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Diversity and Distribution of Grasshoppers (Orthoptera) Fauna of District Buner

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ABSTRACT

The present research work was conducted to evaluate the diversity and distribution of grasshoppers in the District Buner. Survey and collection of specimens were done from April 2022 to September 2022. A total of 718 sample of grasshoppers were collected. The identification revealed 26 species under 20 genera spreading into 10 subfamilies with 4 super families under the 2 sub order i.e. Ensifera (Chopard, 1920) and Caelifera (Ander, 1939). Super Families were revealed i.e. Acridoidea (Macleay, 1821), Pyrgomorphoidea (Brunner von Wattenwyl, 1874), Tettigonioidea (Krauss, 1902), and Tetrigidea (Rambur, 1838). Family Acrididae (Macleay, 1821) resulted with eight subfamilies and 16 genera consisted 22 species, whereas family Pyrgomorphoidae was revealed with single subfamily and two genera and including two species. Family Tettigonioidae consisted only single subfamily Euconocephalinae and one genus and with single species. While family Tetrigidea also included only single genus with single species. The statistical analysis revealed that 87% of the species were resulted under the family Acrididae, followed by 6.82%, 2.37% and 2.76% for Pyrgomorphidae, Tetrigidea, and Tettigoniidae respectively. The most dominant species was recorded *Locusta migratora migratora* (Linnaeus, 1758) (8.64%) whereas, *Boopendon nubilum* (Say, 1825) (0.97%), indicated the lowest range. The diversity was discovered by the investigation of many parameters, including morphometric measurements of the body, wings, femur, tabia, tarsi, antennae, and pronotum using a common scale ruler and a finely divided ruler.

INTRODUCTION

In kingdom animalia, phylum arthopoda composed of different classes, in which the class Insecta has been classified into 31 orders. A total of 27 orders belong to pterygota while the remaining belongs to apterygota. Orthoptera is one of the orders of Pterygota. Orthoptera consist of different species like Grasshopper, Cricket, and katydid(Arnett, 2000). Orthoptera is the sixth largest order of insects (Alfred, 2003). Grasshoppers are large, slender, winged insects with strong hind legs and powerful mandibles, or mouth parts, suitable for chewing and biting. They have a front pair of rigid wings called tegmina and a hind pair, often bright color, large membranous wings. Their size ranges from 1–10 cm in length. Formerly the grasshoppers were placed in the Orthoptera order along with cockroaches, mantids, phasmids, long horned grasshoppers and crickets, but the order now included only short and long horned grasshoppers (Sultana and Wagan, 2015). Grasshoppers are the largest and most diverse group of insects. Grasshoppers have several advantages for such studies, relating to its great body size easy catch ability and high dominance so, that it became a main invertebrate group for biological indication in its wider sense. They are often the main invertebrate consumer in grasslands and are to be an important food source for many groups of predators e.g. birds, lizards etc(Panhwar, 2015)(Ali *et al.,* 2017). In general, order orthoptera is classified into two sub-order such as short horned grasshopper (Caelifera) and long horned grasshopper (Ensifera). Most of them are herbivores, but some are carnivores. Most grasshoppers are polyphagous and consume vegetation from various plant sources. Some of them are omnivorous and consume animal tissue and faeces as well (Daly *et al*., 1998). The distribution and abundance of grasshoppers was linked to a number of factors, including vegetation, temperature, precipitation and geographical area. Temperature and rainfall are important for plant growth (Khan *et al*., 2021). Grasshoppers are also affected by changes in plant conditions (Clark, 1948). Grasshoppers in Pakistan were found in arid and semi-arid areas. Pakistan's geographical

conditions provide ideal breeding grounds for grasshoppers, which therefore pose serious threats to both irrigated and rainy crops and pastures (Forsman *et al*., 2002). Orthoptera is known to be one of the largest orders of insects representing 22,500 species worldwide (Ghosh and Sengupta, 1982). Acridddae is family of short horned grasshoppers and locusts which are placed in suborder Caelifera under superfamily Acrididae (Vandergast *et al*., 2017). Acridoidea is largest superfamily and most diverse group representing 11,000 species worldwide (Shishodia *et al*., 2010).It is therefore the present study was conducted to investigate the diversity, distribution and sessional occurrence of Grasshopper in district Buner Pakistan.

