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Study on some selected species of Acrididae (Orthoptera) from district Dadu, Sindh-Pakistan

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Abstract

Acrididae are commonly known as true grasshoppers. They are diverse group amongst order Orthoptera. The grasshoppers belonging to family Acrididae are pests of agricultural crops, forests, vegetables, orchards and wide variety of fruits. The true grasshoppers were captured from four talukas of district Dadu i-e: Taluka Dadu, Taluka K.N. Shah, Taluka Mehar and Taluka Johi during October 2018- July 2019. The collected specimens were 213 which were sorted out into Family Acrididae and 04 subfamilies i-e: Acridinae, Oxyinae, Oedipodinae and Cyrtacanthacridinae falling into 06 genera and 06 species i-e: *Oxya velox* (Fabricius, 1787), *Cyrtacanthacris tartarica tartarica* (Linnaeus, 1758), *Anacridium rubrispinum* Bey-Bienko, 1948, *Acrida exaltata* (Walker, 1859), *Truxalis eximia eximia* Eichwald, 1830 and *Aiolopus thalassinus thalassinus* (Fabricius, 1781). The highest population was observed of *Oxya velox* 27.23% followed by *Acrida exaltata* with 22.53% and *Anacridium rubrispinum* with 15.49%. While lowest population was observed in *Truxalis eximia eximia* with 9.38% followed by *Cyrtacanthacris tartarica tartarica* with 12.20% and *Aiolopus thalassinus thalassinus* with 13.14%. Beside this, morphological description along with distributional data and photographs are provided.

Keywords: Acrididae, species, distribution, population, Pakistan

1. Introduction

Acrididae are commonly known as true grasshoppers. They are diverse group amongst order Orthoptera ^[1]. The grasshoppers belonging to family Acrididae are pests of agricultural crops, forests, vegetables, orchards and wide variety of fruits ^[2]. True grasshoppers (Acrididae) are advantageous for several studies related to the size of their body and are easily captured from their host plants. Therefore, due to their easier capturing, pest status and availability on host plants make them dominant among the invertebrate group and specify them as a biological indicator ^[3]. These grasshoppers are major source of food and widely consumed by the predators like mantises, birds, and other vertebrates.

Basically the grasshoppers are divided into two major groups Caelifera (short-horned grasshopper) and Ensifera (long-horned grasshopper). There are nearly 49 species of long horned grasshoppers found in Pakistan ^[4] while nearly 360 species have been reported of short horned grasshoppers ^[5]. Family Acrididae falls in the short horned grasshoppers and this family is more dominant amongst the order Orthoptera worldwide with 25000 species ^[6]. Acrididae grasshoppers possess economic importance due to their intensive damage to agricultural crops and considered as major pest of plants. These plants are important for their production rate and nutritional values. Acrididae grasshoppers and Locusts invaded many crops in the past and caused destructive damage to them ^[7].

Biodiversity of Acrididae of Sindh revealed 97 species ^[7]. While 32 species have been reported from district Tharparkar ^[8]. There were about 39 species of Acrididae were reported from Punjab Pakistan ^[9]. About 32 species of band-winged grasshoppers were reported from Sindh ^[10]. A lot of work on the genus *Hieroglyphus* of subfamily Hemiacridinae of Pakistan revealed report of four species in addition on new species to Science i-e: *H. akbari* from Pakistan including Sindh province ^[11-15]. Nearly, 33 species were reported from various localities of Sindh including Khairpur district ^[16]. District Dadu is more diverse region and provide an ideal situation for the breeding of insects particularly short horned grasshoppers (Acrididae). It is therefore present study is propose to conduct morphotaxonomic study on Acrididae from this district.

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2. Materials and Methods

Collection of Species & Killing of species. The Acrididae grasshoppers were capture from different areas of district dadu during the year October 2018- July-2019 through aerial nets (Figure. 1 & 2). The material was taken to Department of Zoology, Entomological Lab. The specimens were killed by KCN or chloroform in air tight jars ^[17].

