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A checklist of acrididae (Orthoptera) of Hazara Division Khyber Pakhtunkhwa Pakistan

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Abstract
An extensive survey was carried out during the year 2016-17 to find out Acridid fauna of Hazara Region. During inspection 1402 species of grasshoppers and Locusts were collected from different localities in Hazara region. Collected specimens of Acrididae family were identified and sorted out into 73 species pertaining to 11 sub-families and 38 genera, has been enlisted to othopterean fauna of this region. Beside this it was noted that the members of subfamily family Acridinae was found to be most abundant with 20.82%, followed by Oedipodinae, Gomphocerinae and Oxyinae with 17.61%, 17.47% and 14.40% respectively. Lowest population was observed in Cyrtacanthacridinae and Tropidopolinae with 3.06% and 2.49% respectively.

Keywords: Checklist, Acridid, Identification, Hazara Region, Locusts, Population.

1. Introduction
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. The grasshopper insect fauna generally are grouped as short-horned grasshopper (Caelifera) and long-horned grasshopper (Ensifera) [1, 2].
Orthoptera is known to be one of the largest orders of insects representing 22,500 species worldwide [3]. Acriddidae is family Short horned grasshoppers and locusts which are placed in suborder Caelifera under superfamily Acrididae[4]. Acridoidea is largest superfamily and most diverse group representing 11,000 species worldwide [5]. Grasshoppers belonging to family Acrididae are of maximum economic importance as they are a major plant pest that can intensely damage the growth of crops [6], pastures, forests [7], their nutritional values and production rate. They cause considerable damage to agricultural crops, pastures and forests and are well reputed for their destructiveness all over the world. Locusts and grasshoppers have invaded green crops from the earliest days to present time [8].
General body characteristic of members of Acrididae includes head without fastigial furrow with wide frontal ridge, fastigial foveolae may be present or absent, with median depression. Antennae are of various forms, dorsum of the pronotum is short and is of various shapes, typically with median and lateral carinae; prosternal process may be present or absent; tympanum is usually present; tegmina and wings are fully developed, reduced or absent; tympanum is usually present; lower basal lobe of the hind femur is mostly shorter or as long as upper one; Brunner's organ is present and hind tibia did not bear any apical spine.
Periodic sporadic reports on insect fauna had been made from different regions of Pakistan some of which are reported by [7-33]. The aim of this paper is to compile and formalize the checklist concerning known species and new and partly unpublished records of the family Acrididae from this region. Additionally, we want to specify the gaps in the knowledge and the need for future research of this group.

2 Materials and Methods
2.1 Location
Specimens were collected various districts of Hazara division. Hazara division is located at 34°30'0" North and 73°15'0" East. It is bounded by northern areas on the north; Azad Kashmir is in its east, Islamabad is situated at the south of Hazara division.

Total area of Hazara division is 18,013 km². It is the wettest part of Pakistan. Hazara division has an unusual bimodal rainfall regime with one peak in February and another in July and August. As Hazara is present at high altitude, temperature in Hazara division is cooler than on plains (Fig.1)

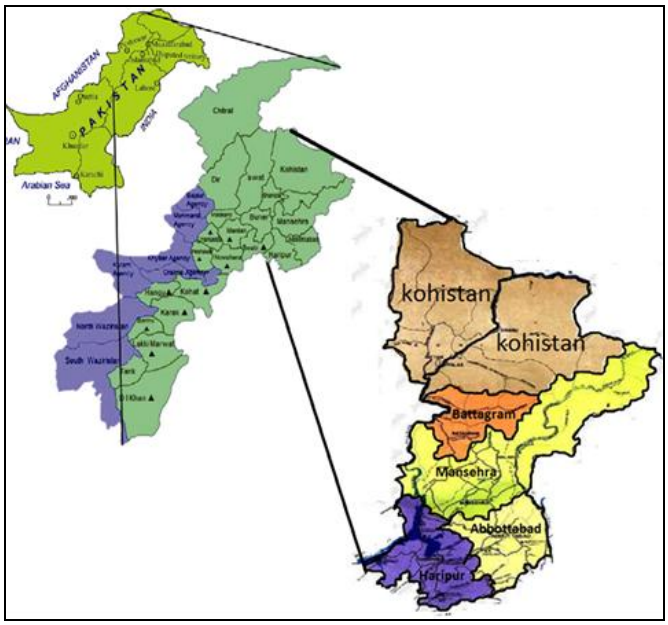

Fig 1: Map of Study area

2.2 Sampling, Killing and Preservation

The adult grasshoppers of both sexes were collected from different localities of Hazara division, KPK, Pakistan during the year 2016-17. Specimens were collected by use of aerial insect net, forceps and by handpicking. Collected specimens were killed using Potassium cyanide. After killing they were relaxed, stretched and were pinned properly through pronotum. The insects were then dried and kept into insect boxes by keeping naphthalene balls in order to prevent from parasitoids and predators.