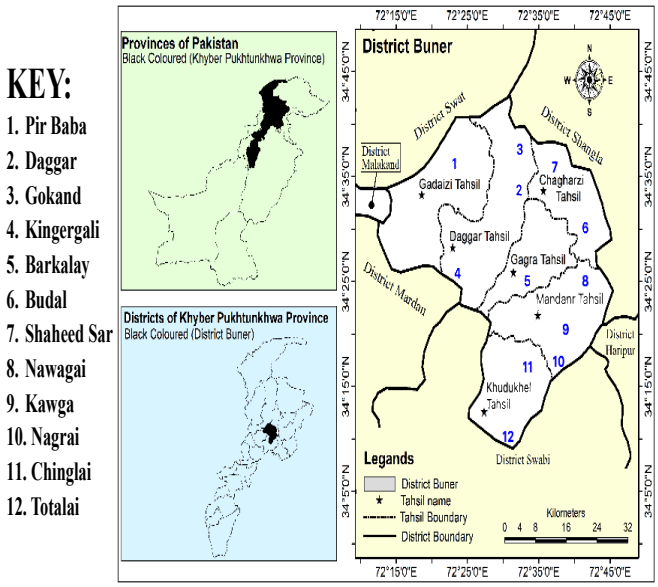
MATERIALS AND METHODS

Study Area

District Buner is located in the province of Khyber Pakhtunkhwa. District Buner has a population of 506,048 people and a total area of 1865 km^2. Its northern border associated with district Swat, its western lies the district Malakand, its southern boundary touches district Mardan and its eastern side situated Hazara division. Additionally, district Buner is located between latitudes 34^0-11/ and 34-43/ in the north and 72^0-13/ and 72^0-45/ in the east (Akhtar *et al*., 2016).

Figure 1

Map of District Buner



Sample Collection

Grasshoppers were collected from the plain areas while they are in their active season. Every locality was received a fortnightly visit. The collection of grasshoppers from Baldi and Kisbenedek were done using an adaptation of the sweep net and hand-picking method. The procedure followed was modified from Vickery and Kevan (1983). During the grasshoppers' active season, extensive year-round surveys were carried out at various intervals, specifically of various ecological niches according to their feeding habits and general vegetation will be searched for grasshopper presence. The following places in the region was the focus of collecting surveys to systematically explore the grasshopper fauna of district Buner.

Table 1

Selected Localities of District Buner

S.No	Name of Locality	Longitude	Latitude
1	Pir baba	72^{0}27I13.81E	34^{0}36I8.55IIN
2	Kingergali	72^{0}14I44IIE	34^{0}30I38IIN
3	Dagger	72^{0}29I3IIE	34^{0}30I38IIN
4	Gokand	72^{0}30I56IIE	34^{0}34I55IIN
5	Barkalay	72^{0}29I15IIE	34^{0}28I3IIN
6	Budal	72^{0}38I59IIE	34^{0}29I27IIN
7	Shaheedesar	72^{0}39I26IIE	34^{0}37I46IIN
8	Nawagai	72^{0}33I29IIE	34^{0}24I24IIN
9	Nagrai	72^{0}40I58IIE	34^{0}22I49IIN
10	Chinglai	72^{0}30I41IIE	34^{0}19I9IIN
11	Totalai	72^{0}29I49IIE	34^{0}11I36IIN
12	Malka	72^{0}40I16IIE	34^{0}19I6IIN

Killing and Preservation of Specimens

Entomological bottle possessed in its bottom contained potassium cyanide was used to kill the collected specimens. The specimens were not submerged in cyanide for more than half an hour since the color of the specimens, especially the green ones, altered. To avoid a color change, the specimen was taken out of the bottle after being killed. Within a few hours, the specimens were stitched in insect box.

Storage

The fully dried samples were taken off the stretching boards and placed inside typical entomological boxes with labels indicating the location, the time of collection, and the name of the collector. To protect the specimen from attack of ants and other insects, naphthalene balls were placed inside the boxes.

Identification

For identification taxonomic key Orthoptera of Pakistan by Sultana and Wagan was used (Sultana and Wagan, 2015).

Morphometry and Photography

During the measuring time, a finely divided ruler and a standard scale ruler were used to measure the lengths of the body, wings, femur, tibia, tarsi, antennae, and pronotum. The specimens were measured and then identified before being placed on top of a sheet of white paper. The photograph was captured through camera Lucida.

