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Biodiversity and Occurrence of Grasshoppers (Acrididae: Orthoptera) of Quetta Division Balochistan*

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Abstract.- During survey of grasshopper fauna (2005-2006) in various representative localities of Quetta division of Balochistan, 14 species were collected. Out of these, 11 species are recorded for the first time from this area. These are: *Acrida exaltata* (7.0%), *Aiolopus thalassinus thalassinus* (16.9 %), *Heteracris illustris* (0.22%), *Locusta migratoria* (4.3%), *Oedaleus senegalensis* (3.14%), *Oedaleus abruptus* (0.22%), *Ochrilidia gracilis gracilis* (2.7%), *Schistocerca gregaria* (1.6%), *Scintharista notabilis* (16.2%), *Sphingonotus rubescens rubescens* (8.31%) and *Truxalis eximia eximia* (3.0%), The species distributions and occurrence at the district level are also considered.

Key words: Acrididae, Biodiversity, Quetta, Pakistan.

INTRODUCTION

Quetta Division of Balochistan lies between 3° to 15' N latitude and 68° to 30' E longitude. The total area of the division is about 64,310 Km covering parts of the Pishin, Qilla Abdullah, Chaghi, and Quetta districts. Mostly mountainous, it is bound East by the Sulaiman Range and North by the Toba Kakar Range, separating it from Afghanistan. In general it has dry climate and receives rainfall during winter season. It has minimum winter temperature ranging well below freezing point, to as low as -13˚C, while maximum winter temperature seldom exceeds 20˚C. Summer maximum and minimum temperatures hover between 40˚C and 12˚C, respectively.

Grasshoppers are largely phytophagous insects, they have been extensive studies on food selection in grasshoppers and these have been adequately reviewed by Uvarov (1966) and Chapman (1990). An overall majority of phytophagous insects restricts host plant use to closely related group of plant species, sometimes even a single species Berneys and Chapman (1994). Grasshoppers are thought to be an exception.

In general grasshoppers are polyphagous, meaning they feed on selectively on plants from multiple plant families. Polyphagy has been demonstrated at the species, population and individual levels (Sword and Dopman, 1999; Chapman, 1990; Chapman and Sword, 1997) provide reviews of host plant use and the relative extent of polyphagy in grasshoppers.

Phylogenetic differences exist among grasshoppers in relation to host plant preferences (Dadd, 1963; Joern, 1979). For example, members of the acridid subfamily Gomphocerinae tend to have a preference from grasses, Cyrtacanthacridinae prefer forbs, and Oedipodinae eat both grasses and forbs (Dadd, 1963; Joern and Lawlor, 1980; Otte, 1981). The Acridinae are typically considered to be grass-feeders (Chapman, 1964; Isley, 1944) very rarely a species in this subfamily will display herbivorous (Chapman, 1964).

Until now a detailed survey of grasshopper fauna of Quetta Division has not been carried out, although several papers have made casual references to it (Kirby, 1914; Uvarov, 1941, 1942, 1943; Jago, 1963; Ahmad and Ahmed, 1979, Ahmad *et al.*, 1980; Bei-Bienko and Mishchenko, 1951a, b; Riffat *et al*., 2002; Irshad 1977a,b; Ahmad, 1980; Khan, 1990, 1992). Grasshoppers are mainly a problem of arid regions of the world, where they periodically cause devastation in their invasion areas (Watts *et al.,* 1982). This study deals with the distribution, occurrence and important host plants in order to characterize the Acrididae fauna of the Quetta Division.

Species of the family Acrididae recorded for the first time from these areas are *Acrida exaltata*, *Aiolopus thalassinus thalassinus*, *Heteracris illustris*, *Ochrilidia gracilis gracilis*, *Oedaleus*

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abruptus, *Odealus senegalensis*, *Scintharista notabilis*, *Sphingonotus rubescens rubescens*, *Schistocerca gregaria*, *Truxalis eximia eximia*, while *Anacridium rubrispinum* is new record in Qilla Abdullah, Chagai and Nushki. *Acrotylus humbertianus* from Chaghi, Nushki, Pishin and Qilla Abdullah, *Sphingonotus savignyi* from Pishin, Chaghi, Nushki and Qilla Abdullah.