2.3 Identification

Identification of specimens was carried out by the use of stereoscopic dissecting binocular microscope with the help of experts, keys and description available in literature and on website "http:/ www.orthoptera.org"

2.4 Depository

The material is deposited at insect Museum, Department of Zoology, Hazara University, Mansehra.

3 Results and Discussion

As a result of this work, a total of 1402 adult specimens were collected from different climatic zone of Hazara division during the year 2016-2017. Field sites included; agriculture land, forests, fruit orchards, grapevine, berry, shrubs, hilly, semi desert and desert areas, trees, shrubs, herbs and grasses. The collected material was sorted out into 73 species of Acrididae pertaining to 11 sub-families and 38 genera (Table.1). Among them members of subfamily Acridinae was found to be most abundant with 20.82%, followed by Oedipodinae, Gomphocerinae and Oxyinae with 17.61%, 17.47% and 14.40% respectively. Lowest population was observed in Cyrtacanthacridinae and Tropidopolinae with 3.06% and 2.49% respectively (Fig.2).

Panhwar *et al.* [34] reported 47 species belonging to 07 sub-families of tettigoniidae from Pakistan. Additionally, they provided first checklist along with distribution data for tettigoniidae (Long-horned grasshoppers) for the first time. Riffat *et al*., [35] carried a preliminary observation on the occurrence of Orthoptera from district Jamshoro Sindh they collected nearly 183 specimens pertaining to Oedipodinae, Acridinae, Oxyinae and Pyrgomorphinae. Beside this, they provided the distribution of species along with taxonomic keys. Li *et al*., [36] carried a detail investigation on orthopteroid insect fauna of China. They reported 22 Genera, 35 Species of Gryllidae and a single genus with a single species of Gryllotalpidae. Ali *et al*., [37] while reporting slant faced grasshopper from Pakistan recorded *Mermiria bivittata* (Serville, 1838) for the first time. Moreover, they extended the distributional range of this species to untouched area. Additionally, they provided a detail description of genus and species supplemented by digital photographs. Panhwar *et al*. [38] reviewed the genus *Pezodrymadusa* (Orthoptera) from Pakistan. Further, they reported *Pezodrymadusa sehraensis* as new species to science. Moreover, they redescribed 15 other species of this genus. In addition to this they provided a checklist and taxonomic key for the identification of species.

Orthoptera of Himachal Pradesh, India resulted in 165 species under 105 genera and 16 families [39]. Checklist of Orthoptera of Madhya Pradesh and Chhattisgarh resulted in finding of 139 species under 12 families. Besides this, information on district wise distribution of and occurrence of species in protected areas was provided [40]. Checklist of Acrididae of Himachal Pradesh resulted in finding of 44 species of locusts and grasshoppers that were captured from different localities and habitats such as grasslands, crop fields, bushes etc. Additionally, species were organised under their respective subfamilies and their occurrence was calculated subfamily wise [41].

Checklist of Orthoptera of India included 1033 species / subspecies belonging to 398 genera and 21 families of Orthoptera from India. The order Orthoptera is divided into two suborders namely Caelifera and Ensifera. The suborder Caelifera includes short-horned grasshoppers, locusts and grouse locusts, however Ensifera includes long-horned grasshoppers, katydids, crickets and mole crickets. The suborder Caelifera is represented by 518 species under 214 genera and 11 families viz. Acrididae (285 species and 134 genera), Dericorythidae (04 species and 02 genera), Pamphagidae (01 species and 01 genus), Chorotypidae (09 species and 07 genera), Eumastacidae (08 species and 04 genera), Mastacideidae (08 species and 02 genera), Pyrgomorphidae (47 species and 21 genera), Tetrigidae (137 species and 39 genera), Tridactylidae (19 species 04 genera). The suborder Ensifera includes 515 species, 184 genera and 10 families namely Gryllidae (231 species and 72 genera), Trigonidiidae (22 species and 08 genera), Gryllotalpidae (08 species and 02 genera), Mogoplistidae (14 species and 07 genera), Myrmecophilidae (04 species and 01 genera), Prophalangopsidae (01 species and 01 genus), Rhaphidophoridae (14 species and 04 genera), Schizodactylidae (03 species and 01 genus), Anostostomatidae (06 species 05 genera), Gryllacrididae (49 species and 14 genera), Stenopelmatidae (03 species and 01 genus) and Tettigoniidae (160 species and 68 genera) [42].The Orthoptera of Singapore revealed 20 species from terrestrial surveys conducted during Project Semakau from Nov.2009 to Feb.2012. Finding of *Gonista cf. bicolor* (de Haan) postulated to be restricted to the Semakau Landfill and appears to be the

first published record for Singapore [43].