Description

Using Sultana and Wagan, descriptions of the specimens was based on visual observation and distinguishing characteristics (Sultana and Wagan, 2015).

Statistical Analysis

The record data were statistically analyzed using Microsoft Excel 2016 and PAST Software V. 3.2.

RESULTS

In the current study a total of 718 grasshopper specimens were collected. The collected specimens were identified and yielded into 2 Sub Orders i.e. Ensifera and Caelifera and spreading into 4 Super Families i.e. (Acridoidea, Pyrgomorphoidea, Tettigonioidea, and Tetrigidea) and while the family Acrididae as spreading into eight subfamilies (Acridinae, Cyrtacanthacridinae, Catantopinae, Calliptaminae, Eyprepocnemidinae,

Hemiacridinae, Oxyinae and Oedipodinae) and contains about 16 genera (*Oxya, Acrida, Calliptamus, Hieroglyphus, Locusta, Phlaeoba, Heteracris, Anacridium, Aiolopus, Xenocatantops, Oedaleus, Stenocatantops, Mecostethus, Patanga, Schistocerca, Boopendon*) and Spreading into 22 species (*Oxyavelox*, *Oxya bidentata, Oxya hylahyla, Oxya japonica*, *Oxya sinuosa*, *Acrida exaltata*, *Acrida cinerea, Calliptamus italicus, Hieroglyphus nigrorepletus*, *Locusta migratoria migratoria*, *Phlaeoba infumata, Heteracris pulcher, Anacridium aegyptium*, *Aiolopus thalassinus*, *Xenocatantops humilis*, *Aiolopus strepens, Oedaleus decorus, Stenocatantops splendens, Mecostethus parapleurus*, *Patanga japonica, Schistocerca Americana, Boopendon nubilum*). In contrast, the family Pyrgomorphidae contains just one subfamily (Pyrgomorphinae), two genera (*Atractomorpha* and *Chrotogonus*) and two species (*Atractomorpha crenulata* and *Chrotogonus trachypterus*). While the FamilyTetrigidea contains only one genera (*Tetrix*) and one species (*Tetrix tenuicornis*). Whereas the Family Tettigoniidae contains only one subfamily Euconocephalinae, one genera (*Euconocephalus*), and only one species (*Euconocepha lusincertus*)as shown in Table 1.2.

Table 2

Taxonomic Information of Identified Species

Order	Sub Orders	Family	Subfamilies	Genus	Species
Orthoptera	Caelifera	Acrididae	Oxyinae	*Oxya*	*O. velox*
				Oxya	*O.bidentata*
				Oxya	*O. hylahyla*
				Oxya	*O. japonica*
				Oxya	*O.sinuosa*
			Acridinae	*Acrida*	*A. exaltata*
				Phlaeoba	*P.infumata*
				Acrida	*A.cinerea*
				Boopendon	*B.nubilum*
			Hemiacridinae	*Hieroglyphus*	*H.nigrorepletus*
			Calliptaminae	*Calliptamus*	*C.italicus*
			Eyprepocnemidinae	*Heteracris*	*H.pulcher*
			Oedipodinae	*Locusta*	*L.migratoriamigratoria*
				Aiolopus	*A.thalassinus*
				Mecostethus	*M.parapleurus*
				Aiolopus	*A.strepens*
				Oedaleus	*O.decorus*
			Catantopiane	*Stenocatantops*	*S.splendens*
				Xenocatantops	*X.humilis*
			Cyrtacanthacridinae	*Patanga*	*P.japonica*
				Schistocerca	*S.americana*
				Anacridium	*A.aegyptium*
		Pyrgomorphidae	Pyrgomorphinae	*Atractomorpha*	*A.crenulata*
				Chrotogonus	*C.trachypterus*
		Tetrigidea		*Tetrix*	*T.tenuicornis*
	Ensifera	Tettigonioidea	Euconocephalinae	*Euconocephalus*	*E.incertus*

Statistical Analysis

Morphometric Measurement of Different Species

Morphometric measurement of Twenty six species in (mm) for seven different parameters BL, body length; AL, antenna length; FW, forewings length; FL, femur length; TL, tabia length; tL, tarsi length; PL, pronotum length were measured and as shown in Table 1.3.