MATERIALS AND METHODS

The systematic survey of grasshopper fauna was undertaken on different dates, times and seasons in the collection areas with regard to the biodiversity covering the period from July 2005 to August 2006. Figure 1 shows the study sites of the different localities within the Quetta Division. The

Fig. 1. Map of Quetta division indicating (□) the study sites.

occurrence and distribution of grasshopper species during survey period was studied by taking on an average of 50 sweeps in each district during each trip with the help of an insect collecting hand net of 30cm in diameter. The material thus collected and killed in a cyanide killing bottles, identified with published insect keys (Kirby, 1914; Bei-Bienko and Mishchenko, 1951). During present investigations some species of grasshoppers were observed associated with particular plants feed on them because the grasshoppers species prefer habitats or associations in which wide variety of vegetations and favorable conditions are to be found there.These collections were deposited in the Museum of Entomology, Department of Zoology, University of Balochistan, Quetta for preparation, identification and storage. After killing the grasshoppers, they were immediately pinned on a setting board and kept with naphthalene balls for safety of grasshopper's preservation. The system of classification followed is that of Uvarov (1966).

RESULTS

As a result of surveys in various representative localities of Pishin, Qilla Abdullah, Chaghi, Nushki and Quetta districts. A total of 458 adult grasshoppers were collected. Fourteen species and five subspecies of the family Acrididae under six subfamilies belonging to twelve genera have been identified (Table 1). The distribution, biodiversity and occurrence of these species at district level are shown in (Tables I and II). Most of the species were collected from grasses, herbs and shrubs. However, some species were collected from single host plants like grasses, vegetables, jowar, wheat, tomato and other crops. *Acrida exaltata* (Walker) on *Pistum sativum*, *Solanum melongena* and *Alopecurus nepalensis. Aiolopus thalassinus thalassinus* (F.) on *Pennisetum flaccidum*, *Medicago sativa* and *Chrysopogon montanus*. *Truxalis eximia eximia* (Echwald) on *Zea mays*, *Salsola kali* and *Suaeda monoca. Ochrilidia gracilis gracilis* (Krauss) on *Digitaria serata* and *Digitaria nodosa. Acrotylus humbertianus* (Sauss) on *Zea mays* and *Allium rubellum*, were most commonly observed on these plants, respectively.

Table I shows that occurrence and distribution of grasshopper species in the districts of Quetta division 2005-2006. The acridoid material indicated the presence of 6 subfamilies of Acrididae. The Acridinae is represented by one species, Cyrtacanthacridinae by two species, Oedipodinae being a dominant subfamily with 8 species, Truxalinae with one species, Gomphocerinae and Eypreponcnemidinae one species with each. The pattern of distribution of grasshopper species has, however, been determined on the basis of one year data. *Aiolopus thalassinus thalassinus* was the most abundant species on all the plant categories throughout the year. This represented 20.3% of the overall catches in all the categories of plants surveyed, and is therefore, the most dominant

Table I.- Distribution of grasshoppers in various districts of Balochistan.

Subfamily and Species	Districts						
	Pishin	Qilla Abdullah	Chaghi	Nushki	Quetta	Total	Occurrence %
Oedipodinae							
Scintharista notabilis (Uv.)	40	20	2	11	10	83	18.1
Sphingonotus rubescens rubescens(Wlk.)	20	6	1	11	10	48	10.4
Aiolopus thalassinus thalassinus (F.)	35	18	8	10	22	93	20.3
Acrotylus humbertianus (Sauss.)	14	10	1	3	9	37	8.0
Locusta migratoria migratoria (L.)	5	1	8	3	5	22	4.8
Oedaleus abruptus (Thunb.)	20	1	8	5	2	36	7.9
Oedaleus senegalensis (Krauss.)	4	2	5	1	3	15	3.3
Sphingonotus savignyi (Sauss.)	5	3	-	6	8	22	4.8
Acridinae							
Acrida exaltata (Wlk.)	10	6	4	10	9	39	8.5
Gomphocerinae							
Ochrilidia gracilis gracilis (Krauss.)	-	-	8	6	4	18	3.9
Cyrtacanthacridinae							
Anacridium rubrispinum (B. Bienko)	3	5	-	-	2	10	2.2
Schistocerca gregaria (Forsk.)	2	1	1	3	7	14	3.1
Truxalinae							
Truxalis eximia eximia (Eich.)	3	2	3	5	7	20	4.4
Eyprepocnemidinae							
Heteracris illustris	1	-	-	-	-	1	0.2
Total average	35.3	16.3	10.6	16.1	21.3		

species in the area. The next abundant species were *Scintharista notabilis* (18.1%) *Sphingonotus rubescens rubescens* (10.4%) *Acrotylus humbertianus* (8.0%) *Acrida exaltata* (8.5%) *Locusta migratoria* (4.8%) *Sphingonotus savignyi* (4.8%) *Oedaleus senegalensis* (3.3%) *Truxalis eximia eximia* (4.4%) *Ochrilidia gracilis gracilis* (3.9%) *Anacridium rubrispinum* (2.2%) *Schistocerca gregaria* (3.1%) While single collected individuals of *Oedaleus abruptus* (7.9%) and *Heteracris illustris* (0.2 %) were recorded rare.

