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## RESEARCH ARTICLE

### DIVERSITY WITH POSITION OF HABITAT OF PYRGOMORPHIDAE BRUNNER VON WATTENWYL, 1874 (ORTHOPTERA: CAELIFERA) FROM KHAIRPUR, SINDH

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#### ABSTRACT

We present diversity and habitat of various species of family Pyrgomorphidae eg: *Chrotogonus* (*Chrotogonus*) *trachypterus trachypterus* (Blanchard, 1836), *Tenuitarsus orientalis* Kevan, 1959, *Poekilocerus pictus* (Fabricius, 1775), *Pyrgomorpha* (*Pyrgomorpha*) *bispinosa deserti* Bey-Bienko & Mistshenko, 1951, and *Atractomorpha acutipennis* (Guerin-Meneville, 1844). The majority of the species were registered for the first time for the locality and the presence of *Pyrgomorpha* (*Pyrgomorpha*) *bispinosa deserti* is confirmed. This study is intended to provide data for future conservation planning, to expand knowledge about dominant/ rare species and to point to the high natural value of the Khairpur Mir's.

#### INTRODUCTION

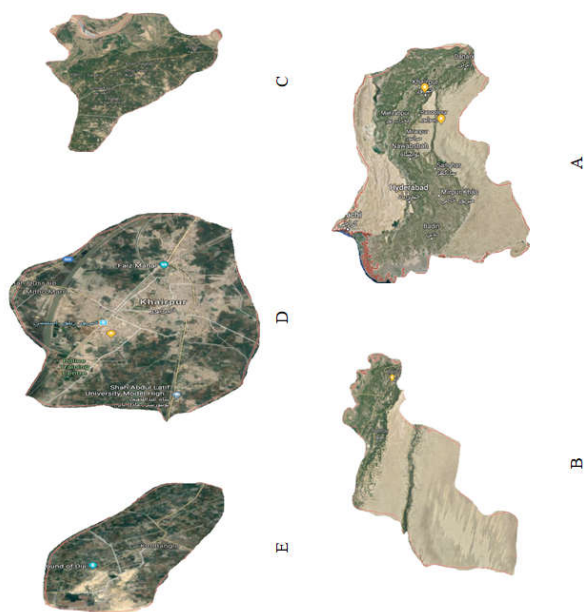
The Pyrgomorphidae is known as very colorful grasshopper family among Orthoptera fauna. Species of this family mostly found in arid and semiarid areas along with desert areas. Species are also found in temperate regions but the majority of species found as tropical Kirby (1914) Pyrgomorphs live on bushes, herbage, grasses, and sedges and on soil and sand. Although many are camouflaged and show adaptation in body shape with twigs, grasses, leaves, and so on, many are stunning examples of aposomatic coloration. A few species are facultatively aquatic. Many species are gregarious, especially in the juvenile stages, and move together in the manner of locusts. At times they cause damage to crops but, in general, they are not pests Resh *et al.* (2009). Due to unavailability of modern taxonomic literature it is very difficult to research on the ecology and diversity in tropical areas Riffat *et al.* (2013). A notable work on different aspects and diversity of Orthoptera carried by Usmani and Shafee (1990); Kumar and Viraktamath (1991); Mukhtar *et al.* (2010); Priya and Narendran (2003) but on province level limited surveys were done by Riffat and Wagan (2008); Riffat and Wagan (2010) from Sindh, Pakistan. Although, insects dominate the terrestrial fauna, sampling constraints and the poor taxonomic knowledge of many groups have limited assessments of their diversity. So keeping view the economically importance of this region present survey was arranged.

#### METHODOLOGY

**Study Area:** District Khairpur Mir's has an area of 15910 km<sup>2</sup> with a total population of 2404334 containing 8 talukas. Khairpur Mir's is bounded on the north by Sukkur, on the east by India, on the south by Sanghar and Nawabshah and on the west by Larkana, Naushahro feroz and the Indus River. Major crops are wheat, rice, sugarcane, cotton, date palms, banana and mangoes. Study included various habitats e.g. agricultural lands, semi mountainous areas with vegetation composed of crops, grasses, herbs, shrubs, fodder crops and wheat fields (Fig 1).

**Collection, Killing and Preservation:** Specimens were collected using different methods. The most common method was collection by hand and use of entomological net. Sampling done mostly at day time around 8am to 11:30am during the months of July-2018 to March-2019 from selected localities of Khairpur Mir's Viz: Khairpur, Kotdiji and Kingri. Collected specimens were killed with cyanide bottle. Pinning of the specimens was done with setting their body parts on stretching boards before drying. Photographs of specimens and their body parts were taken by digital camera. Completely dried specimens were detached from stretching boards. Dust and other extraneous matter were removed with the help of a dry camel hairbrush. Labeling of specimens was done before to store in standard entomological boxes by showing locality as well as date of collection with mentioning collector name.