According to the findings, *Tetrix tenuicornis* had a minimum antenna length of 4 mm and a maximum antenna length of 28 mm for *Euconocepha lusincertus*. *Tetrix tenuicornis* had forewings that were the shortest (10 mm), whereas *Patanga japonica* had the longest forewings (40 mm). *Patanga japonica* had the longest recorded body length (60 mm), while *Attractomorpha crenulata* had the shortest recorded length (11 mm). The largest known femur measured (32 mm) in *Patanga japonica* and (8 mm) in *Tetrix tenuicornis*. Both *Hieroglyphus nigrorepletus* and *Acrida exaltata* had pronotum lengths of up to 16 mm, while *Tetrix tenuicornis* had a pronotum length of just 4 mm. One of the essential aspects for taxonomical study is morphometric assessment of the various body sections.

Table 3

Morphometery of Identified Species of Grasshopper

Species	BL	FWL	FL	TL	tL	PL	AL
Oxya velox	24	21	17	15	4	9	7
Oxya bidentata	25	22	15	13	5	10	8
Oxya hylahyla	28	22	19	15	4	7	10
Oxya japonica	36	26	19	18	5	8	11
Oxya sinuosa	27	18	15	15	6	8	10
Acrida exaltata	42	32	30	30	7	14	19
Acrida cinerea	45	35	29	28	8	11	19
Calliptamus italicus	31	17	15	13	7	9	6
Hieroglyphus nigrorepletus	56	23	22	21	5	13	17
Locusta migratoria migratoria	30	24	16	12	5	12	11

Phlaeoba infumata	25	22	17	14	4	8	7
Heteracris pulcher	45	35	31	30	11	13	18
Anacridium aegyptium	35	27	17	16	7	11	10
Aiolopus thalassinus	35	30	22	20	7	11	11
Xenocatantops humilis	24	19	15	12	6	7	8
Aiolopus strepens	30	24	18	14	7	10	9
Oedaleus decorus	37	27	22	19	7	12	9
Stenocatantops splendens	30	25	28	27	8	10	9
Mecostethus parapleurus	34	27	20	15	9	10	19
Patanga japonica	60	38	32	31	12	12	14
Schistocerca Americana	20	16	17	16	9	8	14
Boopendon nubilum	37	20	19	15	7	9	13
Atractomorpha crenulata	11	18	10	9	2	9	7
Chrotogonus trachypterus	13	14	9	8	3	5	5
Euconocepha lusincertus	19	33	13	11	5	11	28
Tetrix tenuicornis	20	10	8	9	3	4	4

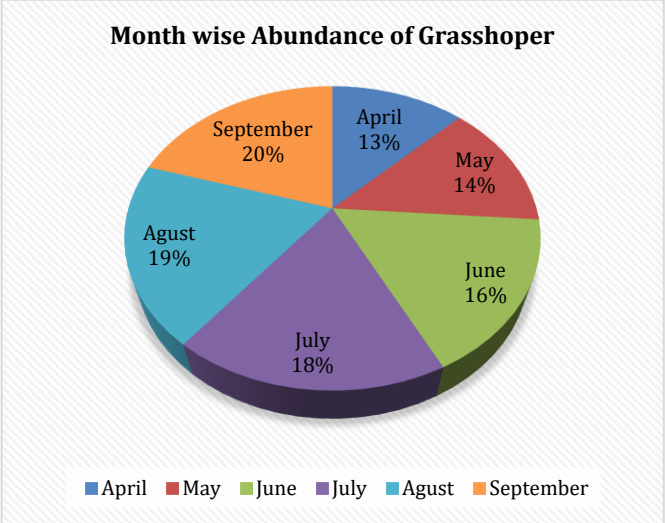
Abbreviations: BL, body length; AL, antenna length; FW, forewings length; FL, femur length; TL, tabia length; tL, tarsi length; PL, pronotum length.

Month Wise Abundance of Grasshoppers

Maximum samples were collected, according to the month-wise distribution, in September (145), followed by August (138), and July (129). While in the month of April, the smallest possible samples were taken (90), 98 and 118 samples were taken in May and June, respectively. As seen in fig. A, the data indicated an increasing trend in species abundance from April to September (figure no 2).