Checklist of the grasshoppers and crickets (Orthoptera) of the Czech Republic resulted with 96 species of Orthoptera belonging to the fauna of the Czech Republic. Further information on missing, unclear, and extinct species and on newly detected species, and confirmed the status of species that have been missing for a long time (*Leptophyes boscii*, *Polysarcus denticauda*, *Ruspolia nitidula*, *Eumodicogryllus bordigalensis*, *Tetrix bolivari*, *Mecostethus parapleurus*). It was also noted that those species for which only several individuals were detected (*Pteronemobius heydenii*) or those survived only at a single locality (*Platycleis montana*, *Aiolopus thalassinus*, *Dociostaurus brevicollis*, *Omocestus petraeus*) or at two localities (*Poecilimon intermedius*, *Platycleis veyseli*, *Pseudopodisma nagyi*). Beside this, *Phaneroptera nana* was recorded as new for Bohemia [44]. Present findings suggest that, the distributions of many of previously recorded species have been extended to new localities.

Following is checklist of species:

Table 1: Checklist of family Acrididae

Sub-Family	Species	Authority
Acridinae	*Acrida exaltata*	(Walker, 1859)
	Truxalis eximia eximia	(Eichwald, 1830)
	Truxalis indica	Bolivar, 1902
	Phlaeoba tenebrosa	(Walker, 1871)
	Phlaeoba infamata	(Bolivar, 1893)
	Phlaeoba antennata	Brunner, 1893
	Duroniella laticornis	(Krauss, 1909)
Catantopinae	*Diabolocatantops innotabilis*	(Walker, 1870)
	Diabolocatantops pinguis pinguis	(Stål, 1861)
	Xenocatantops humils	(Serville, 1839
Cyrtacanthacridinae	*Anacridium aegyptium*	(Linnaeus, 1764)
	Anacridium rubrispinum	Bey- Bienko, 1948
	Cyrtacanthacris tatarica	(Linnaeus, 1758)
Calliptaminae	*Sphodromerus undulatus undulatus*	(Kirby, 1914)
	Calliptamus italicus italicus	Linnaeus, 1758
	Calliptamus barbarus barbarus	Costa, 1836
	Calliptamus tenuicerics	Tarb, 1930
Eyprepocnemidinae	*Eyprepocnemis alacris alacris*	(Serville, 1838)
	Eyprepocnemis roseus	Uvarov, 1942
	Choroedocus illustris	(Walker, 1870)
	Heteracris littoralis	(Rambur, 1838)
	Heteracris adspersa	(Redtenbacher, 1889)
	Heteracris notabilis	(Uvarov, 1942)
Oxyinae	*Oxya hyla hyla*	Serville, 1831
	Oxya hyla intricata	(Stål, 1860)
	Oxya fuscovittata	(Marschall, 1836)
	Oxya bidentata	Willemse, 1925
	Oxya velox	(Fabricius, 1787)
	Oxya nitidula	(Walker, 1870)
Hemiacridinae	*Hieroglyphus perpolita*	(Uvarov, 1932)
	Hieroglyphus nigrorepletus	Bolivar, 1912
Tropidopolinae	*Tropidopola longicornis longicornis*	(Fieber, 1853)
	Tristria pulvinata	(Uvarov, 1921)
Spathosterninae	*Spathosternum prasiniferum*	(Walker, 1871)
Gomphocerinae	*Aulacobothrus luteipes*	(Walker, 1871)
	Chorthippus indus	Uvarov, 1942
	Chorthippus biguttulus biguttulus	(Linnaeus, 1758)
	Chorthippus brunneus	(Thunberg, 1815)
	Dociostaurus angulatus	Tarbinsky, 1927
	Dociostaurus dorsatus	Zetterstedt, 1821
	Dociostaurus nigrogeniculatus	Tarbinsky, 1928
	Dociostaurus maroccanus	(Thunberg, 1815)
	Stenohippus mundus	(Walker, 1871)
	Stenohippus trapezoids	(Bolivar, 1914)
	Gonista sagitta	(Uvarov, 1912)
	Gonista rotundata	Uvarov, 1933
	Ochrilidia geniculata	(Bolivar, 1913)
	Ochrilidia gracilis gracilis	(Krauss, 1902)
	Gelastorhinus semipictus	(Walker, 1870)
	Mermiria bivittata	(Serville, 1838)
Oedipodinae	*Acrotylus humbertianus*	Saussure, 1884
	Acrotylus longipes longipes	(Charpentier, 1845)
	Acrotylus longipes subfasciatus	(Bey-Bienko, 1948)
	Aiolopus thalassinus tamulus	(Fabricius, 1798)
	Aiolopus thalassinus thalassinus	(Fabricius, 1781)