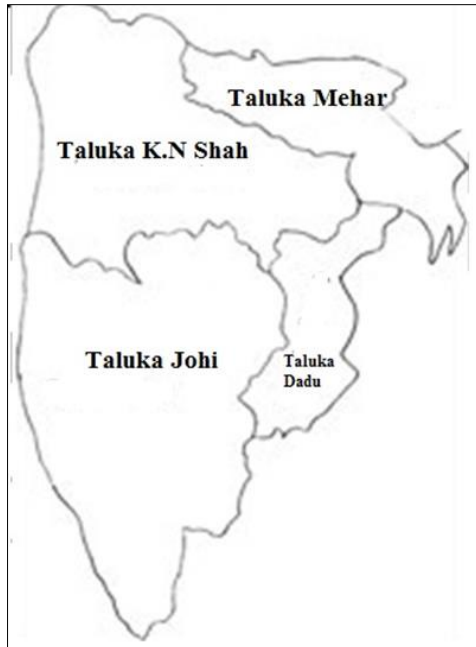


Fig 1: Map of District Dadu



Fig 2: Collection of samples

Preservation of species

Acrididae species were pinned with entomological pins. Afterwards specimens were stretched on the stretching board. Collector name, Locality name, Collection date and Name of species were written. The specimens were transferred to the Insect boxes made up of wood ^[18]. (Figure. 3)



Fig 3: Acrididae grasshoppers

Identification of species

Species were identified with assistance of taxonomic keys present in papers, books, literature and morphological characters were noted. Extra dust was removed with Camel brush of 0.2 size so as to see clear taxonomic characters. ^[19-26] (Figure. 4)



Fig 4: Identification of species

Dissection of genitalia of species

Study of genitalia was carried out by keeping specimens overnight in desiccator by pouring Alcohol (75%) and water (Figure. 5). Next day the last abdominal tergite was removed with pointed forceps, washed by means of tap water and extra muscle were removed by KCN. The genitalial characters were noted and preserved in micro-vials pouring drops of Glycerine ^[18, 27, 28].



Fig 5: Samples in desiccator

3. Results

The true grasshoppers (Acrididae) were captured from four talukas of district Dadu i-e: Taluka Dadu, Taluka K.N. Shah, Taluka Mehar and Taluka Johi during October 2018- July 2019. The collected specimens were 213 which were sorted out into Family Acrididae and 04 subfamilies i-e: Acridinae, Oxyinae, Oedipodinae and Cyrtacanthacridinae falling into 06 genera and 06 species i-e: *Oxya velox* (Fabricius, 1787), *Cyrtacanthacris tartarica tartarica* (Linnaeus, 1758), *Anacridium rubrispinum* Bey-Bienko, 1948, *Acrida exaltata* (Walker, 1859), *Truxalis eximia eximia* Eichwald, 1830 and *Aiolopus thalassinus thalassinus* (Fabricius, 1781). The highest population was observed of *Oxya velox* 27.23%

followed by *Acrida exaltata* with 22.53% and *Anacridium rubrispinum* with 15.49%. While lowest population was observed in *Truxalis eximia eximia* with 9.38% followed by

Cyrtacanthacris tatarica with 12.20% and *Aiolopus thalassinus thalassinus* with 13.14%. (Table. 1).

Table 1: Showing distribution of species in various talukas of district Dadu

Species	Talukas of district Dadu				Total	Percentage
	Mehar	K.N Shah	Dadu	Johi		
<i>Oxya velox</i> (Fabricius, 1787) (Oxyinae)	22	10	7	19	58	27.23%
<i>Cyrtacanthacris tatarica tatarica</i> (Linnaeus, 1758) (Cyrtacanthacridinae)	8	7	6	5	26	12.20%
<i>Acrida exaltata</i> (Walker, 1859) (Acridinae)	17	8	5	18	48	22.53%
<i>Truxalis eximia eximia</i> Eichwald, 1830 (Acridinae)	6	4	3	7	20	9.38%
<i>Aiolopus thalassinus thalassinus</i> (Fabricius, 1781) (Oedipodinae)	8	6	4	10	28	13.14%
<i>Anacridium rubrispinum</i> Bey-Bienko, 1948 (Cyrtacanthacridinae)	13	5	4	11	33	15.49%

Subfamily Oxyinae Brunner von Wattenwyl, 1893

Tribe Oxyini Brunner von Wattenwyl, 1893

Genus *Oxya* Serville, 1831

Species *Oxya velox* (Fabricius, 1787)

urn:lsid:Orthoptera.speciesfile.org:TaxonName:47199

Description

Medium size, filiform antenna 24-26 segmented, longer than head pronotum together. Vertex of fastigium widely short and wide rounded, slightly depressed in middle. Pronotum rounded in front, obtusely posterior rounded, three sulci by dorsum crossed, curved with acute apex, broad at base. Tegmina semi transparent, green paler in colour, brownish green at base, wings colorless and hyaline. Hind tibia paler brown on out side and paler on in side with elongated black band. Hind tibia paler brown. Female large in size, similar to male. Ovipositor with pointed tooth like spine, stout and short. (Figure. 6 & 7, Table 2).