Figure 2

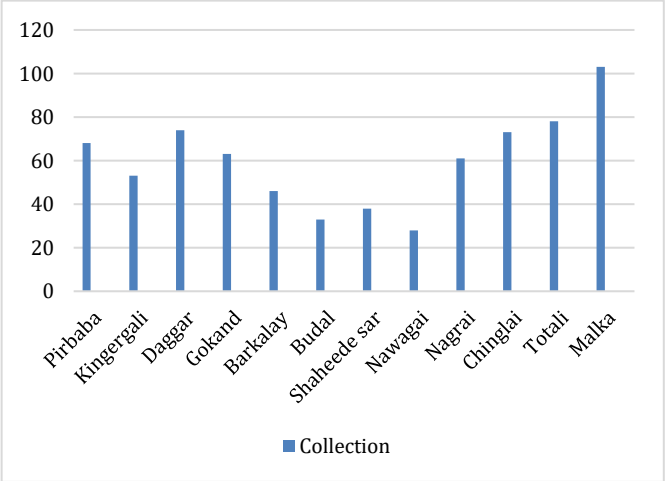
Month Wise Abundance of Grasshopper



Localitiewise Abundance of Grasshoppers

Figure 3

Localitiewise Abundance of Grasshoppers

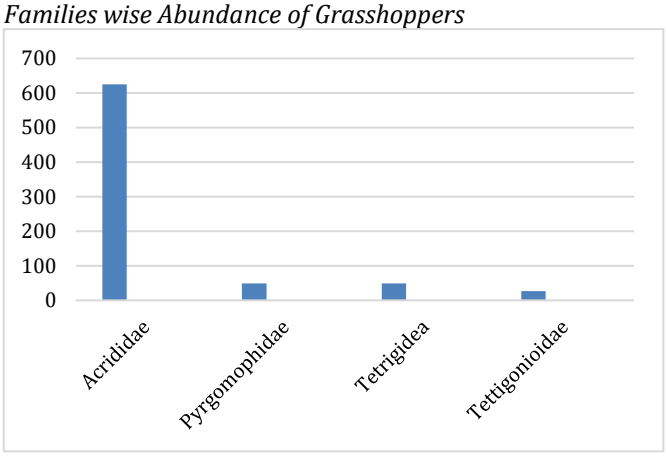


Families Wise Abundance of Grasshoppers

Most abudent family was Acrididae and represented by 22 species, Pygromorphoidae by 2 species, Tetrigidea by one species and Tettigonioidea by one species. Families' diversity of different collected grasshoppers is shown in Fig 4.

Figure 4

Families wise Abundance of Grasshoppers

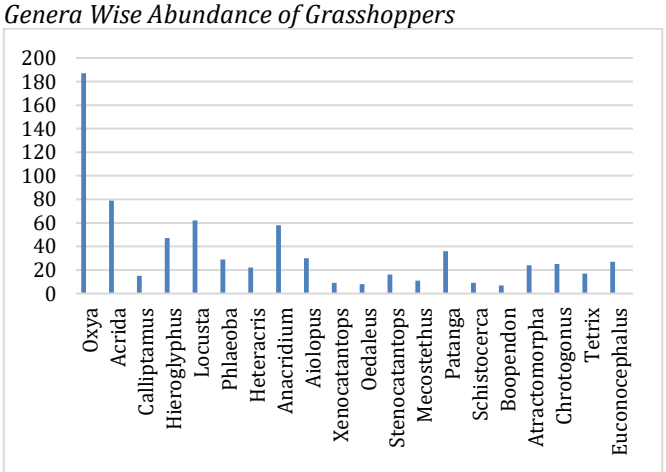


Genera Wise Abundance of Grasshoppers

Most abudent genera was *Oxya*and represented by 187 individuals while minimum number is represented by genera *Boopendon* 7 individuals and 8 individuals by genera *Oedaleus* respectively from the collected diversity of grasshoppers. Genera wise diversity of different collected grasshoppers is shown in Fig 5.

