
Oxyinae	00.68±1.59	01.70±1.29	24.91±0.91
Acridinae	02.04±0.91	02.04±1.18	03.07±2.60
Calliptaminae	-	-	00.34±7.81
Oedipodinae	07.16±0.49	02.38±1.09	05.11±2.02
Pyrgomorphidae	03.41±0.71		01.02±4.51

The family Pyrgomorphidae was only found in Mirpur and Bhimber while absent in Kotli. This could be due to inappropriate collection method.

In relation to species distribution pattern 9 species are broadly, 7 intermediately and 9 narrowly distributed in the study site (Table III).

Species richness and diversity indices ranged from 14 - 18 and 1.98 - 2.46 respectively (Table IV).

Table III.- Grasshopper species based on their frequency distribution across three sampling sites.

Acrididae	Grasshopper species		
	Broadly distributed (\geq 66- 100% of all sites)	Intermediately distributed (> 33 <66% of all sites)	Narrowly distributed (0 \leq 33% of all sites)
Hemiacridinae			
<i>Spathosternum prasinerum prasinerum</i> (Walker)	100		
Calliptaminae			
<i>Acorypha glaucopsis</i> (Walker)			33.33
Euprepocnemidinae			
<i>Euprepocnemis alacris alacris</i> (Serville)		66.66	
<i>Heteracris robustus</i> (Serville)		66.66	
<i>H. illustris</i> Walker			33.33
Catantopinae			
<i>Catantops innotabilis</i> Walker	100		
<i>Catantops brachycerus</i> Willemse			33.33
<i>Anacridium aegyptium</i> Linnaeus			33.33
<i>Chondracris rosea</i>			33.33
<i>Hieroglyphus nigroroptus</i>	100		
<i>H. concolor</i>	100		
Oxyinae			
<i>Oxya hyla hyla</i> Serville	100		
<i>Oxya fuscovittata</i> Marschall		66.66	
Acridinae			
<i>Acrida exaltata</i> Walker	100		
<i>Phlaeoba infumata</i> Brunner		66.66	
<i>Gonista rotundata</i>		66.66	
Oedipodinae			
<i>Aiolopus thalassinus thalassinus</i> Fabricius	100		
<i>Locusta migratoria</i> Linnaeus			33.33
<i>Oedaleus abruptus</i>		66.66	
<i>Gastrimargus africanus africanus</i>	100		
<i>Trilophidia annulata</i>	100		
Pyrgomorphidae			
<i>Chrotogonus robertsi</i> Serville		66.66	
<i>Atractomorpha sinensis sinensis</i> (Bolivar)			33.33
<i>Pyrgomorpha conica</i> Olivier			33.33
<i>Aularches miliaris</i> Linnaeus			33.33

This difference could be the result of inharmonic collection or floristic composition differences of the study sites. These districts consist of different cropping system and diversity, floral composition and annual precipitation (personal communication). So, these results are comparable with those of Otte (1977) and Evans (1988) who reported that number

of grasshopper species increased as the number of plant species increased but we have not calculated the plant species of the study sites due to certain reasons for plant species identification.

Table IV.- Mean relative abundance (individuals/150 sweeps) of grasshopper species collected and

diversity index in the different districts of
Mirpur division.

Acrididae	Mirpur	Kotli	Bhimber
Hemiacridinae			
<i>Spathosternum prasiniferum</i> <i>prasiniferum</i> (Walker)	14	25	20
Calliptaminae			
<i>Acorypha glaucopsis</i> (Walker)	-	-	1
Eupreocnemidinae			
<i>Eupreocnemis alacris alacris</i> (Serville)	-	3	6
<i>Heteracris robustus</i> (Serville)	7	-	9
<i>H. illustris</i> Walker	4	-	-
Catantopinae			
<i>Catantops innotabilis</i> Walker	1	6	3
<i>Catantops brachycerus</i> Willemse	-	-	1
<i>Anacridium aegyptium</i> Linnaeus	-	-	1
<i>Chondracris rosea</i> (De Geer)	2	-	-
<i>Hieroglyphus nigrorepletus</i> Bolivar	13	6	1
<i>H. concolor</i> (Walker)	2	4	6
Oxyinae			
<i>Oxya hyla hyla</i> Serville	2	3	40
<i>Oxya fuscovittata</i> Marschall	-	2	33
Acridinae			
<i>Acrida exaltata</i> Walker	5	4	4
<i>Phlaeoba infumata</i> Brunner	-	1	5
<i>Gonista rotundata</i> Uvarov	1	1	-
Oedipodinae			
<i>Aiolopus thalassinus</i> <i>thalassinus</i> Fabricius	3	3	5
<i>Locusta migratoria</i> Linnaeus	1	-	-
<i>Oedaleus abruptus</i> (Thunberg)	8	1	-
<i>Gastrimargus africanus</i> <i>africanus</i> (Saussure)	8	2	5
<i>Trilophidia annulata</i> (Thunberg)	1	1	5
Pyrgomorphidae			
<i>Chrotogonus robertsi</i> Serville	4	-	2
<i>Atractomorpha sinensis</i> <i>sinensis</i> (Bolivar)	2	-	-
<i>Pyrgomorpha conica</i> Olivier	4	-	-
<i>Aularches miliaris</i> Linnaeus	-	-	1
Diversity Index	2.46	1.98	2.19
Total individual/ 150net sweeps	82	62	148

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