



## DIVERSITY OF ORTHOPTERA FAUNA OF SAGAR DISTRICT, MADHYA PRADESH, INDIA

Uday Tiwari\* & U. S. Gupta

Department of Zoology, Dr. H. S. Gour University, Sagar 470003 (M.P.) India

\*Corresponding author Email: utd.uday@gmail.com

### ABSTRACT

Phylum Uniramia of the Animal Kingdom includes orthopteroid insect more than 27,000 species were distributed worldwide. Orthopteroid insects are an essential component of the fauna of many ecosystems in particular grasslands. The actual reports of this Insects in the Sagar region of Madhya Pradesh in not clearly investigated. In the present study we are reported the first time survey and collection of insects in Pathariya hill complex forests of Sagar district of Madhya Pradesh, (INDIA) in the year 2017-18. The collection methods including trapping, aerial nets, hand picking, sweeping and beating. The preserved samples were identified with various earlier publications and also with the help of identification keys. There were 32 species of grasshoppers found at the study site. The grasshopper community was further divided into four categories on the basis of its occurrence in the different ecological niches of the study site. These were open ground type, field type, scrub type and woodland type.

### INTRODUCTION

Amongst the insects Orthoptera is one of the biggest order comprises more than 22,500 species worldwide (Ghosh and Sengupta 1982) out of which 1,750 species, 400 genera and 21 families are known from India (Tandon and Hazra 1998). The order is essential components of different ecosystems especially grassland. According to Gupta and Chandra (2017) members of this order are frequently known as short and long-horned grasshoppers, raspy cricket, pygmy grasshoppers, grouselocusts, mole crickets, crickets, katydids, and cave crickets. It is one of the most valuable invertebrate groups for environmental assessment and monitoring (Jamison *et al.* 2002). It is indispensable component of food chain and web comprises first order consumers and frequently comprises an extensive fraction of the arthropod biomass in grassland ecosystems (Odum *et al.* 1962).

Although only a few species are considered serious pests, other non-gregarious species can become very dangerous when climatic conditions facilitate their multiplication (Benkenana and Harrat, 2009). Therefore, it is necessary to have comprehensive knowledge of all locust species that settle in a territory. In India, at Madhya Pradesh regions, limited information available on faunal diversity of orthopteras pecially in Sagar regions. Joshi *et al.* (2004) reported 12 species of orthoptera from Kanha National Park. Shishodia (2006) reported 21 species of orthoprean insects from Rewa. The aims of the future studies on this geographically important of Orthoptera fauna needs to be basically focusing on its ecological important and evaluation of ecosystem services provided by the Orthoptera fauna.

## MATERIAL AND METHODS

### Study Area

Sagar district is situated on northern boundary of Madhya Pradesh state of India at at 23° 50' N latitude and 78° 04' E longitude. The present research investigation was carried out in the Pathariya hills complex which is situated in the Sagar University campus. This hill complex situated on eastern side of Sagar town and rises near about 100 m elevation. Highest altitude of the hill is 613 m and the range of altitude is from 540 to 600 m above mean sea level. Forested region in the southern end of the ridge is called "Rajababa"; the middle part "Gualipura" and in between a small flank extending to the east as "SajiBhatar" (Thakur and Khare, 2010).

The study area has tropical dry deciduous type of forest vegetation. Due to low soil depth and shallow area the dry mixed forest has been developed. The entire area was very rich in terms of flora mainly Sagona (*Tectonagrandis*), Saja (*Terminaliatomentosa*), Bija (*Pterocarpusmarsupium*), Dhawda (*Anogeissuslatifolia*), Landia (*Lagerstroemia parviflora*), Bel (*Aeglemarmelos*), and a few other miscellaneous species. In the ground flora common grasses are Kasul (*Heteropogoncontortus*), Ghamara (*Tridexprocumbens*) and other members of grasses. The entire study area is having typical monsoon climate. The average annual rainfall is about 1220 mm and mainly received during rainy season from June to September. The mean minimum and maximum temperature falls between 12.5 to 45 ° C.

### Collection Method

Insects were collected from pathariya hill complex forest of Sagar, Madhya Pradesh in the year 2017 and 2018 by sweep net method, hand picking, beating as well as collecting with aerial nets and trapping in the morning and evening time. The mode of survey was random and presence – absence data (binary) of Orthopteran fauna were documented from each area of Pathariya hill complex. Then collected specimens were transferred in bottles for killing that contains cotton soaked with ethyl acetate covered with paper. The collected specimens were preserved by both dry and wet preservation methods. Identification was done with the help of Orthoptera fauna of India Kirby (1994) and webography.