Figure 5

Genera Wise Abundance of Grasshoppers

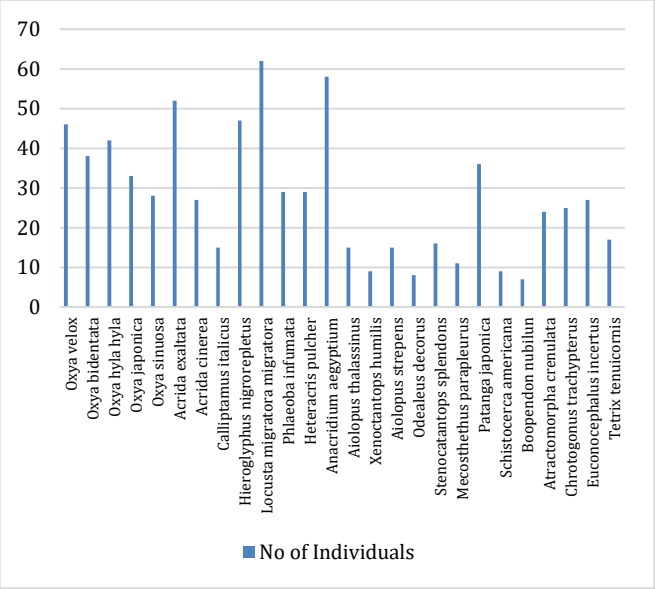


Species Wise Abundance of Grasshoppers

Locustamigratoramigratora was the most common species, and *Boopendonnubilum* had the lowest diversity value. Fig no 6 shows the number of individuals or species variety of the various collected grasshoppers.

Figure 6

Species Wise Abundance of Grasshoppers



DISCUSSION

The study of grasshopper is very significant as a result of its indication about climate changes and as an important element of the ecosystem. In the current research 2 sub order (Ensiera and Caelifera) 4 Super family (Acridoidea, Tettigonioidea, Pyrgomorphoidea and Tetriogidea), 4 families (Acrididae, Tettigonidae, Pyrgomorphidae and Tetrigidea) 10 subfamilies, (Acridinae, Cyrtacanthacridinae, Catantopinae, Calliptaminae, Eyprepocnemidinae, Hemiacridinae, Oxyinae, Oedipodinae, Pyrgomorphinae and Euconocephalinae) 20 genera and 26 species were recorded. Most abundant species was *Locustamigratoramigratora* whereas minimum value for diversity was shown by *Boopendonnubilum*, indicated the lowest value of the total sample size.

Similarities between the 33 species classified under four families are evident, with Tetrigidae members belonging to the fourth family. In all instances, the Acrididae family was the most prevalent, indicating similarities in this regard (Paulraj *et al*., 2009). In study reports, this similarity was also identified from (Capinera *et al*., 1997), (Thakur *et al*., 2004)and (Chandra *et al*., 2007). While the remaining species were unreported, three species (*A. exaltata, H. pulcher, and O. hylahyl*a) were discovered to be comparable.

According to reports, six subfamilies contained twelve genera and about 14 species. Acridinae, Eyprepon cnemidinae, and Oedipodinae were discovered to share similarities. Eight species make up the dominant subfamily Oedipodinae, whilst five species make up the most abundant subfamily Oxyinaeaccording to recent research. *Acridaexaltata* was a common species in both studies; other species are not mentioned in this article (Nawaz and Nawaz, 2010).

In Jharkhand (India), Nayeem and Usmani collected 421 specimens from 41 species, 28 genera, 10 subfamilies, and 3 families while working on taxonomy and field observations of the grasshopper and locust fauna (Orthoptera: acridoidea). Both the studies were reported to involve the subfamilies Oxyinae, Oedipodinae, Catantopinae, Eyprepocnemidinae, and Acridinae. While other species were lacking, *O.japonica, O.hylahyla, O.velox, H. nigrorepletus,* and *A. exaltata* were determined to be similar (Nayeem and Usmani, 2012).

There are 25 species of grasshoppers, which are divided into 22 genera, 10 subfamilies, and 18 orders within three families. The family Acrididae demonstrated the greatest level of diversity, followed by Pyrgomorphidae and Tettigonidae. Oedipodinae was the most prevalent subfamily among the ten subfamilies of grasshoppers in the research area. According to the results of the current study, Pyrgomorphidae, Tettigonidae, and Tetrigidae were the next three most prevalent families after Acrididae. And the *Locusta migratora migratora* was the dominant species. they cannot, however, be reported study on the *Tetrigidae* family (Suganya *et al*., 2020).