Fig 6: Dorsal view *Oxya velox*



Fig 7: Lateral view *Oxya velox*

Table 2: Showing measurements of different body parts of *Oxya velox*

Body Parameters	Measurements (mm)	
	Male	Female
length of Antennae	7.62	11.61
Length of Pronotum	4.55	7.25
Length of Tegmina	16.47	24.20
Length of Femur	12.70	18-19
Total body length	20.36	32.47

Subfamily Cyrtacanthacridinae Kirby, 1910

Tribe Cyrtacanthacridini Kirby, 1910

Genus *Cyrtacanthacris* Walker, 1870

Species *tatarica* (Linnaeus, 1758)

Subspecies *Cyrtacanthacris tatarica tatarica* (Linnaeus, 1758)

urn:lsid:Orthoptera.speciesfile.org:TaxonName:50973

Description

Body of large size Antennae filiform vertex of. *Fastigium angular*. Over lapped pronotum by three oblique sulci; medium carina low; Tegmina and wings fully developed. Posterior femur slight. Whitish or redish brown mixed with yellow colour. Wings yellow with spine towards base with slightly tinged hyaline. Tegmina many irregular space on median area banded with a row of dark spot along. Female much larger size similar to male, robust ovipositor valve through curved apices, lower valve sub-acute peripheral, adjacent prediction. (Figure 8 & 9, Table 3).



Fig 8: Dorsal View of *C. tatarica*

Fig 9: Lateral view of *C. tatarica tatarica*Table 3: Showing measurements of different body parts of *Cyrtacanthacris tatarica tatarica*

Body Parameters	Measurements (mm)	
	Male	Female
length of Antennae	15.28	21.67
Length of Pronotum	10.55	14.49
Length of Tegmina	40.52	60.41
Length of Femur	24.66	33.89
Total body length	49.88	64.44

Subfamily Acridinae MacLeay, 1821**Tribe Acridini MacLeay, 1821****Genus *Acrida* Linnaeus, 1758****Species *Acrida exaltata* (Walker, 1859)**

urn:lsid:Orthoptera.speciesfile.org:TaxonName:52513

Description

Size elongated, large and approximately widely stick like. Antenna shorter than head, pronotum to gather, Antenna possess 18 segment, Antenna ensiform. Head longer than pronotum, slightly ascending up ward, conical and stretched out. Wings and tegmina are fully developed, apically tegmina is pointed. Lobes of hind knee with pointed apices, hind femur elongated, slender but narrow. Body paler green in color. Wings hyaline, with green or light paler coloration. Tegmina in the middle with row of spot. Hind tibia and hind femur brown paler color. Female large in size but similar appearance to male. Ovipositor with curved valves. (Figure 10 & 11, Table 4).

Fig 10: Dorsal View of *Acrida exaltata*Fig 11: Lateral view of *Acrida exaltata*Table 4: Showing measurements of different body parts of *Acrida exaltata*

Body Parameters	Measurements (mm)	
	Male	Female
length of Antennae	9.74	11.54
Length of Pronotum	4.99	7.26
Length of Tegmina	25.38	36.38
Length of Femur	17.81	25.28
Total body length	30.38	46.55

Subfamily Acridinae MacLeay, 1821**Tribe Truxalini Serville, 1838****Genus *Truxalis* Fabricius, 1775****Subspecies *Truxalis eximia eximia* Eichwald, 1830**

urn:lsid:Orthoptera.speciesfile.org:TaxonName:52044

Description

Big size, rod like, elongate, behind the eyes light line successively from eye on one or the other side of head, tegmina and pronotum. Antenna shorter than pronotum together and head, ensiform antenna with 18 segments. Pronotum elongated, narrower, posterior margin angular. Wing and tegmina fully developed, apices with acute angular. Slender hind femur, most elongated, three spines with upper knee lobes, series of teeth present in ventro- internal carina. Hind tibia with 25-28 black tipped spine on either side. Pale brown or greenish brown. Semi-transparent tegmina, in the middle yellow brown with greenish brown. Wings at base bluish, base violet in colour, wing hyaline. Hind femur brown paler, at distal end ventrally with dark brown band. Female large in size similar to male. Curved valves with ovipositor. (Figure 12 & 13, Table 5).