Most of the long horn grasshoppers were collected during night as they come attracted to the light. Mecopoda was collected and counted by their sound. It was difficult to determine the population of Orthpterans as they have varied habitats. Only the numbers of different genus and species were counted during the survey period. On the basis of count grades were allotted as follows :-

Grade	No. of Insects
+	Less than 5
++	Between 5 – 10
+++	More than 10
N	Nymph only
A	Adult only
NA	Nymph & Adult present

## RESULT AND DISCUSSION

The study areas terrestrial abiotic environment has been broadly divided by ecologists into Epigeal and hypogean components. As is well known grasshoppers pass some part of their life in the epigeal environment and some part in the hypogean environment. Table 1 shows the occurrence of the grasshopper types of the study site in these two types of environments. The epigeal occurrence included both the hoppers as well their adult stages. Field observation on the grasshopper community of the study site (Table 1) revealed that from the 32 species of the grasshoppers in the habitat two species (*Gryllusbimaculatus*, *Acridaexaltata*) were the annual species as these were regularly found in the aboveground part; seven species (*Conocephalusmaculatus*, *Euconocephaluspallidus*, *Elimaesecuriger*, *Letanainfurcata*, *Holochloraalbida*, *Mecopodaelongata* and *Gryllotalpaaficana*) lived for about eight or more months but not complete 12 months.

Four species (*Gastrimargusafricanusafricanus*, *Cyrtacanthacristatarica*, *Patangasuccincta*, and *Pachyacrisvinosa*) led the epigeal life between 5 to 8 months. Twenty six grasshoppers (*Sathrophylliarugosa*, *Hexacentrus unicolor*, *Brachytrypessp.*, *Oecanthusindicus*, *Trigonidiumsp.*, Bush cricket, *Scelimenaproducta*, *Systolederusgreeni*, *Mazarrediacristulata*, *Euparatettixpersonatus*, *Atractomorphasp.*, *Chrotogonussp.*, *Poekiloceruspictus*, *Hieroglyphusbanian*, *Teratodesmonticollis*, *Aiolopusthalassinus*, *Oedaleusabruptus*, *Oxyafuscovittata* and *Catantopspinguis*) led the epigeal life for less than four months. All the grasshoppers also led hypogean life in the egg stage, oviposited by the reproductive females.

Table 1: Showing the epigean distribution of grasshoppers

Sr. No.	Genus	Date	Period
1	<i>Conocephalus maculatus</i>	15 Aug-30 Nov	4
2	<i>Euconocephalus pallidus</i>	15 Aug-30 Nov	4
3	<i>Elimaese curigera</i>	15 Aug-30 Nov	4
4	<i>Letanain furcata</i>	31 Jul-31 Dec	5 1/2
5	<i>Holochlora albida</i>	15 Oct-15 Nov	1 1/2
6	<i>Mecopoda elongata</i>	31 Aug-15 Nov	3
7	<i>Sathrophyllia rugosa</i>	15 Oct-31 Oct	1
8	<i>Hexacentrus unicolor</i>	15 Sep-31 Oct	2
9	<i>Gryllotalpa africana</i>	31 Jul-30 Nov	4 1/2
10	<i>Gryllus bimaculatus</i>	30 Jun-15 Oct	10
		15 Dec-31 May	
11	<i>Brachytrypes</i> sp.	15 Aug-15 Oct	2 1/2
12	<i>Oecanthus indicus</i>	15 Oct-31 Oct	1
13	<i>Trigonidium</i> sp.	31 Oct-30 Nov	1 1/2
14	Bush cricket	30 Sep-31 Oct	1 1/2
15	<i>Scelimenap producta</i>	15 Sep-31 Oct	2
16	<i>Systolederus greeni</i>	15 Sep-15 Oct	1 1/2
17	<i>Mazarrediacristulata</i>	15 Sep-15 Oct	1 1/2
18	<i>Euparatettix personatus</i>	15 Sep-15 Oct	1 1/2
19	<i>Atractomorpha</i> sp.	15 Jul-31 Oct	5