	Aiolopus simulatrix simulatrix	(Walker, 1870)
	Hilethera oedipodioides	(Bolivar, 1902)
	Locusta migratoria migratoria	(Linnaeus, 1758)
	Gastrimargus africanus sulphureus	(Bey-Bienko, 1951)
	Gastrimargus africanus africanus	(Saussure, 1888)
	Gastrimargus orientalis	Sjöstedt, 1928
	Oedaleus abruptus	(Thunberg, 1815)
	Oedaleus senegalensis	(Krauss, 1877)
	Scintharista notabilis pallipes	Uvarov, 1941
	Oedipoda miniata atripes	Bey-Bienko, 1951
	Mioscirtus wagneri rogenhoferi	(Saussure, 1888)
	Sphingonotus savignyi	Saussure, 1884
	Sphingonotus balteatus himalayanus	Uvarov, 1923
	Sphingonotus rubescens subfasciatus	Bey-Bienko, 1951
	Sphingonotus rubescens afghanicus	Mishchenko, 1937
	Sphingonotus rubescens rubescens	(Walker, 1870)
	Heteropternis respondens	(Walker, 1859)
	Trilophidia annulata	(Thunberg, 1815)

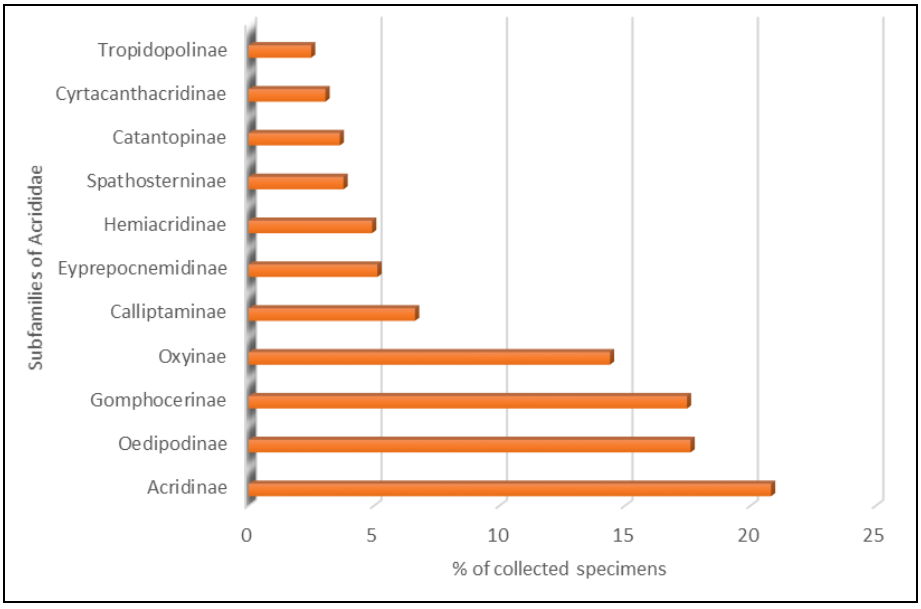

Fig 2: Showing% of population of collected specimens with respect to their Sub-families

4. Conclusion

As a result of the present study it is concluded that the Hazara region occupies a wide range of habitat and it is rich in the Orthoptera fauna. More surveys may lead to the discovery of new species in the world of Science.