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**Fig. 1** Showing the Map of Three Talukas of District Khairpur Mir's. A-Sindh Province, B-District Khairpur Mir's, C-Taluka Kingri, D-Taluka Khairpur, E-Taluka Kotdiji

Naphthalene balls were placed in boxes to prevent the attack of ants, fungus and other insect.

**Identification, taxonomy and nomenclature:** The specimens were determined in accordance to widely accepted morphological diagnostic characters presented by Uvaro (1977); Riffat and Wagan (2015). In nomenclature and taxonomic order we follow the Orthoptera Species File (Version 5.0/5.0) <http://www.orthoptera.org>.

## RESULTS AND DISCUSSION

An extensive survey was carried out in various habitats e.g. agricultural lands, semi mountainous areas with vegetation composed of crops, grasses, herbs, shrubs, fodder crops and wheat fields. According to survey from different talukas of Khairpur Mir's, majority of grasshoppers was presented in the field and large numbers were captured. Material was sorted out into 4 tribes including 3 species and 2 sub subspecies i.e. Chrotogonini Bolívar, 1904: *Chrotogonus* (*Chrotogonus*) *trachypterus trachypterus* (Blanchard, 1836), *Tenuitarsus orientalis* Kevan, 1959, Poekilocerini Burmeister, 1840: *Poekilocerus pictus* (Fabricius, 1775), Pyrgomorphini Brunner von Wattenwyl, 1874: *Pyrgomorpha* (*Pyrgomorpha*) *bispinosa deserti* Bey-Bienko & Mistshenko, 1951, and Atractomorpheni Bolivar, 1905: *Atractomorpha acutipennis* (Guerin-Meneville, 1844). It was noticed that Tribes Pyrgomorphini and Poekilocerini were dominant in grasslands opposing to this, Chrotogonini was overriding in harvested wheat, geminating crops and sandy areas.

### Family Pyrgomorphidae Brunner, 1874

#### Tribe Chrotogonini Bolívar, 1904

##### Genus *Chrotogonus* Serville, 1838

**Subspecies** *Chrotogonus* (*Chrotogonus*) *trachypterus trachypterus* (Blanchard, 1836)

**Distribution:** Worldwide: Afghanistan, Iran, Nepal, Bangladesh and Pakistan. Local: Sindh, Baluchistan, Punjab, KPK, Gilgit Baltistan.

**Host plants:** Cotton, wheat, maize, paddy plants.

**Main Life form:** Terri-deserticole.

**Habitat:** Plains and Agricultural fields.

**Remarks:** *C. trachypterus trachypterus* or surface grasshoppers noticed as pest of barley, maize, jowar, bajra and pearl millet etc. Mostly specimens collected in April to August. This species showed great variation in color pattern, they occur in brown or reddish, brown sternum yellowish, occasionally white band with black spots. Body color resembles with the soil and can be commonly spotted in ploughed field and roadsides grasses. Earlier, Mahmood and Yousuf (2000) reported this from Azad Jammu and Kashmir while, Kumar *et al.* (2014) collected from India. Beside this, Riffat *et al.* (2013) also collected this from Tharparkar. Mollashahi (2017) described this as pest of vegetables, alfalfa, early growth stages of Gramineae and many crops.

**Genus** *Tenuitarsus* Bolivar, 1904

**Species** *Tenuitarsus orientalis* Kevan, 1959

**Distribution:** Worldwide: India and Pakistan. Local: Punjab, Baluchistan, KPK and Sindh.

**Host plants:** Rice, fodder crops.

**Main Life form:** Terri-arenicole.

**Habitat:** cultivated fields of rice and other fodder crops

**Remarks:** This species occur in sandy areas and maximum numbers were captured from dry land, its body is light yellowish in color and it was observed that specimens of this species collected from locality Umerkot were slight smaller than specimens collected from Mithi locality of Thar Desert. Beside this, its wings were light bluish from base and white from centre. Earlier, Kumar *et al.* (2014) collected this species from India while, Riffat *et al.* (2013) reported this species from Umerkot and Sanghar districts of Thar Desert. Khan *et al.* (2018) reported this species from North Eastern States of India. During present survey we have observed it fair number rice crop without any ham.

#### Tribe Poekilocerini Burmeister, 1840

**Genus** *Poekilocerus* Serville, 1831

**Subspecies** *Poekilocerus pictus* (Fabricius, 1775)

**Distribution:** Worldwide: Afghanistan, India, Bangladesh, Nepal, Pakistan, Maldives Islands, Sri-lanka, Bhutan. Local: Sindh, Baluchistan, Punjab, KPK.

**Host plants:** *Calotropis procera* (akk), cotton seedlings, melon, chilli, mango orchards, rice, betel creepers, forest trees and trees of jasmine.