Insect surveys and collection were done for the first time in 2014–2015 in the Kolhapur district of Maharashtra's Tilari forest, Chandgad. 17 species of grasshoppers from 3 families and 17 genera were identified during this investigation. Family Tettigonidae had the most species (6), followed by Family Acrididae (8), and Family Pyrgomorphidae (3). According to the results of the current study, the Acrididae family, which includes roughly 22 species, Pyrgomorphidae, which has two species, Tetrigidae, which has just one species, and Tettigonidae, which has one species, are the most numerous families. And the *Locusta migratora migratora* was identified as the main species (More and Nikam, 2016).

There are 26 species, 14 genera, 2 families, and 8 sub families listed. In the current effort, both families (Acrididae and pyrgomorphidae) were discovered. The most prevalent family in both investigations was Acrididae, which suggested similarities. Except for subfamily Spathosterninae, which was absent from a recent study, all subfamilies were discovered to be comparable. Six species, including *O. japonica, O. hylahyla, O. velox, C. trachypterus, H. nigrorepletus*, and *A. exaltata,* were discovered to be similar, whereas the remaining 15 species were not identified in the most current investigation (Akhtar *et al*., 2012).

Between 2012 and 2013, research was conducted in Uttar Pradesh, India, on the abundance, distribution, and taxonomic investigations of hemiacridinae, also known as rice grasshoppers. They collected 408 samples of *Hieroglyphus banian* and 555 samples of *Hieroglyphus nigrorepletus,* whereas the current study collected *Hieroglyphus nigrorepletus* 47 samples, one species from the hemiacridinae subfamily, was frequently discovered, while the other species wasn't present (Akhtar *et al*., 2014).

Four families, ten subfamilies, and forty species were represented by the 340 samples that were collected. Acrididae and Pyrgomorphidae are mutually reported

families, however Dericorythidae and Pamphagidae were lacking. The family Acrididae was discovered to be widely distributed in the results of both research. In contrast to the other four subfamilies, which have not been discovered in recent research, Acridinae, Calliptaminae, Oedipodinae, Eyprepocnemidinae, and Pyrgomorphinae were discovered as common subfamilies in both studies (Abusarhan *et al*., 2017).

It listed 18 species, which were divided into 10 subfamilies, 14 genera, and 3 families. The Acrididae, Tettigoniidae, and Pyrgomorphidae families were all recorded in a same manner. In both situations, the Acrididae family was discovered to be the richest, indicating parallels in this regard. Acridinae, Oxyinae, Oedipodinae, and Pyrgomorphinae were comparable subfamilies, however Melanoplinae, Cyrthacanthacrinae, and Phaneropterinae were absent (Hussain *et al*., 2017). They stated that *O. hylahyla* was the most prevalent species, however current study indicates that *Locusta migratora migratora* is the dominant species. In both explorations, four species (*A. exaltata, O. hylahyla, O. japonica, and A crenulata*) were identified as related (Hussain *et al*., 2017).

Five subfamilies, nine genera, and nine species of Acrididae were reported. Similarities were observed in (Oedipodinae, Acridinae, and Eyprepocnemidinae) subfamilies, whereas the third and fifth subfamily was not detected in the current research. One species (*A.exaltata*) were found mutually however, other seven species were not found in the current investigation. The largest subfamily was Oedipodinae, while the most prevalent subfamily according to recent research was Oxyinae. *Oedaleus senegalensis* was the most abundant species, but *Locusta migratora migratora* was the most prevalent species in the current study. In both studies, the grassland fields had unquestionably the highest collection of acridides (Usman *et al*., 2017).

About 21 species of grasshoppers from three families were sampled. Both studies reveal similarities among all three families (Acrididae, Tettigoniidae, and Pyrgomorphidae). Three species (*A. exaltata, A. crenulata*, and *E. incertus*) were claimed to be identical, however further investigation reveals additional species to be different. And according to him, *Oxya nititula* was the dominant specie in the study, whereas *Locusta migratora migratora* was the abundant species (Kandibane *et al*., 2004).

In the Hazara region, 1402 species of grasshoppers and locusts were collected from various locations during the inspection. The Acrididae, the main family, which comprises 73 species belonging to 11 subfamilies and 38 genera, has been included in the othopterean fauna of this area. In addition, it was revealed that the subfamily Acridinae's members were most numerous (20.82%), followed by the subfamilies Oedipodinae, Gomphocerinae, and Oxyinae (17.61%, 17.47%, and 14.40%, respectively). Cyrtacanthacridinae and Tropidopolinae had the lowest populations, with 3.06% and 2.49%, respectively. The three subfamilies in the current study were in line, with Oxyinae as the dominant subfamily, followed by Acridine and Oedipodinae, and Pyrgomorphidae, 6.82%, Tettigoniidae, 3.76%, and Tetrigidae, 2.37%). Other subfamilies were not investigated in the current study (Ali and Panhwar, 2017).