Fig 12: Adult Dorsal view of *T. eximia eximia*Fig 13: Lateral view *T. eximia eximia*

Table 5: Showing measurements of different body parts of *Truxalis eximia eximia*

Body Parameters	Measurements (mm)	
	Male	Female
length of Antennae	13.48	21.37
Length of Pronotum	5.98	9.75
Length of Tegmina	32.86	51.25
Length of Femur	24.15	40.98
Total body length	38.99	56.08

Subfamily Oedipodinae Walker, 1871**Tribe Epacromiini Brunner von Wattenwyl, 1893****Genus *Aiolopus* Fieber, 1853****Species *thalassinus* (Fabricius, 1781)****Subspecies *Aiolopus thalassinus thalassinus* (Fabricius, 1781)**

urn:lsid:Orthoptera.speciesfile.org:TaxonName:67742

Description

Body small medium size. Filiform antennae 21-23 segmented longer than skull self-possessed with pronotum. Sub-conical crown minor than pronotum. Pronotum saddle shaped, prozona narrow, carina median present, absent lateral carinae. Wings and tegmina are fully developed. Long hind femur, rounded dorsal genicular lobe. Hind tibia is thin and slender, 10-11 black tipped spine on either side. Dusty brown, greenish brown or may be paler brown. Brownish antenna. Reddish brown head. Tegmina brownish and semi transparent. Wings colorless and hyaline. Paler brown color. Ventral carinae a longitudinal green group, innermost side with 2-3 dark bands. Female slightly large in size and similar in appearance to male, ovipositor curved, robust, short.

Table 6: Showing measurements of different body parts of *Aiolopus thalassinus thalassinus*

Body Parameters	Measurements (mm)	
	Male	Female
length of Antennae	5.98	6.18
Length of Pronotum	2.92	3.59
Length of Tegmina	17.22	19.08
Length of Femur	9.37	10.76
Total body length	14.85	21.36

Subfamily Cyrtacanthacridinae Kirby, 1910**Tribe Cyrtacanthacridini Kirby, 1910****Genus *Anacridium* Uvarov, 1923****Species *Anacridium rubrispinum* Bey-Bienko, 1948**

urn:lsid:Orthoptera.speciesfile.org:TaxonName:50540

Description

Body size large. Antenna black filiform, about 28 segmented equal or extensive pronotum and head. Tegmina and wings wholly established, rounded at apices. Pronotum tectiform with median carina crest; adjacent carinae lacking; dorsum crossed by three sulci. Hind femur slender, dorsal carina toothed, lesser genicular parts larger and obtusely smoothed. Hind tibia with 8-11 yellow red at bases and black at tips. Arolium flat and larger than claws. Body and antenna dark brown. Head and pronotum paler brown. Tegmina semitransparent, paler brown, brown spots. Dark band with wing hyaline. Posterior femur is paler brown, with three black band on dorsal side. Hind tibia dull bluish. Female like male in presence. Ovipositor short with curved with spots. (Figure 16 & 17, Table 7).

**Fig 14:** Dorsal view of *A. thalassinus thalassinus***Fig 15:** Lateral view of *A. thalassinus thalassinus***Fig 16:** Dorsal view of *Anacridium rubrispinum***Fig 17:** Lateral view of *Anacridium rubrispinum*

Table 7: Showing measurements of different body parts of *Anacridium rubrispinum*

Body Parameters	Measurements (mm)	
	Male	Female
length of Antennae	18-19	19-20
Length of Pronotum	10-11	14-15
Length of Tegmina	50-52	65-66
Length of Femur	23-25	34-37
Total body length	45-47	62-65

4. Conclusion

Present study concludes that Acridids are the pest of various crops so their morphological data is necessary to compare with the molecular data. It may reveal new species or convert a sub species into single species. Hopefully, this basic study from the studied area will help taxonomist of this region in exploration of these species.

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