The widely distributed species recorded in all districts were *Acrida exaltata, Aiolopus thalassinus thalassinus, Acrotylus humbertianus, Sphingonotus rubescens rubescens* and *Scnitharista notabilis*, Moreover they were found almost in all seasons, while moderately distributed species were *Oedaleus senegalensis, Locusta migratoria, Sphingonotus savignyi, Truxalis eximia eximia, Ochrilidia gracilis gracilis. Anacridium rubrispinum and Schistocerca gregaria* were quite nominal.

Table II shows the average population of each species in Pishin, Qilla Abdullah, Chaghi, Nushki and Quetta districts. The present study demonstrates that the prevalent species are *Acrotylus humbertianus* (38%), *Acrida exaltata* (26%), *Aiolopus thalassinus thalassinus* (42%), *Spingonotus rubescense rubescense* (42%), *Scintharista notabilis* (48.1%) and *Heteracris illustris* (100%) in Pishin, while *Heteracris illustris* in other districts was noted to be zero. *Anacridium rubrispinum* (50%) was found in Qilla Abdullah, *Locusta migratoria migratoria* (36.3%), *Ochrilidia gracilis gracilis* (44.4%) *Oedaleus abruptus* (22.2%) and *Oedaleus senegalensis* (33.3%) in Chagi, whereas, *Sphingonotus savignyi* (36.3%), *Schistocerca gregaria* (50%) and *Truxalis eximia eximia* (35.0%) were found in Quetta.

Table II.- Population ratio in field of the various Districts of Balochistan.

Subfamily and Species	Districts				
	Pishin	**Qilla Abdullah**	**Chaghi**	**Nushki**	**Quetta**
Oedipodinae					
Scintharista notabilis (Uv.)	48.1	24.0	2.4	13.2	12.0
Sphingonotus rubescens rubescens(Wlk.)	42	12.5	2.0	23	21
Aiolopus thalassinus thalassinus (F.)	42	19.3	9	11	24
Acrotylus humbertianus (Sauss.)	38	27.0	3	8.1	24.3
Locusta migratoria migratoria (L.)	38	5	36.3	14	23
Oedaleus abruptus (Thunb.)	23	3	22.2	14	6
Oedaleus senegalensis (Krauss.)	56	13.3	33.3	7	20.0
Sphingonotus savignyi (Sauss.)	27	14	-	27	36.3
Acridinae					
Acrida exaltata (Wlk.)	26	15.3	10.2	26	23.0
Gomphocerinae					
Ochrilidia gracilis gracilis (Krauss.)	-	-	44.4	33.3	22.2
Cyrtacanthacridinae					
Anacridium rubrispinum (B. Bienko)	30.0	50.0	-	-	20.0
Schistocerca gregaria (Forsk.)	14.2	7.1	7.1	21.4	50.0
Truxalinae					
Truxalis eximia eximia (Eich.)	15.0	10.0	15.0	25.0	35.0
Eyprepocnemidinae					
Heteracris illustris	100	-	-	-	-

These were reported for the first time from these localities of Balochistan Province-Pakistan.

DISCUSSION

It is noted that the abundance of different species (Acrididae) fluctuates from season to season. Previously Riffat *et al*. (2002) recorded more than 14% grasshopper population to be *Aiolopus thalassinus thalassinus*. Similarly, Khan (1992) and Perwin *et al*. (1983) reported *Aiolopus thalassinus thalassinus* to be 100% and 40% of the overall grasshopper population respectively. These parameters were compared with our present data with 20.3% of the grasshopper specimens to be *Aiolopus thalassinus thalassinus*, In addition we have collected three species of *Oedaleus abruptus* and *Scintharista notabilis* of subfamily namely Oedipodinae and *Heteracris illustris* species of subfamily Eypreponcnemidinae from Quetta Division. While these names species were not recorded by Riffat *et al*. (2002), Ahmad (1980), Perwin (1983) and Khan (1992). However, Riffat *et al.* (2002) recorded only one species *Truxalis exima exima* of subfamily Truxalinae from Zhob Division.

Although some Authors have previously reported and described the distribution of these species from different areas except Quetta division namely *Aiolopus thalassinuss thalassinuss, Acrida exaltata, Heteracris illustris, Locusta migratoria, Ochrilidia gracilis gracilis, Oedaleus abruptus, Oedaleus senegalensis, Schistocerca gregaria, Scintharista notabilis, Sphingonotus rubescens rubescens*, and *Truxalis eximia eximia.*

Dirsh and Uvarov (1953) recorded *Anacridium rubrispinum* from Quetta and Pishin. Suhail (1994) recorded *Acrotylus humbertianus, Anacridium rubrispinum and Sphingonotus savignyi* from Quetta. We collected these species from Pishin and Qilla Abdullah, Chaghi, Nushki and Quetta.

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