		30 Apr-15May	
<b>20</b>	<i>Chrotogonus</i> sp.	15 Jun,	41/2
		15 Mar-31 May	
<b>21</b>	<i>Poeciloceruspictus</i>	15 Jun-31 Nov	6
<b>22</b>	<i>Acridaexaltata</i>	15 Jun-31 Aug	6
		Dec,	
		15 Apr-31 May	
<b>23</b>	<i>Hieroglyphusbanian</i>	15 Aug-31 Oct	3
<b>24</b>	<i>Teratodesmonticollis</i>	15 Sep-31 Oct	2
<b>25</b>	<i>Aiolopusthalassinus</i>	31 Jul-15Sep	2
<b>26</b>	<i>Gastrimargusafricanus</i>	31 Jul-30Sep	21/2
<b>27</b>	<i>Oedaleusabruptus</i>	31 Jul-15Sep	2
<b>28</b>	<i>Catantopspinguis</i>	15 Oct-15Dec	21/2
<b>29</b>	<i>Cyrtacanthacristatarica</i>	30 Jul-15Oct	3
<b>30</b>	<i>Patangasuccincta</i>	15 Aug- 15 Oct	21/2
<b>31</b>	<i>Pachyacrisvinosa</i>	15 Aug- 15 Oct	21/2
<b>32</b>	<i>Oxyafuscovittata</i>	15 Jun-15Sep	3

The grasshopper community was further divided into four categories on the basis of its occurrence in the different ecological niches of the study site (Table 2). These were open ground type, field type, scrub type and woodland type (Elton and Miller 1954).

**Table 2: Distribution of grasshoppers on the basis of habitat in the study site**

<b>Open ground type</b>	<i>Gryllotalpa africana</i> <i>Gryllus bimaculatus</i> <i>Trigonidium</i> sp. <i>Scelimenaprodacta</i> <i>Systolederus greeni</i> <i>Mazarrediacristulata</i> <i>Euparatettix personatus</i> <i>Atractomorpha</i> sp. <i>Chrotogonus</i> sp. <i>Teratodes monticollis</i> <i>Acrida exaltata</i> <i>Aiolopus thalassinus</i> <i>Gastrimargus africanus africanus</i> <i>Oedaleus abruptus</i> <i>Cyrtacanthacristatarica</i> <i>Patangasuccincta</i> <i>Pachyacris vinosa</i> <i>Oxyafuscovittata</i>
<b>Field type</b>	<i>Euconocephalus pallidus</i> <i>Letanainfurcata</i> <i>Holochloraalbida</i> <i>Mecopoda elongata</i> <i>Hexacentrus unicolor</i> <i>Oecanthus indicus</i> <i>Hieroglyphus banian</i>
<b>Scrub type</b>	<i>Elimaese curigera</i> <i>Poeciloceruspictus</i>
<b>Woodland type</b>	<i>Euconocephalus pallidus</i> <i>Letanainfurcata</i> <i>Mecopoda elongata</i> <i>Oecanthus indicus</i> <i>Trigonidium</i> sp. Bush cricket
<b>Intermediate type</b>	<i>Conocephalus maculatus</i> <i>Elimaese curigera</i> <i>Sathrophylliarugosa</i> <i>Catantop spinguis</i>

It harbors thirty two species of grasshoppers in four different kinds of life forms (Table 2). Among these, eighteen species, constituting the largest group, preferred to thrive mostly on the ground vegetation or the open patches named as "Open-formation type" by Elton and Miller (1954), seven species, preferred to restrict their activity on either the herbs or the erect tall grasses. Only two species preferred the shrubs and six species preferred to sit on or under the trees: Uvarov (1977) has classified the grasshoppers of such life-forms as graminicole, Herbicole and arboricole. His arboricole category included both the shrub and the tree dwelling

grasshoppers. According to him even the arbicole grasshoppers descend on the ground for oviposition. There were also some such species that confined their activity mainly as herbicoles and arboricole but occasionally they climbed to the adjoining shrubs for temporary roosting and perching.

## CONCLUSION

Orthopteroid insects are an essential component of the fauna of many ecosystems in particular grasslands. Diverse and abundant they play an important role in nutrient cycling and provide food base for numerous animals, especially birds, mammals and reptiles. The present study has been made to investigate the following as no data is available on Orthopteran fauna of Sagar – Grasshoppers fauna of the study area. Interrelationship of the grasshoppers with the abiotic factors. Orthopteroid insects belong to Phylum Uniramia of Kingdom Animalia. Two major types of grasshoppers belonging to Caelifera – short horn and Ensifera – long horn were found. The result shows that among long horn grasshoppers the family Tettigoniidae and in short horn grasshoppers, the family Acridoidea show much diversity in the species. We found that the structural organization of the grasshoppers was closely related with the climatic condition. Majority of the species showed their maximum adaptability for rainy season and most of the species survived up to winter season. Thus the grasshoppers show diverse resistance towards general climate.

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