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6. References

1. Panhwar WA. Studies on the Systematic and Ecological Status of Tettigonioidea (Ensifera) Of Pakistan. PhD Thesis Submitted To Department of Zoology, University of Sindh, 2015, 1-242.
2. Ali S, Panhwar WA, Riffat S, Mehmood SA, Wagan MS. First record of the genus *Mermiria* Stål with its species *Mermiria bivittata* (Serville, 1838) from Pakistan (Orthoptera, Acrididae, Gomphocerinae). Journal of Entomology and Zoology Studies. 2017; 5(1):279-281
3. Ghosh AK, Sengupta S. Insect Collection, Preservation and Study (Handbook). Zoological Survey of India Publication, 1982, 65.
4. Ander. Division of Orthoptera into two suborders, Ensifera and Caelifera. Opuscula Entomologica 1939; 2(Suppl.):306.
5. Shishodia MS, Chandra K, Gupta SK. An annotated checklist of Orthoptera (Insecta) from India. Zoological Survey of India, 2010.
6. Parihar DR. Grasshopper Pests Of GrazingLand Vegetation And Their Management In Indian Desert, Central. Ari. Zon. Res. Inst. Jodhpur. India. 1987; 130.
7. Joshi PC, Lockwood JA, Vashishth N, Singh A. Grasshopper (Orthoptera: Acridoidea) community dynamics in a moist deciduous forest in India. Journal of Orthopteran Research. 1999; 8:17-23.
8. Soomro F, Sultana R, Wagan M, Abbasi A. Fauna of Acrididae (Orthoptera: Acridoidea) from Nara Desert District Khairpur. Sindh University Research Journal-SURJ (Science Series). 2015; 47(4).
9. Bughio BA, Sultana R, Wagan MS. A new species of the genus Hilethera Uvarov (Oedipodinae: Acrididae: Orthoptera) from Pakistan. J. Cell Anim. Biol. 2012; 6:29-32
10. Cardinale BJ, Diane S, Srivastava JE, Duffy PW, Justin D *et al*. Effects of biodiversity on the functioning of trophic groups and ecosystems. Nature. 2006; 443:989-992.
11. Chapman RF. The structure and wear of mandibles in some African grasshoppers. Proc. zool. Soc. Lond. 1964;