**Main Life form:** Arboricole (arbusticole).

**Habitat:** Agriculture fields, forest and other planted Areas especially present on dense akk plant.

**Remarks:** This is a major pest of *Calotropis procera* commonly known as akk plant. It is not only occurring in Pakistan but also in India and Afghanistan. During present survey it was noticed that this species gives preferences to akk plants found in sandy areas along with semi-arid regions. This is the largest and most brightly colored species hence regard as a 'mount road grasshoppers or akk grasshopper'. Earlier, Mahmood and Yousuf (2000) reported this species from Azad Jammu and Kashmir near streams and roadsides in *Calotropis procera* plant. Yunus *et al.* (1980) recorded it from cotton in parts of Sukkur and D.G. Khan in Pakistan. Riffat *et al.* (2013) collected this species from Tharparkar. Riffat *et al.* (2017) also carried work on the reproductive activities of this pest.

#### Tribe Pyrgomorphini Brunner von Wattenwyl, 1874

**Genus** *Pyrgomorpha* Serville, 1838

**Sub-Species** *Pyrgomorpha (Pyrgomorpha) bispinosa deserti* Bey-Bienko & Mistshenko, 1951

**Distribution:** Worldwide: West Africa, Mongolia, Transcaucasia, Bangladesh, India and Pakistan Local: Sindh (Khairpur Mir's).

**Host plants:** Long grasses and semi rocky soil.

**Main Life form:** Herbivole.

**Habitat:** This species has habitat where lack of vegetation like Rocky areas and grass especially near the path ways.

**Remarks:** This is diurnally grasshopper widely distributed in arid areas. During present survey its maximum numbers were collected from almost all localities. It feeds on grasses, cowpea and seedlings of b ajra. It was also noticed that this subspecies has two generations/ year. Copulation is riding type. The number of nymphal instars varies from 5-7, in males 6-7 in female. Earlier, Mahmood and Yousuf (2000) reported this from Azad Jammu and Kashmir. Riffat *et al.* (2013) reported this subspecies from Umerkot. Kokanova (2018) reported this species from Urban Landscapes of Turkmenistan. Specimens of this species collected from barren soil and bushes present in rocky areas of Taluka Kotdiji near Nara desert.

#### Tribe Atractomorphi Bolivar, 1905

**Genus** *Atractomorpha* Saussure, 1862

**Species** *Atractomorpha acutipennis* (Guerin-Meneville, 1844)

**Distribution:** Worldwide: Nigeria, Camerouns, Spanish Guinea, Congo, Sudan, Kenya, Tanzania, S. Africa, India and Pakistan.

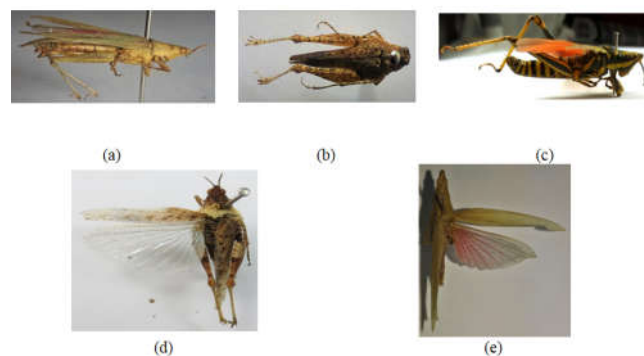
**Local:** Punjab, Baluchistan, KPK and Sindh (Khairpur Mir's).

**Host plants:** Rice, defoliate the leaves.

**Main Life form:** Terri-herbivole.

**Habitat:** Found in riverine vegetation, rice fields, forest, weeds and farms along with this also found in sandy and bare soils.

**Remarks:** This subspecies was established by Bolivar (1905) from India and placed it in Washington, when its holotype was lost its neotype has been designated by Banerjee and Kevan (1960). They have collected this neotype from Karachi, Pakistan. It is interesting to note that earlier workers described its female but presently, we have reported both sexes of Thar Desert in significant large numbers. Earlier, Wagan and Riffat (2015) collected its few numbers from Thar. Recently by Hodjat (2018) mentioned that this species found in Africa and Southern Asia. During present survey it was observed that this is commonly found species everywhere shows contrasting pink wings. It was noted that this species is not cause significant losses to crops. Its pest status should be considered minor.



**Fig. 2** Images of species. a-*Pyrgomorpha (Pyrgomorpha) bispinosa deserti*, b-*Tenuitarsus orientalis*, c- *Poekilocerus pictus*, d- *Chrotogonus (Chrotogonus) trachypterus trachypterus*, e- *Atractomorpha acutipennis*

#### Conclusion

The majority of the species were recorded for the first time from Khairpur Mir's which is due to the lack of taxonomic research in this area in the past. The most frequent and abundant species present *Chrotogonus (Chrotogonus) trachypterus trachypterus* on more than 50% of localities and with more than 30 specimens recorded per locality were *Poekilocerus pictus*. Among the observed species, require additional attention and more frequent surveys in other untouched areas.

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