There are 22 species of grasshoppers classified into 19 genera and 3 families. The majority of the Acrididae (17 family members within 8 subfamilies) were discovered. Pyrgomorphidae (2) and Tettigoniidae (3), on the other hand, only have one subfamily each. Acrididae, Tettigoniidae, and Pyrgomorphidae species percentages were revealed through statistical analysis. The species *Diabolo catantopspinguis* was the most prevalent, and *Euconocephalus incertus* showed the widest distribution. The variety was discovered by the investigation of many parameters, such as morphometric measurements of the wings, bodies, tarsi, femurs, tabia, antennae, and pronotum using a common scale ruler and a finely divided ruler. MS Excel 2010 was used to analyse the data. In the current research 2 sub order (Ensiera and Caelifera) 4 Super family (Acridoidea, Tettigonioidea, Pyrgomorphoidea and Tetriogidea), 4 families (Acrididae, Tettigonidae, Pyrgomorphidae and Tetrigidea) 09 subfamilies, (Oxyinae, Oedipodinae,Acridinae, Cyrtacanthacridinae, Catantopinae, Eyprepocnemidinae and Pyrgomorphinae) 20 genera and 26 species were recorded. The most numerous species was *Locusta migratora migratora*, whereas *Boopendon nubilum,* which represented the lowest value of the entire sample size, displayed the lowest value for diversity. The statistical methodology and morphometric techniques used in the two investigations are identical (Khan *et al*., 2021).

While Shelton and Rogers and Pfadt andLavigne reported seeing some grasshoppers on the ground eating algae, fungi, detritus material, humus, and moss, this phenomena was not observed in the current study (Sheldon and Rogers, 1978)(Pfadt, 1982). Most grasshoppers, especially those belonging to the Acridoidea superfamily, Braker claimed, lay their eggs in the earth. The majority of grasshoppers were seen laying eggs in soil during the current study (Braker, 1989).

The distribution of various grasshopper groups described in this study was consistent with that of Andersen et al., who confirmed that Acridid grasshoppers were the largest group in Kakadu National Park, Australia, followed by Tettigoniidae and Pyrgomorphidae. 56 species and 46 genera were discovered throughout his research, which was divided among 5 families. Of these, 4 families (Acrididae, Pyrgomorphidae, Tettigoniidae, and Tetrigidae) shown similarities, however one family (Eumastacidae) was not included in the current study. The fact was that neither event involved any species that was identical to the other(Andersen *et al*., 2000).

CONCLUSION

The present research work was conducted to evaluate the diversity and distribution of grasshoppers in the District Buner. It was the earliest pioneering effort ever done with the following.

1. Survey and collection of specimens were done from April 2022 to September 2022. A total of 718 sample of grasshoppers were collected.
2. The identification revealed 26 species under 20 genera spreading into 10 subfamilies with 4 super families under the 2 sub order i.e. Ensifera and Caelifera.

3. Caelifera was the most dominant suborder and Ensifera having less number of species.
4. Acrididae was the most prevalent family, while theTettigonioideaindicated the lowest range.
5. The most dominant species was recorded *Locusta migratora migratora* whereas, *Boopendon nubilum* indicated the lowest range.

Authors' Contributions

Conceptualization: Imad Ali Khan, and Sardar Azhar Mahmood. Methodology: Kausar Saeed, Imad Ali Khan, and Sardar Azhar Mahmood. Data Analysis: Imad Ali Khan, and Kausar Saeed. Formal Analysis: Sardar Azhar Mahmood, Investigation: Imad Ali Khan. Resources: Kausar Saeed. Data Correction: Imad Ali Khan and Kausar Saeed. Writing / Original Draft preparation: Imad Ali Khan, Writing Review and Editing: Imad Ali Khan. Supervision: Sardar Azhar Mahmoodand. Project Administration: Sardar Azhar Mahmood, Kausar Saeed, and Imad Ali Khan.

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