142:107-121.
12. Dadd RH. Feeding behavior and nutrition in grasshoppers and locusts. Adv. Insect Physiol. 1963; 1:47-109
13. Eades DC, Otte D, Cigliano MM, Braun H. Orthoptera species file. Version 5.0/5.0. [cited 2017 Apr 03]. Available from: http://orthoptera.species.file.org
14. ElEla SA, ElSayed W, Nakamura K. Incidence of orthopteran species (Insecta: Orthoptera) among different sampling sites within Satoyama area, Japan. Journal of Threatened Taxa. 2012; 4(3):2476-2480.
15. Gupta SK, Chandra K. A new species of the short-horned grasshopper genus Heteropternis Stål, 1873 (Orthoptera: Acrididae) from Central India. In Annales de la Société entomologique de France (NS) Taylor & Francis. 2016; 52(4):196-203.
16. Isley FB. Correlation between mandibular morphology and food specificity in grasshoppers. Ann entomol. Soc. Am Florida University, Florida, 1944, 1- 5.
17. Joern A, Lawlor LR. Food and microhabitat utilization by grasshoppers from arid grasslands: comparisons with neutral models. Ecology. 1980; 61:591-599.
18. Joern A. Feeding patterns in grasshoppers (Orthoptera: Acrididae): Factor influencing diet specialization. Ecologia. 1979; 38:325-347.
19. Kirby WF. The fauna of British India, including Ceylon and Burma, I. Orthoptera (Acridiidae). London: Taylor and Francis. 1914; ix+276.
20. Lomer CJ, Bateman RP, Johnson DL, Langewald J, Thomas M. Biological control of Locusts and grasshoppers. Annu. Rev. Ent. 2001; 46:667-702.
21. Mahmood K, Idris AB, Salmah Y. Tetrigidae (Orthoptera: Tetrigoidea) from Malaysia with the description of six new species. Acta Entomologica Sinica. 2007; 50:1272-1284.
22. Nadia A, Irfan A, Tanveer H, Ishtiaq A. American-Eurasian J Agric. & Environ. Sci. 2015; 15(8):1693-1699.
23. Otte D. The North American grasshopper. Acrididae: Gomphocerinae and Acridinae. Harvard University Press, Cambridge, MA. 1981; I:1-275.
24. Panhwar WA, Riffat S, Wagan MS, Khatari I, Santosh K. Systematic study on the various Tribes of Phaneropterinae (Tettigonioidea: Orthoptera) occurring in Pakistan. Pakistan Journal of Zoology. 2014; 46:203-213.
25. Panhwar WA, Riffat S, Wagan MS, Santosh K. Notes on the distribution and morphological description of Glyphonotus sinensis Uvarov, 1939 (Orthoptera: Tettigoniinae: Glyphonotini) from Pakistan. International Journal of Advanced Research. 2013; 1(9):679-682
26. Panhwar WA, Riffat S, Wagan MS, Santosh K. On the distribution and taxonomy of Conocephalus species (Orthoptera: Tettigonioidea: Conocephalinae) from Pakistan. Journal of Biodiversity and Environmental Sciences. 2013; 3(11):171-176
27. Panhwar WA, Riffat S, Wagan MS, Wagan YS, Santosh K, Solangi FH. Taxonomy and Ecology of Genus Euconocephalus Karny, 1907 (Orthoptera: Tettigonioidea: Conocephalinae) from Pakistan. International Journal of Advanced Research. 2014; 2(2):268-277.
28. Parihar DR. Grasshopper pests of grazing land vegetation and their management in Indian Desert. Central Arid Zone Research Institute; Jodhpur, 1987.
29. Riffat S, Wagan MS. Super flood destroyed the natural habitat of many animals in Sindh province Proc. 2nd International Conference of (IC Biour-life) Shah Latif Uni. 2010, 277-279.
30. Riffat S, Wagan MS. A revision of the Genus Heiroglyphus Krauss 1877 (Hemiacridinae: Acrididae: Orthoptera) with description of one new specie from Pakistan. Pakistan Journal of Zoology. 2012; 1:43-50.
31. Riffat S, Wagan YS, Wagan MS. Orthopteran Biodiversity of Thar desert, Sindh, Pakistan. Pakistan Journal of Zoology. 2013; 2:299-304.
32. Uvarov BP. XI.—A revision of the Old World Cyrtacanthacrini (Orthoptera, Acrididæ).—I. Introduction and key to genera. Journal of Natural History. 1923; 11(61):130-144.
33. Li Han, Yu LH, Ming SF. The investigation of Orthoptera from Huagaxi Nature Reserve of Sichuan, China. International journal of fauna and biological studies. 2015; 2(1):17-24
34. Panhwar WA, Riffat S, Wagan MS, Khatri I, Rustamani AR. First Checklist and Distribution of Tettigonioidea (Ensifera: Orthoptera) from Pakistan. ZOO's PRINT. 2016; XXXI(11):7-12
35. Riffat S, Wagan YS, Wagan MS. Orthopteran Biodiversity of Thar desert, Sindh, Pakistan. Pakistan Journal of Zoology. 2013; 2:299-304.
36. Li Han, Yu LH, Ming SF. The investigation of Orthoptera from Huagaxi Nature Reserve of Sichuan, China. International journal of fauna and biological studies. 2015; 2(1):17-24
37. Ali S, Panhwar WA, Riffat S, Mehmood SA, Wagan MS. First record of the genus *Mermiria* Stål with its species *Mermiria bivittata* (Serville, 1838) from Pakistan (Orthoptera, Acrididae, Gomphocerinae). Journal of Entomology and Zoology Studies. 2017; 5(1):279-281
38. Panhwar WA, Ahmed Z, Khatri I Castaneda. J Review of the genus Pezodrymadusa (Tettigoniidae: Orthoptera) witt description of a new species from Pakistan. 2017; 6(2):78-93.
39. Shishodia MS, Gupta S. Checklist of Orthoptera (Insecta) of Himachal Pradesh, India. Journal of Threatened Taxa. 2009; 1(11):569-72.
40. Chandra K, Gupta SK, Shishodia MS. A checklist of Orthoptera of Madhya Pradesh and Chhattisgarh. Zoos' Print Journal. 2007; 22(5):2683-7.
41. Kumar H, Usmani MK. A Checklist of Acrididae (Orthoptera: Acridoidea) of Himachal Pradesh. Advances in Life Sciences. 2012; 1(2):162-3.
42. Chandra K, Gupta SK, Shoshodia MS. A checklist of Orthoptera (INSECTA) of India. Zoological Survey of India (MP), India. 2010, 1-57.
43. Tan MK, Wang LK. The Orthoptera of Semakau Landfill, Singapore: A Project Semakau checklist. Nature in Singapore. 2012; 5:309-18.
44. Holuša J, Kočárek P, Vlk R, Marhoul P. Annotated checklist of the grasshoppers and crickets (Orthoptera) of the Czech Republic. Zootaxa. 2013; 3616(5):437-60.